OTTER CREEK ENGINEERING

TOWN OF SOUTH HERO

SOUTH HERO

WASTEWATER FEASIBILITY STUDY

RF1-316-1.1

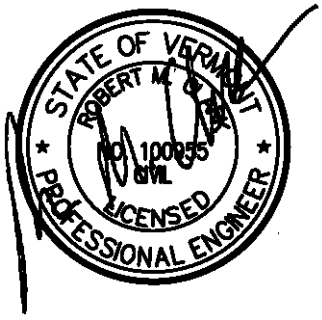
SOUTH HERO, VERMONT

2025

TOWN OF SOUTH HERO

SOUTH HERO AND KEELER BAY
WASTEWATER FEASIBILITY STUDY
CWSRF LOAN NUMBER
RF1-316-1.1

SOUTH HERO, VERMONT



2025

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ENGINEERING

TOWN OF SOUTH HERO
SOUTH HERO
WASTEWATER FEASIBILITY STUDY

SOUTH HERO, VT
2025

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EXECUTIVE SUMMARY

The Town of South Hero does not have a public wastewater system and is interested in investigating the possibility of constructing a wastewater system(s) capable of serving its two designated Village Centers, South Hero Village and Keeler Bay Village. The Town of South Hero Town Plan 2023-2031 also identifies the following goals, which this study will seek to support:

Goal & Objectives

1. Maintain and upgrade, where reasonable and necessary, municipal facilities and grounds at reasonable costs.

2. Strive to meet the basic needs of residents and access to affordable goods and services within Town, including in times of emergency.

3. Ensure that new growth does not overburden Town services by planning, budgeting, and exploring new ways to cover costs of growth such as impact fees.

4. Increase civic infrastructure, community engagement, and communication through transparent government.

Implementation

1. Continue to support state-approved innovative solutions for safe sewage disposal for homes and businesses with wastewater challenges. Encourage and embrace innovative new technologies for septic systems that would allow safe effluent disposal in challenged soils.

2. Review the results of the 2022-2023 Wastewater Feasibility Study for any possible future action.

Otter Creek Engineering was able to draw the following conclusions:

- The Town of South Hero has two designated village centers, South Hero Village and Keeler Bay Village, and the goal of this study is to help promote reasonable growth and development within these areas.

- Currently, on-site wastewater disposal is a limitation in not only facilitating reasonable growth but also allowing for redevelopment of existing parcels. The burden exists for current property owners and perspective residents and businesses.

- Approximately 87% of South Hero Village is served by the South Hero Fire District No. 4 municipal water supply. Having access to this public facility eliminates the need for wellhead protection areas and thus increases the land available which could be used for on-site wastewater disposal.

- Keeler Bay has inherent site constraints due to a lack of topography which all but eliminates the potential for a gravity-based sewer system. Other constraints include

the proximity of the Village to the shoreline of Lake Champlain, and generally high groundwater table. An additional challenge in Keeler Bay, not seen on the scale of South Hero Village, is the lack of suitable soils for onsite wastewater disposal.

- South Hero Village currently has wastewater disposal need of approximately 19,270 gallons per day in the designated Village Center. Extending a quarter mile radius past the village center, the disposal need expands to 33,198 gallons per day.

- Keeler Bay Village currently has wastewater disposal need of 6,042 gallons per day in the designated Village Center. Extending a quarter mile radius past the village center, the disposal need expands to 13,689 gallons per day.

- This study has identified seven target areas as potential sites for wastewater disposal areas. Five suitable sites were identified in Keeler Bay, but landowners were not interested in working with the Town.

- For South Hero Village, the Allenholm Farm, located on South Street, has an unconstructed capacity of 3,500-5,600 gallons per day.

    - A portion of this capacity has been reserved for South Hero Elementary School's replacement wastewater system, which limits the overall capacity available to South Hero.

    - Although the property owner is currently amenable to developing a small community wastewater system, the property has been placed in a conserved land use through the South Hero Land Trust, which places additional restrictions on the property. This further limits the wastewater potential.

- The Lavin Property was subsequently investigated and was found to have a permitted capacity of 5,320 gallons per day. The Town has purchased a sub-parcel from this site and subsequently 2,911 gallons per day of permitted wastewater capacity.

    - Through the course of real estate due diligence, it was found that there is an additional capacity of 3,366 gpd, resulting in 6,277 gpd overall available capacity.

- It is important to understand the difference between centralized and decentralized wastewater systems when considering the alternatives presented in this report:

    - Centralized systems are generally designed and constructed to convey untreated wastewater to a central treatment plant, which typically discharges to a large body of water (such as a lake or river) and in this case would be Lake Champlain. Currently, there is no waste load allocation in the Lake Champlain TMDL for any additional phosphorus discharge.

    - Recently, the EPA and the State have been encouraging the use of decentralized systems for difficult areas in rural settings. As the name denotes, decentralized systems do not utilize a single, centralized treatment system and instead opt for multiple, smaller in-ground wastewater treatment solutions.

- In general, centralized treatment alternatives offer comprehensive wastewater treatment for larger municipalities and allow for substantial growth and development within communities.

- Decentralized systems provide a flexible alternative to wastewater treatment and often meet the needs of the community while providing for reasonable growth and development.

- **Due to the lack of available sites for wastewater disposal, the most appropriate solution for Keeler Bay is to continue to replace the wastewater systems, as needed, with individual, on-site solutions.**

- **Both the Allenholm Farm and Lavin properties' combined allotted yield is not sufficient to support the existing disposal needs of South Hero Village. As such, the recommended wastewater solution is a combination of both individual, onsite systems, and targeted, site-specific cluster systems.**

- If the wastewater is treated further, a larger allocation can be possible at these sites. If secondary and tertiary treatment are provided at the Allenholm Farm and Lavin sites, the approved allocation could be increased to 20,000 gpd.

- Assuming the Town secures a Rural Development Loan and grant funding, the calculated annual per user cost for the proposed village wastewater system on the Lavin property project associated with the debt service ranges between $5,900 and $8,700 per year. The range is based on the varying types and level of grants and loans received.

    - Municipal Wastewater rates are generally considered affordable when they range between 1 and 2 % of the communities median household income (MHI). The 2023 ACS MHI for the Town of South Hero is $131,458 per annum. The Statewide MHI is 74,014, and therefore South Hero cannot expect substantial forms of traditional subsidy.

    - Even with such a high MHI, affordable user rates would be considered between $1,300 and $2,600 per year.

- In order to make the project affordable, OCE considered alternative funding strategies.

    - Often, in Vermont especially, utility fees for water and wastewater are paid directly by the customers (and connections) who utilize that service.

    - As demonstrated above, the anticipated user rates are too high for the project cost to be born entirely by the users of the system.

    - Some communities consider the importance of municipal water and wastewater service to maintaining and developing their Village and Growth

centers. As such, they assess a tax on the entire Town, as a way of ensuring that water and wastewater service can be provided at an affordable rate.

- Under this financial model, the Town would fund the initial capital investment through a tax assessment on the grand list, and the annual operating costs of the system would be born by the users.

- This works out to an additional ~$120 tax for a $350,000 property per year and an annual wastewater system user rate of $800.

- Alternatively, the Town could investigate the Lavin property for a larger, community based, indirect discharge wastewater system that could potentially have a higher capacity than what is currently permitted.

- As noted in the report, this would meet the existing and future needs of both designated village centers, but it would also require a substantially larger capital investment. This would also require the creation of a public utility for operating and managing the sewer system, which would also require a full-time licensed wastewater operator.

- Support for a larger community based wastewater system would require substantial local support and additional funding.

1.0 PROJECT PLANNING

a. **Location –** South Hero is a community located within Vermont's "Champlain Islands" and was first settled by Ebenezer Allen, a cousin of Ethan Allen. The earliest industry of South Hero centered around the large oak and pine trees that grew there, which were used for ships' planking and masts. Today, the Town has two established Village Centers, which were given Village Center Designations (VCD) by the State in 2014, as shown in the zoning maps included in **Appendix A.** These village centers are the South Hero Village area, which is generally located at the intersection of Route 2 and South Street, and the Keeler Bay Village area, which is further north along Route 2 near the intersection of Route 2 and Vermont 314. These Village centers are an integral part of the Town of South Hero and the Champlain Island community. It is within these areas in which the Town desires to assess the existing and long-term wastewater needs.

   Locations for potential wastewater systems will be evaluated and sited within the general physical boundaries of the two village zoning areas (South Hero and Keeler Bay Villages). **Figure 1** identifies the general area of South Hero, and **Figure 2** shows the overall area of investigation, and the investigation radii of each village relative to one and other. Also depicted on **Figure 2** is the Agency of Commerce and Community Development (ACCD) designated center for each village. A ¼ mile buffer has been applied to this boundary, as properties within ¼ mile are eligible for funding to connect to any community wastewater system project. Properties outside of this boundary may connect, but only at the expense of the system itself. That is to say, self-funding for the infrastructure in order to connect would be needed for those properties outside the buffer. **Figures 3 and 4** provide additional focus specific to South Hero and Keeler Bay respectively. For clarity, known water and wastewater systems within the investigation limits are shown in **Figures 5 and 6** respectively.

b. **Environmental Resources Present South Hero –** The general project area was reviewed using the State of Vermont Agency of Natural Resources online interactive database and mapping tool. **Appendix B** includes ANR Resource Atlas Maps depicting known natural and environmental resources within the general project area. Once potential disposal areas are proposed, those specific areas will need to be examined in a site-specific manner. The breakdown of resources within the general project area is listed below.

   i. **Wetlands:** Class II wetlands and wetland advisory areas exists within the village, and unmapped wetlands may exist on some properties. While not widespread, they will need to be considered for the final design if a project goes forward. In general, development within the wetlands will not be permitted but temporary impacts to those wetlands or their associated buffers may be required to complete utility infrastructure. The overall goal of any infrastructure project will be to utilize the techniques of avoidance and minimization to limit wetland impacts. A wetland delineation would be performed prior to design to determine the extent of wetlands within the project area.

   ii. **Water Bodies:** South Hero is surrounded by Lake Champlain. The lake is critical to the local economy and the source for numerous public water supplies including South Hero Fire District No. 4. Portions of the lake are on the 303(d) list of impaired lakes and ponds for elevated levels of Polychlorinated Biphenyls (PCBs) in lake trout. Additionally, current federal and state regulations do not allow additional direct discharge systems to discharge into the lake to limit the phosphorus entering it.

iii. **Hazardous Waste Elements:** There are four (4) hazardous sites and three (3) hazardous waste generators in South Hero Village. The hazardous sites are described in detail below. The sites' designations range from no action to low priority, so their potential effects on construction of sewer and wastewater disposal are low.

1. *Midway Oil (Site Number 890414):* This is a hazardous site stemming from the discovery of significant petroleum contamination within soils that were found during the excavation for the installation of four underground storage tanks (UST). A site investigation report was completed on February 15, 1995, and recommended soil remediation to attempt to intercept contaminants from migrating further. The site's priority is designated as low with contamination to soils and groundwater, but no effect on sensitive receptors.

2. *South Hero Grocery (Site Number 941730):* Contamination at this site was found as a result of the closure of three gasoline USTs which were closed in 1994. A site investigation report was completed on June 12, 1995, and included a recommendation of quarterly monitoring. The site's priority is designated as low with contamination to soils or groundwater, but no effect on sensitive receptors.

3. *LFJ Store (Site Number 900567):* Contamination at this site was found during a gasoline UST closure in which vapor levels were found to be 200 to 300 ppm. The site was closed, and the priority is listed as no further action planned (NFAP).

4. *Allen's Garage (Site Number 951857):* Contamination at this site was the result of a gasoline UST. A site investigation report was completed on October 24, 1995, which recommended removing and treating via enhanced static pile method soils above 10 ppm found north of the existing building. On February 29,1996, the site was designated site management activities completed (SMAC).

In summary, the hazardous sites found within the Village area are not expected to have any significant negative effects on the development of a community wastewater system. Recommendations for further site investigation are made should infrastructure be located near or adjacent to these hazardous waste sites. Ultimately, if construction were to commence, a method for handling contaminated soil should be in place, should the need arise. The various reports from these sites are included in **Appendix C**.

iv. **Prime Agricultural Soil:** In addition to the surrounding farmlands, South Hero Village contains soil which is classified as primary agricultural soils by the State of Vermont. The designation is important for development projects which would require an Act 250 permit, as impacts to the land's ability to be used for agriculture must be minimized. In General, designated growth centers with pre-existing development, as is the case here, are less of a concern. This is especially true for buried utility infrastructure projects, which often do not take away from the land's potential use for agriculture purposes. A potential disposal field, however, would have impacts on the land and prevent agricultural uses in their direct locations.

v. **Wildlife:** Within the immediate Village area, specifically on its border with Lake Champlain, there exists a couple of rare plant and animal species and an endangered plant species. The endangered plant species has not been seen since 1964 and is contained to be within the Station Marsh. The potential impacts would be related to the construction of wastewater mains and services.

Furthermore, the South Hero Marsh exists in between South Hero Village and Keeler Bay Village. It is home to various rare, threatened, or endangered species, with a significant natural community of Deep Bulrush Marsh. Potential disposal areas around these will have to be carefully located to avoid any impacts.

c. **Environmental & Historical Resources Keeler Bay –** The general project area was reviewed using the State of Vermont Agency of Natural Resources online interactive database and mapping tool. **Appendix D** includes ANR Resource Atlas Maps depicting known natural and environmental resources within the general project area. Once potential disposal areas are proposed, those specific areas will need to be examined in a site-specific manner. The breakdown of resources within the general project area is listed below.

i. **Wetlands:** Class II wetlands and wetland advisory areas exist within the village, and unmapped wetlands may exist on some properties. While not widespread, they will need to be considered for the final design. In general, development within the wetlands will not be permitted but temporary impacts to those wetlands or their associated buffers may be required to complete utility infrastructure. The overall goal of any infrastructure project will be to utilize the techniques of avoidance and minimization to limit wetland impacts. A wetland delineation would be performed prior to design to determine the extent of wetlands within the project area.

ii. **Water Bodies:** South Hero is surrounded by Lake Champlain. The lake is critical to the local economy and the source for numerous public water supplies including South Hero Fire District No. 4. Portions of the lake are on the 303(d) list of impaired lakes and ponds for elevated levels of Polychlorinated Biphenyls (PCBs) in lake trout. Additionally, current federal and state regulations do not allow additional direct discharge systems to discharge into the lake to limit the phosphorus entering it.

iii. **Waste Management Elements:** There are four (4) hazardous sites and two (2) hazardous waste generators in the Village. The hazardous sites are described in detail below. The sites' designations range from SMAC to low priority, so their potential effects on construction of sewer and wastewater disposal are considered to be low.

1. *Cornerstone Market (Site Number 941599):* This is a hazardous site stemming from the removal of a gasoline UST. A site investigation report was completed on November 22, 1994, and recommended groundwater monitoring wells and annual sampling. The site's priority is designated as low with contamination to soils or groundwater, but no effect on sensitive receptors.

2. *St Rose of Lima Parrish (Site Number 20094015):* Contamination at this site was found as a result of the closure of a heating oil UST which was closed in 2009. Following the removal of the tank, soils surrounding the tank were screened for

petroleum vapors which had a peak reading of 464 ppm. After the removal of approximately sixteen (16) tons of petroleum contaminated soil, the site was found to have levels below 1 ppm throughout the excavation. The was designated SMAC on December 3, 2010.

3. *Keeler Bay Deli & Variety (Site Number 880191):* Contamination at this site was the result of a gasoline UST closure in which contaminated soils were found. The soils were stockpiled and later checked for detectable contamination which ranged between 2.0 and 8.0 ppm. Due to the low levels of contamination, the site was closed on October 24, 1989.

4. *Keeler Bay Variety (Site Number 982434):* Contamination at this site was the result of a gasoline UST. An initial site investigation was completed on November 4, 2004, which included the drilling of monitoring wells and sampling. Continued sampling and the decrease of contaminants found lead to a SMAC designation for the site on September 18, 2019.

In summary, the hazardous sites found within the Village area are not expected to have any negative effects a potential sewer system. Should construction commence, though, a contaminated soils plan should be in place beforehand just in case contaminated soils are encountered. The various reports from these sites are included in **Appendix E**.

iv. **Prime Agricultural Soil**: In addition to the surrounding farmlands, Keeler Bay Village contains a few areas with soils which are classified as primary agricultural soils by the State of Vermont. The designation is important for development projects which would require an Act 250 permit, as impacts to the land's ability to be used for agriculture must be minimized. In General, designated growth centers with pre-existing development, as in the case here, are less of a concern. This is especially true for buried utility infrastructure projects.

v. **Wildlife:** Within the immediate Village area, specifically on its border with Lake Champlain, there exists a rare plant species which was last seen in 1966. The presence of this plant species is not particularly inhibiting and should have little to no potential impact to the potential project.

Furthermore, the South Hero Marsh exists in between South Hero Village and Keeler Bay Village. It is home to various rare, threatened, or endangered species, with a significant natural community of Deep Bulrush Marsh. Potential disposal areas around these will have to be carefully located to avoid any impacts.

d. **Population Trends –** Represented in **Table 1** below is the Town of South Hero's recent population data. South Hero has lost population over the last 20 years while the state and the county have increased at a similar rate.

Table 1 Population Data

	South Hero	Grand Isle County	Vermont
2000	1,696	6,901	608,827
2010	1,631	6,970	625,741
2020	1,674	7,293	643,077
% Change	-1.30	5.68	5.63

While the population is estimated to be lower in the Town when compared with 20 years ago, there have been some marginal increases in the last decade. Recent stagnation in population growth could be due to the limited wastewater capacity in the two village zoning areas. An excerpt of the Town Plan (**Appendix F**) stated that a majority of residents lived in the town but worked in nearby Chittenden County. If the villages had greater wastewater disposal capacity, more businesses could open there, and more people may be apt to then move to South Hero and may choose to work there rather than having to commute.

The design period for the project alternatives was selected as 50 years, so we've conservatively assumed that South Hero would reverse its trend and grow more similarly to the county and state alike at 5% (over the two decades of data provided above). Should South Hero then grow at 2.5% per decade, it's projected population at the end of the design period would be 1,894.

In 2020, according to the U.S. Census American Community Survey, the Village had a total of 164 housing units, with 121 being occupied and the remaining 43 being vacant According to the Vermont Department of Labor, in 2020, the Town of South Hero had 64 private businesses employing 279 people. Additionally, there are unrealized impacts of the Covid-19 Pandemic on housing and the ability for a large portion of the population to work from home.

e. **Community Engagement –** The Town of South Hero established the Village Wastewater Committee through the Selectboard. The committee was formed for the purpose of "overseeing a wastewater study for South Hero Village and Keeler Bay".

Through the development of the Village Wastewater Committee, regular public meetings have occurred since 2021. The meetings have ranged from monthly to quarterly, depending on the progress made at the previous meeting. These committee meetings have presented updates from the project team, including technical updates from the consulting team and potential funding sources from the State.

Additionally, the committee, with help from Northwest Regional Planning Commission, established a wastewater feasibility website, which is linked below.

South Hero Wastewater Feasibility Study (arcgis.com)

Moving forward, the Wastewater Committee will continue to hold regularly scheduled public meetings. Separate, warned meetings will occur to present the results of the report, when deemed appropriate by Town officials.

A public meeting was held on February 27, 2024, which was well attended by community members. While the general consensus was the need for a community wastewater system, the

overarching opinion was that cluster systems would be more preferable than a centralized larger system

f. **Historical Resources Present**: The Champlain Islands are known to have numerous locations of historical and archaeological significance. Consultation with the State of Vermont, Division of Historic Preservation Office occurred at the project onset. In general, due to the sensitive nature of the Champlain Islands, each potential project area will require a site-specific review. Advancing through the stages of project development, from feasibility through construction while require a significant investment in archaeological and historic preservation services by specialized consultants who can review sites for sensitivity and mitigate any impacts. Dr. Charles Knight, Owner of Crown Consulting Archaeology was engaged for the preliminary investigations included in this report.

a. **Location Map –** Locations for potential wastewater systems will be evaluated and sited within the general physical boundaries of the two village zoning areas (South Hero and Keeler Bay Villages). **Figure 1** identifies the general area of South Hero, and **Figure 2** shows the overall area of investigation, and the investigation radii of each village relative to one and other. Also depicted on **Figure 2** is the Agency of Commerce and Community Development (ACCD) designated center for each village. A ¼ mile buffer has been applied to this boundary, as properties within ¼ mile are eligible to connect to any community wastewater system project. **Figures 3 and 4** provide additional focus specific to South Hero and Keeler Bay respectively. For clarity, known water and wastewater systems within the investigation limits are shown in **Figures 5 and 6** respectively.

b. **History – Existing Water and Wastewater Systems –** Approximately 87% of South Hero Village is served by the South Hero Fire District No. 4 municipal water supply, and a small portion of Keeler Bay is served as well. Those which are not on the water system are served by their own private well supply. Having access to the public facility eliminates the need for well isolation areas and thus increases the land available which could be used for on-site wastewater disposal. This is critical, as South Hero is predominately comprised of on-site disposal systems, which vary in design and capacity based on the age and location.

c. **Condition of Existing Facilities –** The Town Plan recognizes that the areas surrounding both villages are not well suited for on-site sewage disposal. This can be seen in Sewage Disposal Rating Maps found in **Appendix G**, where most of the soils in the area are rated moderately and marginally suited soils due to soil type, slope, depth to bedrock, and seasonal high-water table. There are a few areas with better suited soils but are relatively small or further away than practical. **Figure 7** represents soil suitability based on color. In general, green is most favorable, progressively decreasing to red which is open bodies of water. This is based on NRCS mapping for soil data within the island.

   Presented below in **Tables 2 - 4** is a summary of wastewater permit information which was available through the Vermont Agency of Natural Resources Wastewater Regional Office Permit Search Database. Lines that are bolded and highlighted red indicate failed wastewater systems, which represent approximately 30% of all systems found within South Hero's investigation radii. As the existing on-site wastewater systems continue to age, it is likely that more systems will fail thus requiring replacement. Of the 62 permits found for systems in the Villages, 9 (or 15%) are over 20 years old and halfway through their anticipated useful life. It's likely that the rest of the systems which could not be found on the database are older.

Table 2 South Hero Wastewater Disposal Systems

Address	Permit Number	Use	Date	Gallons Per Day	Type of System	Notes
10 Carter Lane	WW-6-2361	Mixed Commerical/Residential	3/11/2011	4000	Mound	Innovative/Alternative System
16 Carter Lane	WW-6-3944	Residential	9/15/2021	420	N/A	
23 Carter Lane	**WW-6-0546**	**Residential**	**9/5/2001**	**405**	**Mound**	**Best Fix**
27 Carter Lane	**WW-6-3150**	**Residential**	**9/23/2016**	**280**	**Mound**	**Best Fix**
38 Community Lane	WW-6-2361-7	Senior Housing	2/3/2021	3000	Mound	
27 Heritage Drive	WW-6-2466	Residential	11/29/2011	420	Bottomless Sand Filter	Innovative/Alternative System
31 Heritage Drive	WW-6-3951	Residential	10/4/2021	420	N/A	
33 Heritage Drive	WW-6-3776	Residential	11/23/2020	420	Mound	
2 Hill Road	WW-6-3858	Residential	4/21/2021	560	Mound	
7 Hill Road	**WW-6-2107**	**Residential**	**10/13/2009**	**700**	**Mound**	
8 Hill Road	**WW-6-2259**	**Residential**	**7/19/2010**	**420**	**Mound**	
12 Hill Road	WW-6-2372	Residential	1/25/2022	420	Mound	
15 Hill Road	**WW-6-3916**	**Residential**	**8/6/2021**	**490**	**Mound**	
22 Hill Road	WW-6-2189	Residential	2/11/2010	495	In-Ground Trench	
25 Hill Road	WW-6-1367-1	Residential	4/16/2019	1540	In-Ground Trench	3 Lots
30 Hill Road	WW-6-3103	Residential	5/19/2016	420	Mound	
6 South Street	**WW-6-0359-3**	**Commercial**	**1/11/2021**	**239**	**Bottomless Sand Filter**	**Innovative/Alternative System**
24 South Street	WW-6-2358	Commercial	4/5/2011	708	Mound	
32 South Street	WW-6-2300	Residential	10/28/2010	980	In-Ground Trench	
40 South Street	WW-6-1868	Commercial	9/15/2008	720	In-Ground Trench	
41 South Street	WW-6-4068	Residential	7/15/2022	420	Mound	
64 South Street	WW-6-0394	Residential	8/19/1997	750	Mound	
251&255 US Route 2	**WW-6-3954**	**Residential**	**11/30/2021**	**420**	**Mound**	
257 US Route 2	**WW-6-1651**	**Residential**	**11/12/2007**	**490**	**Mound**	**Innovative/Alternative System**
266 US Route 2	WW-6-3541	Commercial	4/30/2019	428	Seepage Pit	
275 US Route 2	WW-6-2858	Residential	7/16/2014	5320	Mound	Innovative/Alternative System, 6 Multi Family Triplex Buildings (not yet constructed)
280 US Route 2	WW-6-0423	Commercial	7/15/1998	60	Holding Tank	Holding Tank Only, Town Garage
295 US Route 2	**WW-6-0147-1**	**Commercial**	**5/6/2019**	**240**	**Mound**	
301 US Route 2	PB-6-0047	Residential	1/9/1996	450	N/A	
308 US Route 2	WW-6-2792-2	Commercial	12/19/2018	560	In-Ground Trench	
316 US Route 2	WW-6-0326-3	Commercial	6/29/2007	1836	Mound	Innovative/Alternative System
323 US Route 2	WW-6-3114	Commercial	5/31/2016	419	In-Ground Trench	
324&326 US Route 2	WW-6-0381	Commercial	3/28/1997	950	N/A	
332 US Route 2	**WW-6-0117-2**	**Commercial**	**3/8/2013**	**90**	**Mound**	**Innovative/Alternative System**
330&334 US Route 2	WW-6-0941-2	Commercial	11/4/2022	243	Mound	Innovative/Alternative System
350 US Route 2	WW-6-3437	Residential	9/13/2018	700	In-Ground Trench	
358 US Route 2	**WW-6-3586**	**Residential**	**9/9/2019**	**420**	**Mound**	

Table 3 Keeler Bay Wastewater Disposal Systems

Address	Permit Number	Use	Date	Gallons Per Day	Type of System	Notes
1 Ferry Road	PB-6-0113-1	Commercial	4/13/2000	1440	Mound	
2 Ferry Road	WW-6-0521	Commercial	8/8/1996	480	Mound	
3 Ferry Road	WW-6-0521-6	Commercial	9/21/2020	130	Mound	
8 Ferry Road	WW-6-0281-2	Commercial	1/6/2005	450	N/A	
15 Ferry Road	WW-6-2776-1	Commercial/Residential	5/5/2014	360	Mound	
33 Ferry Road	WW-6-1705-1	Commercial	3/26/2010	490	Mound	Innovative/Alternative System
20 Sunrise Drive	WW-6-3145	Residential	9/1/2016	420	Mound	
22 Sunrise Drive	WW-6-4045	**Residential**	**8/22/2022**	**280**	**Mound**	**Innovative/Alternative System**
28 Sunrise Drive	WW-6-3463	Residential	3/21/2019	490	Mound	
32 Sunrise Drive	WW-6-2118	**Residential**	**4/9/2010**	**420**	**Bottomless Sand Filter**	
34 Sunrise Drive	WW-6-3619	Residential	3/10/2020	280	Bottomless Sand Filter	
36 Sunrise Drive	WW-6-3312	**Residential**	**2/22/2017**	**420**	**Bottomless Sand Filter**	
18 Keelers Bay Road	WW-6-2516-1	**Residential**	**7/5/2012**	**280**	**Mound**	
20 Keelers Bay Road	WW-6-2645	**Residential**	**2/27/2013**	**280**	**Mound**	
29 Keelers Lane	WW-6-1153-1	**Residential**	**2/12/2019**	**280**	**Mound**	
36 Cardinal Lane	WW-6-3230	Residential	4/20/2017	280	Mound	
238 US Route 2	WW-6-2865	**Residential**	**8/11/2014**	**420**	**Mound**	
456&466 US Route 2	WW-6-2516-6	Residential	2/8/2022	2916	Mound	Keeler Bay Association
460 US Route 2	WW-6-3981	Residential	12/15/2021	490	Mound	
488 US Route 2	WW-6-0092	**Restaurant**	**6/18/1990**	**1755**	**Mound**	
493 US Route 2	WW-6-1356-2	Residential	1/25/2018	490	Mound	
500 US Route 2	WW-6-3100	**Commercial**	**5/17/2016**	**935**	**Mound**	
513 US Route 2	WW-6-3395	**Commercial/Residential**	**2/5/2019**	**1797**	**Mound**	**Innovative/Alternative System**
541 US Route 2	WW-6-1916	**Residential**	**12/15/2008**	**280**	**Mound**	
564 US Route 2	WW-6-0093-1	Commercial	9/11/2003	1140	Mound	

Table 4 – South Hero Town Permit Ages

Age (years)	Number of Systems
0-10	33
11-20	20
21-30	9

We identified eleven (22) failed systems within the State's wastewater permit database which have been highlighted as the red and bolded rows in **Tables 2 and 3**, and when wastewater systems fail, they are replaced with "best fix" solutions. These solutions include mound wastewater disposal areas, and in some instances, require the use of an innovative treatment technology.

Existing water supplies, including the boundary of South Hero Fire District 4 are depicted in **Figure 5.** Also included are the failed wastewater systems and known systems which have a larger wastewater disposal capacity.

The Town issued a survey to residents in the Village centers, requesting feedback on the condition of existing water supplies and wastewater systems. There were 76 total respondents, of which 65 reported being within the study areas. A copy of the survey results is included as **Appendix H.** The following observations are offered:

- 63% of respondents reported no issues with their wastewater system, 18% reported yes or unsure of problems.
- 22% of respondents said that their wastewater system has limited the use of their property, with the majority of the limitations being related to adding to or expanding their current property/building.
- 33% of respondents said yes or maybe to whether a better wastewater system would benefit them or their business.
- Half of respondents reported having an in-ground leachfield, while the other half reported mounds, advanced treatment, none, or unsure.
- Over half of respondents reported being connected to South Hero Fire District #4
- In the open ended comment section at the end of the survey, 81% showed positive interest in water/wastewater systems, while 19% showed negative interest.

d. **Financial Status of Existing Water and Wastewater Facilities –** There are no municipal wastewater systems. Currently, all wastewater expenses are the responsibility of the individual landowners.

e. **Water / Energy / Waste Audits –** No water, energy or waste audits have been conducted as part of this study.

The Town of South Hero has made a considerable effort to promote reasonable growth within the Town itself and more specifically, the two designated village centers. Village designations were explicitly sought after and given to South Hero Village and Keeler Bay Village to allow for growth and redevelopment within a defined area. On-site wastewater disposal is a limitation in not only facilitating reasonable growth but also allowing for redevelopment of existing parcels. The burden exists for current property owners and perspective residents and businesses.

a. **Health, Sanitation and Security –** In 2007, the State revised regulations to eliminate certain exemptions and assumed jurisdiction over all small-scale wastewater systems throughout Vermont, including previously exempted systems when they are modified or deemed to have failed. Over time, issues identified during property transfers may help to monitor the risk of overlapping water and wastewater systems in South Hero and other communities throughout Vermont.

   Properly designed wastewater disposal systems, which are operated and function as designed, are critical to maintaining public health and protecting the environment. As noted in sections 2 and 3 of this report, the existing density of development and poor soil conditions, coupled with the vast array of natural resources—including the Villages proximity to Lake Champlain and various wetlands, limits the overall land area which is available for adequate wastewater disposal. Considering the 22 failed systems identified across the two villages, it could be assumed that even more failed systems exist currently and more will fail in the future. In some instances, the small lots, poor soils and existing water and sewer facilities do not meet current regulatory standards for isolation.

   For some Vermont communities, this condition has been defined as an "emergent condition" - where there is no obvious public health threat (such as widespread septic system failures or bacterial contamination of water supplies), but the inability to meet current standards acknowledges the risk to public health is real and presumed.

   Both Villages are within the source protection area for South Hero Fire District 4 public water system.

   Development of a community wastewater system would provide enhancement and protection of water quality in Lake Champlain, address limitations presented by the density of existing development, and reduce / eliminate conflicts with disposal fields and remaining private drinking water supplies.

b. **Aging Infrastructure –** South Hero has a robust and documented history, beginning when the first settlers came by boat in 1783. A review of historical records, including aerial photography, USGS Maps, and Town files indicates that many of the buildings along the Route 2 corridor were constructed prior to 1938, and most buildings in general were constructed before 1966.

   Given the limited number of properties in both South Hero and Keeler Bay Villages that have an issued State of Vermont Wastewater permit for their water and wastewater system, and the

age of existing homes and buildings within the project study area, it can be inferred there are many water and wastewater systems that have been in place for decades and are either approaching or have passed their anticipated useful life. Depending on the site-specific conditions, such as types of soil and depth to groundwater, and the level of maintenance performed, it is unclear what the remaining useful life is of these systems. **Table 4 (presented earlier)** is the estimated age based on permit date from the available wastewater permits for both South Hero and Keeler Bay.

The estimated lifespan for a residential septic system, according to the United States Environmental Protection Agency, is 40 years or less. Use of pretreatment with septic tank effluent filters, regular pumping of septic tanks, and monitoring what is disposed in household wastewater may help to prolong the life of a septic system; accordingly, it appears that many of these systems are at or exceeding the expected useful life regardless of this. Development of community water and wastewater solutions would address the aging infrastructure within the Villages as community-based solutions.

c. **Reasonable Growth –** Despite a population which has remained relatively stagnant, the Town has made considerable effort to promote growth. As mentioned previously, a Town survey indicated that residents want to further develop the village centers to allow for growth and infill development. Providing community wastewater collection and disposal would inherently allow for more dense development on the individual properties and incentivize people and businesses who are interested in moving to the area. The area is known regionally for its picturesque nature and regularly attracts an influx of summer inhabitants to enjoy what South Hero currently has to offer. With a community wide solution for water and wastewater utilities, it is likely that reasonable growth could occur, which would help promote a vibrant and healthy local economy within the targeted growth areas rather than through sprawl.

   It is the desire of the Town and residents to promote reasonable growth and development within the two designated village areas, rather than the rural and agricultural areas. Future development potential is directly related to available wastewater capacity, zoning, and regulatory limitations within these boundaries. The Town Plan itself mentions that the lack of wastewater capacity creates barriers to housing, businesses, and municipal services. While expanding municipal water in the village areas would also encourage growth, considerations of such are outside the scope of this report.

   Future wastewater flows were estimated based on the following factors:

   - Existing density / parcel size and development patterns
   - Current South Hero Zoning Bylaws
   - The desire of local residents to increase commercial opportunities within he designated village centers, while also increasing the availably of housing
   - Options for redevelopment and modest expansion of existing structures

   While there is no specific development that has been identified, it is not unreasonable to consider the future needs of South Hero Village to be between 30,000 and 40,000 gpd and

Keeler Bay to be between 10,000 and 20,000 gpd. For the purpose of this report, the target design flow for South Hero Village is 40,000 gpd at a design year of 2043. The target design flow for Keeler Bay Village is 20,000 gpd for the same design year.

Goals of the Study – In 2013, a Town-wide survey to gain an understanding of how South Hero residents envisioned its future. The results are included within the 2015 Town Plan in its Appendix 3, and in part, mentioned the citizens' desire for commercial centers to be developed in the denser portions of the town. Contingent to commercial development is the need for sufficient sewage disposal in order to serve the commercial businesses and to continue the general growth within the designated village areas. South Hero Village already has a community water system, whereby a significant number of properties are served potable water through South Hero Fire District #4. The addition of a community-based wastewater disposal system could further incentivize both residential and commercial growth within these designated areas, and, equally important, allow existing business and property owners to maintain compliance with State regulations for wastewater disposal.

a. **Centralized vs. Decentralized –** In the 1970s and 80s, Federal and State grants promoted the construction of centralized wastewater treatment systems. Centralized systems are generally designed and constructed to convey untreated wastewater to a central treatment plant, which typically discharges to a large body of water (such as a lake or river) and in this case would be Lake Champlain. Current regulations in place would make discharging to Lake Champlain almost impossible.

Over the past several decades, it has become clear that relying on the centralized approach to address the wastewater needs of a community is not the only viable option. Many smaller communities cannot afford the high cost of a centralized system yet have the same challenges associated with wastewater collection, treatment, and disposal.

Recently, the EPA and the State have been encouraging the use of decentralized systems for difficult areas in rural settings. As the name denotes, decentralized systems do not utilize a single, centralized treatment system and instead opt for multiple, smaller in-ground wastewater treatment solutions. In general, centralized treatment alternatives offer comprehensive wastewater treatment for larger municipalities and allow for growth and development within communities. Decentralized systems provide a flexible alternative to wastewater treatment and often meet the needs of the community while providing for reasonable growth and development.

The Federal Clean Water Act requires states to develop Total Maximum Daily Loads (TMDLs) for lakes and rivers that are not meeting water quality goals. A TMDL is an estimate of the amount of a pollutant that a body of water can receive without impairing vital uses, such as drinking water supply or support of aquatic life. In 2002, the State of Vermont and New York established a TMDL within the Lake Champlain Drainage Basin due to excess phosphorus from a variety of sources, which has impaired water quality in numerous locations along the lake.

Although a centralized treatment system may have been a viable alternative for the Villages of South Hero and Keeler Bay decades ago, there is no current regulatory framework which would provide a path forward to authorizing a new direct discharge to Lake Champlain due to no further phosphorus allocations.

Additionally, the current size and anticipated future design flow of these Village Centers is not large enough to suggest that it would be appropriate to investigate pumping waste to another regional municipality, such as Milton or Colchester. This is further complicated by the physical limitations presented by the Lake, and the fact that both municipalities are currently making improvements to meet their requirements under the above referenced TMDL.

As such, a centralized wastewater solution was not considered further in this report. Should there be a significant change in politics and/or a desire for significant growth and development in the future, connection to an adjoining municipality could warrant further investigation. The remaining sections of this report focus on Decentralized solutions for both designated Villages.

Decentralized Solutions – Decentralized Wastewater treatment systems treat domestic wastewater from homes and businesses not served by a centralized public sewer system. Types of decentralized wastewater systems could include:

a. Individual septic wastewater treatment systems: These systems are commonly referred to as 'on-site' systems and represent the current configuration found in both designated village centers.

b. Cluster Systems: These systems involve connecting multiple properties and/or multiple buildings to a single wastewater disposal system. For South Hero and Keeler bay, cluster systems would likely include several, larger capacity wastewater disposal systems.

c. Package Wastewater Plants: These systems can involve an innovative technology and/or secondary wastewater treatment. For package plants to be considered a decentralized solution, the consulting community has been advised that the system must provide an indirect discharge.

Decentralized systems can include conventional or advanced on-site in ground disposal of wastewater and work well in applications which serve a cluster of properties and neighborhoods. In general, centralized treatment alternatives allow for growth and development within communities while decentralized systems provide a flexible alternative to wastewater treatment and often meet the needs of the community while providing for reasonable growth and development over time.

b. **Desktop Analysis –** Prior to initiating any on-site soil investigations, it is appropriate to evaluate soil conditions based on available soils mapping and complete a "Desktop" analysis. Not all soil is created equally, nor are all sites. The Natural Resources Conservation Service (NRCS) offers an online interface to review mapped soils. A soils map for the project area is included as **Figure 7,** which identifies soil suitability for on-site wastewater systems.

Seven general areas within the municipality of South Hero were reviewed for their potential ability to provide large-scale on-site wastewater disposal. The ability to provide larger scale wastewater disposal was based on the NRCS mapped soils data, parcel size (to accommodate a larger community solution) and proximity to the Designated Village Centers.

The seven areas are shown on the **Figure 7** with large, bold boundaries. For each area reviewed, Drawings were prepared using the Vermont Agency of Natural Resources (ANR) Atlas online database. The Drawings show parcels, topography, and Soil Types on both a orthophotograph basemap, and on a Lidar Hillshade basemap. These drawings are included in **Appendix I.**

Soil types in the seven general Areas are listed below in relative order from highest to lowest permeability and suitability for wastewater treatment and disposal. Specific on-site evaluation of soil types via excavations/test pits is required to further evaluate Areas for wastewater disposal, however an initial desktop analysis is useful in targeting sites with the highest potential in advance of completing onsite investigations and exploration.

i. **KARS SERIES – KaA (0-3% slopes), KaB (3-8% slopes), and KaC (8-15% slopes):** Desktop review of the Kars series indicates that they consist of deep, well to excessively drained soils that formed in glacial outwash. They are nearly level to steep soils on glacial outwash plains and kames. Thickness of solum ranges from 15 to 35 inches, thicknesses greater than 24 inches being where tongues of B horizon extend into C horizon. The degree of tonguing ranges from none to amplitudes of 20 inches spaced 2 to 6 feet apart. Rock fragments range from pebbles to stones in size and range from 3 to 40 percent of the A horizon, 35 to 50 percent of the B horizon and 35 to 70 percent of the IIC horizon. Kars soils occur on sorted glacial deposits of outwash plains, kames, and eskers. It also includes less well assorted material of glaciolacustrine beach ridges. Slopes range from 0 to 50 percent. The soil formed in water-sorted coarse material high in limestone, with or without thin surficial deposits of sandy to silty material. The soils are well to excessively drained, and runoff is slow to medium; internal drainage is medium to rapid; permeability is moderate or moderately rapid in the A horizon, moderately rapid in the B horizon, and rapid or very rapid in the C horizon. Kars soils have the highest potential for a larger, soil based wastewater disposal system. Kars soil types are present in Areas 1 through 5.

ii. **AMENIA SERIES – AaA (0-3% slopes), AaB (3-8% slopes), and AbB (3-8% slopes):** Amenia series consists of very deep, moderately well drained soils formed in glacial till. They are on uplands of glacial till plains. Slope ranges from 0 to 25 percent. The thickness of solum ranges from 18 to 36 inches and depth to carbonates range from 10 to 34 inches. The carbonates are nearly all calcium. Depth to bedrock is more than 60 inches. Rock fragments range from 4 to 35 percent by volume throughout the soil. Amenia soils are nearly level to moderately steep soils on glacial till plains. Slope ranges from 0 to 25 percent. Amenia soils are moderately well drained. The potential for surface runoff is low to high. Saturated hydraulic conductivity is moderately high to high in the mineral surface layer and subsoil and low to moderately high in the substratum. Amenia soil types are present in areas 3, 5, 6 and 7.

iii. **KENDAIA SERIES – KbA (0-3% slopes):** The Kendaia series consists of very deep, somewhat poorly drained soils formed in calcareous glacial till. These areas occupy footslope positions and drainageways on dissected glacial till plains, hills, and drumlins. Slope ranges from 0 to 15 percent. Solum thickness ranges from 18 to 38 inches. Depth to carbonates ranges from 15 to 38 inches. Bedrock is more than 60 inches below the soil surface and in most pedons is deeper than 71 inches. Rock fragments range from 5 to 30 percent, by volume, in the surface layer and subsoil, increasing with depth, and range from 10 to 60 percent in the substratum.

Kendaia soils are nearly level to sloping soils on glacial till plains where water from higher adjacent landforms is concentrated. Slope ranges from 0 to 15 percent, but most are less than 3 percent. The soils developed in strongly calcareous glacial till. Kendaia are somewhat poorly drained. The potential for surface runoff is high or very high. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low to moderately high in the substratum. Kendaia soil types present in areas 2,3,5 and 7.

iv. **COVINGTON SERIES – CbA (0-3% slopes):** Covington series consists of very deep, poorly drained soils that formed in calcareous glaciolacustrine and estuarine clays on glacial lake plains. Slope ranges from 0 to 8 percent. The thickness of the solum ranges from 20 to 40 inches. Depth to the calcareous material ranges from 20 to 60 inches. The depth to contrasting strata or bedrock is more than 60 inches. Rock fragments range from 0 to 5 percent. Covington

soils are level to gently sloping soils on lake and marine plains. They are on broad plains and in depressions and drainageways and on toeslopes of swells and knolls. Slope ranges from 0 to 8 percent. The soils formed in calcareous, lacustrine, or marine clays. Covington are considered poorly drained. The potential surface runoff is negligible or very high. Saturated hydraulic conductivity is low to moderately high in the mineral surface layer and the subsoil, and moderately low to very low in the substratum. Covington soil types are present in area 6.

c. Identification of Landowners – The potential for acceptable soil types in the seven areas to support large wastewater treatment and disposal systems depends on specific on-site evaluation of soil types via excavations/test pits. The Town of South Hero was not listed as a current landowner on any of the properties identified within the seven targeted areas, thus exploratory excavations will require approval and permission from private property owners. A discussion of potentially favorable soil types and suitable parcels within each areas is presented below. Private property owners with favorable sites are identified in **Figures 8 and 9.**

i. **Target Area 1 –** This area is located north of Keeler Bay Village, off of US Route 2 and consists of a large number of historically agricultural parcels. This target area was generally reviewed for potential to support wastewater solutions for Keeler Bay Village. The large undeveloped area of Kars (KaB) fine sandy loam soil has the greatest potential for installation of one or more large in-ground wastewater disposal systems. As depicted in **Figure 9,** the largest available parcel within this area, containing Kars soils is a piece of conserved land owned by the Trust Company of Vermont. This parcel, locally referred to as the "Munson Property" was historically owned by Randall Munson, Owner and founder of Munson Earth Moving Corporation. Members of the South Hero Wastewater Committee reached out to the Trust Company of Vermont to identify the restrictions of the land which has been conserved and to determine if they would be supportive of a community wastewater disposal system. The requests were denied by the current property owner and thus were not considered further for additional investigation as part of this report.

ii. **Target Area 2 –** This area is located west of Keeler Bay Village along Vermont Route 314. This target area was generally reviewed for potential to support wastewater solutions for Keeler Bay Village. As depicted in **Figure 9,** this area is located outside the current service area for South Hero Fire District No. 4. In order to identify suitable sites within this target area, locations of existing private property water supplies are critical. The Kars (KaB) fine sandy loam soil have potential for installation of one or more large in-ground wastewater disposal systems. The largest parcel of land with Kars soils is currently listed as owned by Glenn and Kimberly Ravdin Family Trust. In discussions with the property owner, they were willing to let test pits occur. During a site walkthrough, representatives from Otter Creek Engineering performed a field visit to layout potential test pit locations. During that field visit, additional site constraints were identified. The existing topography, location of roads and shared drives, along with the locations of private wells drastically reduced the potential for a community-based wastewater solution. After conducting the field visit to the property, it was decided that it would not be appropriate to conduct soil test pits, as the limiting constraints of the site would reduce the capacity of any potential wastewater disposal system to a few viable locations. The Kendaia (KbA) silt loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems, however, there is not significant land area available for a larger, community solution.

iii. **Target Area 3 –** This area is located south and west of Keeler Bay Village and is bisected by Sunset View Road. This target area was generally reviewed for potential to support wastewater solutions for both designated Villages. This area contains several parcels with large undeveloped areas of Kars (KaB) fine sandy loam soil which has potential for installation of one or more large in-ground wastewater disposal systems. The large undeveloped area of Kendaia (KbA) silt loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems. Several property owners were identified in this area, on the north side of sunset view road, including lands owned by Brenda and Guy Goulet, Sharon Dubuque, David and Doris Brownell. These properties are identified in **Figure 9.** These properties are not currently under conservation and were considered ideal for investigation, given their general proximity to both Keeler Bay Village and South Hero Village. The requests to conduct site specific soil investigations were denied by the current property owners and thus these sites were not considered further for additional investigation as part of this report.

   On the south side of Sunset View Road, The Amenia (AaA and AaB) silt loam soil and (AbB) very stony silt loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems. Properties containing this soil type include lands currently owned by Susan and David Wendell, and Camp Ta-Kum-Ta. The property line shared by these property owners bisects suitable soil of a size that would be appropriate. Both landowners were amenable to site specific investigations. A site walkthrough was performed by representatives of OCE. The land identified on the Wendell property which is closest to Sunset View Road was located too close to existing development and not conducive for a community system. The Ta-Kum-Ta property has an existing mound disposal system located in the target area. Any additional wastewater system constructed in this area would need to consider the existing mound, thus likely falling under the jurisdiction of the indirect discharge program. Test pits were conducted at this property and are discussed later in this report.

iv. **Target Area 4 –** This area is located south and west of South Hero Village off of Station Road. This target area was generally reviewed for potential to support wastewater solutions for South Hero Village and contains a large undeveloped area of Kars (KaC) fine sandy loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems. As depicted on **Figure 8,** This parcel is listed as owned by the Brent Hazen Trust. Members of the South Hero Wastewater Committee reached out to the property owner to determine if they would be supportive of a community wastewater disposal system. The requests were denied by the current property owner and thus were not considered further for additional investigation as part of this report.

v. **Target Area 5 –** This area is located south of South Hero Village generally off of South Street and contains several large areas of Kars (KaA, KaB, and KaC) fine sandy loam soil. This target area was generally reviewed for potential to support wastewater solutions for South Hero Village. As shown in **Figure 8,** much of this soil is located on small developed properties and therefore is not suitable for large wastewater disposal systems. This density development could be considered indicative of the soil capacity to support on site wastewater. The largest areas of Kars soils are located on the Allenholm Farm, and much of the land is currently in conservation for agricultural purposes Initial conversations were

had with Ray Allen regarding his willingness to participate in septic capacity discussions. Test pits were conducted at this property and are discussed later in this report.

vi. **Target Area 6 –** This area is located within the South Hero Designated Village Center and its associated ¼ mile buffer. This target area was considered for wastewater solutions for South Hero Village. The area contains the highest density of existing development and is served by SHFD4 public water supply. The Amenia (AaA and AaB) silt loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems. The Covington (CbA) silty clay loam soil and the Vergennes (VaA) silty clay soil are likely not suitable for large wastewater disposal systems. Currently, there are several larger mound wastewater disposal systems which have been permitted in this area. These systems include:

- The Blue Paddle Bistro owns, operates, and maintains a mound wastewater disposal system with a design capacity of 1,836 gpd, providing wastewater disposal for the restaurant.

- MKN LLC owns, operates and maintains a 4,000 gpd mound wastewater disposal system which provides wastewater service to all of the buildings off of community lane, including the Town Fire Station.

From the existing permit database, it can be inferred that the Amenia (AaA and AaB) soils provide the best potential for wastewater solutions, however the density of existing development is the limiting factor. Islandacres Farm, LLC owns several properties in this area, with large, undeveloped portions of land. Much of the land is currently used for agricultural operations and is in conservation. A portion of their property on the north side of US Route 2, behind the storage units was not conserved. They were willing to allow for site investigations to occur. The soils mapping indicates that Vergennes silty clay soil would is present, however, further investigation is warranted given the Amenia soils which abut the property. Test pits were conducted at this property and are discussed later in this report.

vii. **Target Area 7 –** This area is located on the east side of South Hero Village, along US Route 2, in close proximity to the Designated Village Center. The area was reviewed for potential wastewater solutions for South Hero Village. The undeveloped areas of Amenia (AaA and AaB) silt loam soil may possibly be suitable for one or more large mound-type wastewater disposal systems. Currently, Martin and Patricia Lavin own a property which has received a State of Vermont Wastewater permit for a 6,000 gpd mound wastewater disposal system with pretreatment. This property has, in the past, been considered for possible development. Additional areas of Amenia silt loam soil exists on lands which are owned by Ralph Lawrence and encompass both the north and the south side of Route 2. Mr. Lawerence was contacted by members of the committee however he was not interested in allowing onsite investigations to occur at this time.

d. Onsite Wastewater Disposal Investigation – Test pits were conducted by the South Hero Highway department and reviewed by representatives from Otter Creek Engineering and the State of Vermont Indirect Discharge Program on November 29, 2023. Test pit logs for each property were prepared and are included in **Appendix J.** Additionally, maps depicting the

location of the test pits are also included in **Appendix J.** The following statements are intended to summarize the onsite investigations which have concluded thus far:

i. **Camp Ta-Kum-Ta Property –** The test pit locations are at the southeast corner of the property in an open field bordered by woods on the north, west, and south. An existing mound disposal wastewater system is located near the eastern property wire fence line. Two test pits (TP-23-01 and -02) were excavated to depths of 92-inches and 84-inches, respectively, to the south of the mound system near the eastern property wire fence line, and one test pit (TP-23-03) was excavated downgradient to the west of TP-23-01 and -02, near the center of the open field. The ground slopes 5-10% toward the west.

   The soils at TP-23-01, -02, and -03 are mapped by the Soil Conservation Service (SCS) as Amenia silt loam (AaB), 3-8% slopes, and described as very deep, moderately well drained soils formed in glacial till, and are on uplands of glacial till plains. Depth to bedrock is more than 60-inches.

   Soil descriptions from TP-23-01 and -02 include a fine sandy loam to depths of 24 to 30-inches atop a gravelly medium to coarse sand with bivalve (clam) shells to 46 to 48-inches, below which is a fine to very fine sandy loam with pebbles to the bottom. The seasonal high water table (SHWT), based on redoximorphic features (mottles), was at depths of 18 to 20-inches. Groundwater seeps are present at 40 to 42-inches and bedrock was not encountered.

   The soil description from TP-23-03 was different in the uppermost unit, consisting of a clay loam to a depth of 16-inches, atop the same gravelly medium to coarse sand to 23-inches, although no bivalve shells were present. The deepest soil was the same fine to very fine sandy loam with pebbles to the bottom at 70-inches. The SHWT, based on redoximorphic features (mottles), was at 10-inches. A groundwater seep is present at 19-inches and bedrock was not encountered.

   Soil data from the three test pits indicate that a linear mound-type wastewater disposal system could possibly be permitted in the vicinity of TP-23-01 and -02. However, additional test pits are required in the areas of these test pits and the area downgradient to the west toward the lower test pit (TP-23-03) to confirm the depth and extent of the SHWT in the fine to medium sandy loam soils. It is likely that a mound would be smaller with a wastewater disposal capacity in the hundreds and not thousands of gallons per day.

   Given the limited potential capacity, and the overall distance from this property to both Keeler Bay and South Hero Village designated centers, this property is not considered a viable solution for wastewater disposal. A detailed alternatives analysis was not prepared.

ii. **Allenholm Property –** The test pit locations are at the northeast corner of the property in an open field bordered by South Street to the east, apple orchards to the north and south, and woods to the west. One test pit (TP-23-04) was excavated to a depth of 90-inches to the north of the southern apple orchard, and the other test pit (TP-23-05) was excavated downgradient to the northwest of TP-23-04, near the center of the open field. The ground slopes about 5-15% toward the west.

The soils at TP-23-04 and -05 are mapped by the SCS as Kars fine sandy loam (KaB and KaC), 3-8% slopes and 8-15% slopes, respectively, and described as deep, well to excessively drained soils that formed in glacial outwash and are nearly level to steep soils on glacial outwash plains and kames.

The soil description from TP-23-04 includes a fine sandy loam with some pebbles and gravel to a depth of 29-inches atop a medium to coarse sandy loam to 76-inches, below which is a very fine sand to the bottom at 90-inches. The SHWT based on redoximorphic features (mottles) was at 29-inches. A groundwater seep was present at 43-inches and bedrock was not encountered.

The soil description from downgradient TP-23-05 near the center of the open field, was similar to the soil in TP-23-04, although the individual soil depths and SHWT were shallower. TP-23-05 includes a fine sandy loam with some pebbles and gravel to a depth of 22-inches atop a medium to coarse sandy loam to 50-inches, below which is a very fine sand to the bottom at 84-inches. The SHWT based on redoximorphic features (mottles) is at 22-inches. A groundwater seep was present at 32-inches and bedrock was not encountered.

Soil data from the two test pits indicate that a mound-type wastewater disposal system can likely be permitted in the vicinity of TP-23-04. However, additional test pits are required to the north, east, and south of TP-23-04 and in the area downgradient to the west toward the lower test pit (TP-23-05) to confirm the depth and extent of the SHWT in the fine sandy loam with some pebbles and gravel soils. It is likely that a mound would be larger with a wastewater disposal capacity in thousands of gallons per day. From the test pit data collected thus far, it is possible that the depth of mound sand required could be reduced if the mound were sited closer to South Street, rather than the toe of the slope.

Although it is not anticipated that the Allenholm property could provide for all the existing and future wastewater needs of South Hero Village, it is a promising site which should be considered as it has larger wastewater potential and is relatively close to South Hero's designated village center. A preliminary mounding analysis was performed using Darcy's law, and a conceptual layout of a mound wastewater disposal system prepared. These are included in **Appendix K.** Since the site is on protected land, conversations were had with the Vermont Land Trust (VLT) about the potential for wastewater disposal on the site. VLT conveyed that there was 3 acres in total available to use for wastewater, two of which were related to the Allenholm farm and one acre which was set aside for the Folsom Education Center as their replacement area. Should some sort of system be built on those sites, there would have to be capacity set aside for the school as well.

iii. **Robinson Property –** Two test pits were excavated in the open field bordered by Wally Point Road to the west, storage unit buildings to the south, and wooded to the east, apple orchards to the north and south, and woods to the west. The ground slope is nearly level (0-3%). Both test pits were not logged since the SHWT is very shallow (less than 8-inches), the soils have a very low permeability, the site is nearly level, groundwater seeps were very shallow, and there is no possibility of permitting a large wastewater disposal system on the property.

iv. The soils on this portion of the Robinson property are mapped by the SCS as Vergennes silty clay (VaA), 0-3% slopes, and described as very deep, moderately well drained soils on glacial lake plains.

e. **Conclusions & Recommendations on Wastewater Disposal for Keeler Bay Village –**Based on the investigations completed to date, we are able to draw the following conclusions and recommendations pertaining to wastewater disposal solutions for Keeler Bay Village:

1. The existing soils within the Designated Village Center and its associated ¼ mile buffer are predominately mapped as poor for on-site wastewater disposal. The presence of these soils extends into the full investigation radius, with a limited amount of potential in Target Areas 1, 2 and 3. Refer to **Figure 7.**

2. A combination of physical site constraints (topography and presence of shallow bedrock or groundwater table) combined with the existing development of Keeler Bay Village (Lot size and density) and the known environmental resources (wetlands and Lake Champlain in particular) present a number of challenges for the existing property owners and restrict the desired infill development.

3. This is further complicated by the lack of municipal water service to Keeler Bay Village and the surrounding areas. Private water supplies and failed septic systems are depicted in **Figure 6.**

4. There are a limited number of parcels within the investigation radius which are of an adequate size and mapped as soils which may support larger capacity, soil based disposal systems. **Figure 9** depicts properties which should be investigated. Based on the desktop analysis, the potential of the disposal sites was ranked as follows:

1. Munson Site
2. Dubuque
3. Goulet
4. Brownell
5. Bagger (formerly Ravdin Trust)

5. To date, actual field investigations have been unable to be conducted on all but one parcel identified above, as the landowners within this area are predominantly not in favor of allowing on site investigations to occur at this time. As discussed earlier in the report, the Bagger Property (Formerly Ravid Family Trust) was reviewed during a site walkthrough, and due to factors other than soil, eliminated from the test pit process.

6. Given a lack of soil capacity, and a willingness of current landowners to participate in a community solution, the recommended approach to community wastewater for Keeler Bay involves replacement of existing, on site wastewater systems with best available technology as they age and require improvement.

7. Additionally, we would recommend that the community consider what is required to extend municipal water service throughout the area. This would eliminate a number of

private water supplies and increase the land available for wastewater disposal. Although this will not eliminate the poor existing soil conditions, it will increase the amount of land available for wastewater disposal and eliminate isolation distance concerns between wastewater systems and potable water supplies.

8. Based on the information above, it is unlikely that additional infill development will be able to occur, within Keeler Bay Village or its surrounding ¼ mile buffer.

f. **Conclusions & Recommendations on Wastewater Disposal for South Hero Village –** Based on the investigations completed to date, we are able to draw the following conclusions and recommendations pertaining to wastewater disposal solutions for South Hero Village:

1. The existing soils within the investigation radius are predominately mapped as moderately conducive to support on-site wastewater disposal, specifically around Hill Road, Walley Point and South Street.

2. A combination of physical site constraints (topography and presence of shallow bedrock or groundwater table) combined with the existing development of (Lot size and density) and the known environmental resources (wetlands and Lake Champlain in particular) present a number of challenges for the existing property owners and restrict the desired infill development within the Village Center.

3. **The investigations thus far have not identified a singular site which can support the community and any reasonable future growth.**

4. **Several properties within the investigation radius appear to have adequate lot size to meet the required isolation distances and may contain soil with capacity to support smaller, cluster style, decentralized wastewater systems throughout the investigation area.**

5. To date, actual field investigations have been conducted on the Allenholm Farm and show promise for a few thousand gallons of capacity. The property is currently conserved for agricultural use, however, which will restrict whether or not it can be used for a community wastewater solution. Additional discussions with the land trust and property owner have been made and the land trust has indicated there is approximately 3 acres available for wastewater disposal use, with capacity needed to be reserved for the Folsom Education Center as it was their replacement wastewater area.

6. Of the land area available, there are two additional sites which should be considered part of a decentralized solution for South Hero Village. The Lavin property, with a permitted, yet unconstructed capacity of 6,000 gpd is well suited to support redevelopment on the East Side of South Hero Village, if the property owner and Town can work out a land purchase.

7. **During the completion of this preliminary engineering study, the Lavin Property was reviewed separately by the Town of South Hero and the landowner. Additional capacity and potential exists on the property.**

8. The mound system currently serving the fire station, library, and other properties on the community lane neighborhood provides 4,000 gpd of capacity which is useful in a decentralized solution.

5.0 COLLECTION ALTERNATIVES CONSIDERED

A collection system refers to the means for conveying wastewater from the individual properties to the treatment / disposal area. The type of collection system which is most appropriate for a given community is dependent on the following factors:

1. Topography
2. Density of Existing Development
3. Design Flow
4. Treatment Approach
5. Disposal Capacity

The Champlain Islands, and more specifically South Hero / Keeler Bay Villages are unique when compared with the rest of Vermont. The areas have very little elevation change and contain development along the US Route 2 Corridor. The lack of elevation presents challenges for a gravity based sewer collection system in either Village. The depth of excavation would exceed 12-feet in many instances and require work consistently at or beneath the groundwater table. Conducting this type of excavation along a Federal highway is both challenging and expensive. As such, a gravity based sewer collection system is not recommended and was not evaluated further in this report.

There are two primary types of pressurized wastewater disposal systems which could be appropriate and were evaluated further.

a. **Septic Tank Effluent Pumping (STEP) –** This system involves providing primary treatment at the connecting users property. For residential and low strength commercial waste connections, this occurs through the installation of a properly sized septic tank. Liquid effluent from the septic tank is subsequently pumped into a shared, low pressure sewer force main, where it is conveyed to a disposal site. In many instances, STEP systems are constructed where the primary treatment and effluent pump system are part of a single tank with cells.

   For municipalities, the advantages of STEP systems include reduced capital and operational costs. Effluent pumps generally have lower operating requirements and maintenance when compared with Grinder pumps, which need a bigger motor (and more electricity) to move solids properly. Additionally, the pressure force main needed to convey the effluent is often smaller, as it no longer needs to pass solids.

   The primary disadvantage to a STEP system is that because primary treatment is occurring on a property-by-property basis, there is an increased level of monitoring and maintenance required when compared to a single point of primary treatment.

   There are many communities throughout the United States which have STEP systems, and they all operate in with different levels of ownership, responsibility, and control. In general, when constructing community facilities, communities are encouraged to own, control, and maintain the infrastructure, including the STEP tanks and their associated effluent pumps.

   A STEP system should be considered an appropriate solution for both Keeler Bay and South Hero Village, when considering community wastewater disposal.

b. **Grinder Pump, Low Pressure Pumping –** This type of system is similar to the STEP system, in which wastewater flows are conveyed through a shared, low-pressure force main. The difference is focused on the waste stream. Grinder pump systems replace the need for septic tanks and other primary treatment on site. In this scenario, the full waste stream (solids and liquids) would be processed through individual grinder pumps at each site and then conveyed through a pressure force main to the treatment and disposal site.

   The primary advantage of a Grinder Pump system is that the entire waste stream is handled in more centralized locations. This allows for easier operational control when compared to STEP systems. A single grinder pump station for each of Keeler Bay's and South Hero Village's potential systems would be appropriate, but additional grinder pump stations could also be added in the future if needed.

   The disadvantages associated with this system include increased capital cost, increased operational cost, and more frequent maintenance. The handling of solids in a waste stream can result in clogging of pumps when inappropriate items (diapers, wipes, rags, etc.) and flushed into the sewer system.

   Conceptual Construction Cost Estimates for each of these alternatives were prepared for each designated village center and are included in **Appendix L.** These construction costs are based on a shared force main within the boundaries of each designated village center and include a number of presumptions pertaining to the depth to bedrock, depth to seasonal highwater, and the overall number of connections. The force main alignment is depicted along Route 2 and extends up any side streets within the Designated Village Centers. The force mains are depicted in **Figures 10 and 11** for South Hero and Keeler Bay respectively. **Figure 12** depicts a routing along US Route 2 which would provide for the interconnection of the two villages, should a combined solution be deemed appropriate.

   In addition to the collection costs associated with each village, costs of interconnecting the villages were explored on a preliminary basis. The costs are also included in **Appendix L**. The cost estimates assume that properties which are located within the designated buffer of each village center, along the interconnection routing are connecting to the project.

A summary of the cost estimates for each village is presented below in **Table 5.**

Table 5
Construction Cost Estimates
Collection System Type and Village Location

	South Hero Village		Keeler Bay Village		Interconnection	
	STEP	Grinder	STEP	Grinder	STEP	Grinder
Construction Cost Estimate	$ 2,198,000	$ 3,179,000	$ 535,000	$ 764,000	$ 2,783,000	$ 3,505,000
Contingency (20%)	$ 439,600	$ 635,800	$ 107,000	$ 152,800	$ 556,600	$ 701,000
Total Construction Cost	$2,637,600	$3,814,800	$642,000	$916,800	$3,339,600	$4,206,000

Notes:

1) Construction Costs are as outlined on the individual estimates and based in June 2025 dollars
2) Costs only included properties within the Designated Village Center Areas
3) Additional Connections and Construction Cost could be expected on the force main to the selected disposal site
4) Interconnection costs only include connections for properties within the 1/4 mile designated center buffer of each village, along the route
5) 20% Project Contingency is an industry standard for this preliminary assesment.

Based on the site investigations conducted thus far, we are able to identify the following potential solutions for each village.

a. **Keeler Bay**
There are a limited number of properties with moderately suited soil for on site wastewater disposal. At this time, the most appropriate solution for Keeler Bay is to continue to replace the wastewater systems, as needed, with individual, on site solutions. Extending water service from South Hero Fire District No. 4 should be explored, as it would allow for additional land to be used for wastewater capacity.

It is not considered financially feasible to connect Keeler Bay to an onsite disposal system associated with South Hero Village as the capital cost of a force main, without any connections, is estimated at over $1.5M. This is shown in more detail in the cost opinions included within **Appendix L.**

b. South Hero Village
Desktop analysis and site investigations completed under this study have concluded that a single, soil based wastewater system to serve the village is not a viable solution. The options for inground wastewater disposal include the following:

- Individual On Site Wastewater Systems
- Cluster wastewater disposal systems

There is potential at the Allenholm farm for up to 6,000 gpd of capacity, of which the entirety of would be used up by the Folsom Elementary School as it is in the area of their replacement disposal area. There is also a permitted capacity of 5,320 gpd on the property owned by Martin and Patrica Lavin. A site investigation involving test pits found that this site could have the capacity for 6,000 gpd with pretreatment. In conjunction with the currently permitted mound for the facilities off of community lane (7,000 gpd total in two mounds) and other permitted uses along the Route 2 corridor, it appears that a viable, in ground wastewater alternative is to develop larger, cluster systems where soils exist. Based on the limited number of parcels with suitably mapped soil, the number of parcels in conservation or with land use restrictions and other environmental factors, it is not feasible to assume that cluster based wastewater systems can meet the existing or projected future needs of South Hero Village alone. As such, the recommended wastewater solution is a combination of both individual, onsite systems, and targeted, site specific cluster systems.

A process flow diagram depicting this approach is provided as **PW-1. Figure 13** provides conceptual routing of low pressure force mains to both the Allenholm and Lavin property. These properties combined could provide in excess 9,000 gpd of disposal capacity for existing uses and infill development within the designated Village Center. Given that the landowners have expressed an interest in working with the Town, either currently or in the past, and onsite investigation has progressed to a level where capacities can be estimated on a preliminary

basis, construction of shared, low pressure force mains and the disposal systems could be considered "Phase I" of a village wastewater solution. Additionally, future, phases should focus on large, undeveloped, and unrestricted parcels in relatively close proximity. These include the Lawrence parcels east of the village along route 2 and parcels off of Station Road. These are shown in **Figure 13** with possible force main routing as a future phase.

Construction costs for mound wastewater disposal systems are based on the length of the mound, number of bed areas and existing ground slope. Steeper sites, with longer mounds a generally more expensive but have a higher potential for wastewater capacity. It is estimated that mound wastewater disposal systems between 4,000 and 6,400 gallons per day would cost between $225,000 and $350,000 dollars when completed using funds from a State or Federal funding program. Detailed cost estimates should be prepared on a property by property basis.

As discussed above, the cost of force mains to convey waste from the designated village center to the potential disposal site is directly dependent on the routing of that utility and the overall length. Sites along State highways will cost more than sites along Town roads.

As discussed earlier in this report, there are other options for wastewater disposal, if the treatment level of the waste is increased. Secondary treatment involves the biological treatment of wastewater to reduce the effluent strength prior to discharge. Secondary treatment is required under the indirect discharge rules. Tertiary treatment provides a third level of effluent renovation, often through filtration.

For the Villages of South Hero and Keeler Bay, there is no viable, in ground disposal site. Thus, the only available option for effluent disposal would be through a treated mound, drip dispersal, or a spray irrigation system. Spray disposal involves land applying treated effluent. The current rules require different amounts of land, based on the level of treatment provided. For example, systems which have tertiary treatment are allowed to provide a greater volume of waste per acre of land when compared with systems that only provide secondary treatment only.

Typically, the upfront capital cost as well as the ongoing operation and maintenance expense of these systems are significantly higher when compared with the inground disposal options presented earlier in this report. This type of solution would only be considered applicable, if there was a large enough user base (high design flow) and a strong desire in the community to provide a solution which would have the ability to connect properties within the ¼ mile buffer around the designated village centers.

This would not only allow for a greater amount of infill development (which would need to conform to the local zoning requirements) but also allow for the connection of many properties whose residential waste systems are on the shoreline of Lake Champlain.

Given the TMDL restrictions on Lake Champlain associated with phosphorus, the design of this alternative needs to include enhanced phosphorus removal. Aside from both the physical and regulatory obstacles, this alternative requires substantial input from the public at large. Spray disposal of renovated effluent is often a highly controversial topic at the local level.

For South Hero and Keeler Bay, it is possible that a secondary treatment system could be constructed, with spray disposal. A number of potential sites were identified, based on the size of the existing lot, the current and surrounding uses, and the proximity to the designated village centers. Other factors considered include whether or not the land contains conservation easements, and whether or not there are environmentally sensitive receptors on site. Potential sites, based on current land use and development patterns are depicted on **Figure 14.**

It is important to note that none of the identified landowners have been contacted as part of this study. These sites were merely identified based on the criteria above, with the purpose of demonstrating a third alternative to wastewater treatment in the Villages. A general community meeting on the matter of the wastewater study found that the community had little to no interest in a sprayfield-type disposal system.

In general, there are a number of package treatment plants which could be pursued and paired with spray disposal to serve either village, or a combined system. The following is a brief description of some treatment technologies which were investigated as part of this report.

a. **Algaewheel:** Algaewheel is an algal-bacterial bioreactor. This a patented technology which has been in use for the last 20 years utilizes algae which grows on rotating wheels. The algae produce oxygen, consumes carbon dioxide, and generates sugars and nutrients. Bacteria then consume the oxygen and nutrients, producing carbon dioxide which completes the sustaining cycle with the algae. When subjected to light, the algal biofilms become saturated with oxygen, enhancing BOD reduction and the nitrification of ammonia. This system lauds itself on being a low energy solution to wastewater treatment with the added benefit of net zero carbon emissions. Often it is paired with solar arrays to power the rotation of the algae wheels and other, low energy equipment. There are several installations in the northeast.

b. **Enereau:** This treatment system, like the Algaewheel, is an advanced treatment process. Whereas Membrane bioreactors (MBR) similar to the Enereau are typically rather high energy processes, the Enereau presents itself as a low energy system. The system also has the added benefit of being compact, requiring about 75% less space than conventional activated sludge processes for municipal wastewater treatment. The Enereau system is a membrane bioreactor (MBR) which can handle flows from below 5,000 gpd to up to 50,000 gpd. This type of system may be appropriate for the size facilities needed to meet the future design flow of South Hero and Keeler Bay. The basic process involves primary treatment which consists of screening and equalization. Before entering the aerobic bioreactor module, return activated sludge is returned to the flow from the next step in the process, being the membrane filtration module and Ultra Filtration (UF) membranes. The process generates a waste activated sludge and high-quality effluent. There are several installations in the northeast.

c. **Conventional Aerated Lagoon:** A conventional aerated lagoon system is a viable secondary treatment system in advance of spray disposal under the current Indirect Discharge Rules. The process would involve constructing an adequately sized lagoon, with mechanical aerators to enhance the wastewater treatment process (when compared with a facultative lagoon). Aerated lagoons are considered a simplistic yet effective wastewater treatment technology. They are located in rural communities throughout Vermont, New England and beyond. They are often chosen as the preferred treatment alternative in rural areas, in part because they involve a relatively low capital cost when compared with other treatment solutions of this scale. The other reason for their selection in rural areas is that generally, there is additional land area available for constructing these large lagoons. US-EPA considers Aerated Lagoons a well suited treatment technology for municipal and industrial wastewaters of low to medium strength.

In general, MBR and Algaewheel systems provide a self contained, package treatment system with opportunities for sustainability through green infrastructure. The overall footprint of the anticipated facility is substantially smaller than that of a conventional aerated lagoon, thus, for the purpose of the report, those systems were considered further.

A preliminary process flow schematic was prepared for this solution and is included as **PW-2**. The design capacity of the facility is 50,000 gpd. In general, waste from the villages is pumped to a singular site. The site will consist of a headworks and flow equalization structure, secondary treatment unit with enhanced phosphorus removal, chlorination / dichlorination facilities, 30 days worth of storage of renovated effluent within lined lagoons, an effluent pump station and spray disposal field consisting

of eight zones. The current indirect discharge rules were reviewed on a cursory basis and a preliminary basis of design for the sizing of facilities is presented in **Appendix M.** Also included in **Appendix M** is product information pertaining to the proprietary package treatment systems discussed above. A detailed cost estimate, based on the algaewheel system for this type of treatment is included in **Appendix N.**

8.0 ALTERNATIVES CONSIDERED (SOUTH HERO VILLAGE)

For the purpose of this report, we reviewed the existing land development, uses, in the area immediately surrounding the Designative Village Center (DVC) of South Hero, which encompasses approximately 121 parcels.

This area pursued a DVC declaration based off responses to the South Hero Interim Zoning Advisory Committee (SHIZAC) survey in the Town Plan. This is included in the Town Plan as Appendix 3. Respondents answered overwhelmingly (93%), 209 "yes" to 16 "no" in favor of commercial development in this area.

Additional considerations for location include the zoning districts and bylaws adopted by the Town. While the Village is its own "Village" district, it also abuts rural/residential and shoreland districts. As stated previously, it is a desire of the Town and its residents to promote growth within the existing Village center.

Funding for Village wastewater solutions also identifies a path of providing reasonable growth. Reasonable growth considerations pertaining to planning analysis include the ability to connect properties to a community wastewater system, so long as they are within ¼ mile of the designated buffer.

Figure 3 identifies the Village Zoning District, the ACCD designated village center and ¼ mile buffer outside of the DVC.

a. **Description –** Scenarios available for South Hero Village include:

1. Do Nothing **–** Do Not Construct a community wastewater system to serve South Hero Village. Wastewater solutions would continue to be on site and the responsibility of individual landowners. This is the current configuration in South Hero Village. The design capacity is limited on a per lot basis.

2. Cluster Wastewater Disposal Systems **–** Under this scenario, the Village would build out cluster, soil based wastewater disposal systems in areas where suitable soil exists. The design capacity of this system is limited by the presence of onsite soil. It is estimated that this scenario could be built out in phases, with up to 20,000 gpd of total design capacity.

3. Package Treatment System with Spray Disposal **–** Construct a package wastewater treatment system with Spray Disposal. The package plant would provide secondary treatment, phosphorus removal, and effluent discharge through spray disposal. The design capacity of this system is up to 50,000 gpd.

b. **Design Criteria –** Design criteria include the following:

1. South Hero, which lies on a flat island within a lake, has inherent site constraints due to a lack of topography which all but eliminates the potential for a gravity-based sewer system. Other constraints include the proximity of the Village to the shoreline of Lake Champlain, and generally high groundwater table. On going agricultural operations, including an

abundance of property which is either in current use programs or has established conservation easements also presents a constraint on any Village wastewater solution.

2. A number of properties within the investigation area are listed as "conserved". Conserved parcels were identified using the data presented on the South Hero Land Trust Website and are depicted on many of the drawings contained within this report. Each parcel with a conservation restriction has unique and specific requirements which must be adhered to if a suitable wastewater solution were presented on conserved lands.

   It is prudent to initiate contact earlier with the entity that holds the conservation title and outline restrictions which could limit use. Unfortunately, community wastewater solutions require an adequate amount of land, isolated from other properties and environmentally sensitive receptors. These types of properties are also ideal for conservation.

3. The Vermont Department of Environmental Conservation (DEC) Drinking Water and Groundwater Protection Division (DWGPD) regulates most of the water and wastewater systems throughout the State. **Table 6** presents a summary of the different categories of systems that may be considered in developing community-based water and wastewater solutions for the Village Centers.

Table 6 Categories of Systems

Table 6 Town of South Hero Community Wastewater Feasibility Study Regulatory Summary			
Category of System	**Regulatory Authority**	**Description**	**Applicability to Community WW Study**
Wastewater			
Small-Scale	EPR, Ch. 1, WW Rules	For soil-based systems with capacities less than 6,500 gpd	If the projected flows exceed 6,500 gpd, then multiple locations will be needed for disposal.
Indirect Discharge	EPR, Ch. 14, IDR	For soil-based systems with capacities at or greater than 6,500 gpd	May be difficult to achieve given soil conditions, otherwise the rules and regulations are more stringent than small-scale.
Water Supply			
Non-Public	EPR, Ch. 1, WW Rules	Covers all water systems that are not considered "Public" including single family residences with private wells, to 9 lot developments with a shared water system	N/A
Public Transient Non-Community (TNC)	EPR, Ch. 21 (WSR)		N/A
Public Non-Transient Non-Community (NTNC)	EPR, Ch. 21 (WSR)		N/A
Public Community (PCWS)	EPR, Ch. 21 (WSR)	For systems serving at least 10 residential connections or 25 year-round residential population	South Hero FD 4 serves 760 residents in the Town
Abbreviations: EPR = Enviornmental Protection Rules WW Rules = Wastewater System and Potable Water Supply Rules IDR = Indirect Discharge Rules WSR = Water Supply Rule CFR = Code of Federal Regulations (Title 40 is "Protection of Environment") NPDES = U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System			

Chapter 1 of the EPRs are administered through the DWGPD Regional Offices and provides regulation, requirements and guidance for the design, construction, replacement, modification, operation, and maintenance of small-scale soil-based wastewater disposal systems with the primary goal of protecting public health and the environment. The WW Rules are applicable to single family residential septic systems up to shared community systems equivalent to the size of a development of approximately 25 homes.

Soil-based wastewater systems with capacities of 6,500 gallons per day or greater are considered “indirect discharges” of sewage and are subject to Chapter 14 of the EPRs, known as the Indirect Discharge Rules (IDRs). The requirements to obtain an Indirect Discharge Permit are significantly more substantial than for systems that are regulated under the Wastewater and Potable Water Supply Rules, and as a result there are many building developments around the State with a capacity of 6,499 gpd or less.

There are two (2) existing Indirect Discharge Permits that have been permitted in South Hero. One of these is Camp Hochelaga, which utilizes evapotranspiration beds for it’s design sewage flow of 8,000 gpd. The second is Apple Island Resort which has a lagoon

and is treated via activated sludge followed by tertiary filter and chlorination with a design capacity of 40,000 gpd. The permits for these are in **Appendix O**.

For larger scale systems above 30,000 gpd but less than 50,000 gpd (approximately 120 homes), the system is required to provide secondary + wastewater treatment (such as an aerated lagoon) prior to discharge. At this size, the IDRs allow for drip dispersal and spray disposal, on top of the conventional trenches, mounds, and spray fields. Spray disposal is similar to an irrigation system, where treated wastewater effluent is spread over a protected area and allowed to percolate into the ground. These systems are often found in ski areas, resorts (such as Apple Island) and other locations where subsurface disposal is not practical due to soil limitations.

When design capacity exceeds 50,000 gpd, tertiary treatment is required prior to land application. This results in significantly more expensive capital and operational costs.

Often these wastewater systems discharge directly to a surface water source such as a lake or river and are regulated under the federal National Pollutant Discharge Elimination System (NPDES) Permit program.

4. Design flows have been estimated for the Designated Village Center (DVC) based on a cursory assessment of use and Town documents. Seasonal properties were assumed to have full-time flow to keep the estimate conservative.

   Residential flows were based on Table 8-1 in Vermont's Environmental Protection Rules Chapter 1, with each living unit being allotted 245 gpd.

   Commercial properties were found and either assigned flows based on use and Table 8-3 of the Wastewater System and Potable Water Supply Rules or their specific wastewater permits were found on the State's database and assigned with their permitted wastewater flow.

   Table 7 below outlines the disposal needs of South Hero Village, within the confines of the Designated Village Center. The estimated flow is just under 20,000 gpd for this boundary. As also can be seen in **Table 7**, as the service area is expanded to include parcels within ¼ mile of the DVC, the residential population which would be served is drastically increased. Please note that these are not additive, but rather representative of a need for a particular land area.

Table 7 - South Hero Village Disposal Needs					
Design Flows (DVC only)					
South Hero Village Residential	=	19 @ 245	gpd/home	10,205	gallons
South Hero Village Commercial	=	(From WW Permits)		9,065	gallons
Subtotal	=			**19,270**	**gallons**
Design flows (extending to the Quarter Mile Investigation Radius beyond the DVC)					
South Hero Village Residential	=	39 @ 245	gpd/home	23,425	gallons
South Hero Village Commercial	=	(From WW Permits)		9,773	gallons
Subtotal				**33,198**	**gallons**
Notes:					
1) Resident Design Flow based on Chapter 1 Table 8-1 of Vermont EPRs					

5. Disposal and treatment systems must be designed for compliance with the applicable standards of the Vermont Environmental Protection Rules and all State and Federal Regulations. For designs in excess of 6,500 gpd, Chapter 14, Indirect Discharge Rules is applicable. For designs less than 6,500 gpd, Chapter 1, Potable Water Supply and Wastewater Disposal Rules Apply.

6. Not cause an impact to environmentally sensitive receptors including Lake Champlain, wetlands, and other surface water resources.

7. Occur on lands which are either under the ownership or control of the Town of South Hero or can be obtained through traditional methods of land acquisition including direct purchase or permanent easement.

8. Facilities should be located reasonably close to the designated village center, to limit the overall capital investment required.

9. Collection systems should be constructed within existing highway rights of way for ease of future maintenance and replacement.

c. Maps

1. Do Nothing **–** There is no do nothing map for this scenario. It is the current configuration.

2. Cluster Wastewater Disposal Systems **–** A conceptual layout of the low pressure force main and potential disposal sites is shown on **Figure 13.** A process flow diagram of this alternative is included as **PW-1**.

3. Package Treatment with Spray Disposal **–** Potential spray disposal sites are identified on **Figure 14.** A process flow diagram is included as **PW-2.** A conceptual layout of the facilities shown in the process flow diagram is provided as **Figure 15.**

d. Environmental Impacts

1. Do Nothing – There is potential for environmental impacts associated with failed, non compliant wastewater systems. There is minimal improvement to the protection of human health and replacement of aging infrastructure. Sprawling development is likely to increase. The environmental impact of this scenario is considered low. The environmental benefit of this alternative is poor.

2. Cluster Wastewater Disposal Systems – This scenario provides substantial benefit for protection of human health, as the design of cluster systems will require full compliance with current and future environmental regulations. The environmental impact of this scenario is considered low. The environmental benefit is good, and it provides a mitigation to sprawling development by allowing infill development to occur in targeted areas. When compared with the "do nothing" scenario, there is an increased protection of human health and the environment.

3. Package Treatment with Spray Disposal – This scenario provides a substantial benefit for the protection of human health and the environment. Under this scenario, a community wastewater system would be constructed which collects and treats the existing (and future) waste streams to the highest quality effluent. There is increased removal of BOD5, TSS, and phosphorus when compared with scenarios 1 and 2. The facility can be designed with reasonable future growth in mind, to not only allow for targeted infill development to occur, but also allow for the replacement of failed or aging on site wastewater systems.

e. Land Requirements

1. Do Nothing – There is no additional land required for this scenario.

2. Cluster Wastewater Disposal Systems – There is a finite amount of land with suitable soil. To date, the Allenholm Farm and Lavin Property have been identified as a first phase of development, with potential capacity in excess of 10,000 gpd.

   The Allenholm farm is currently encumbered with a conservation easement for agricultural uses. The Town will need to work with Ray Allen, the South Hero Land Trust, Vermont Land Trust and State officials to identify a path forward. This could not include swapping land on the Allen Property which is not currently in conservation for the site that is more suitable for a community wastewater system, as has been made clear by the Vermont Land Trust.

   Over the course of developing this PER, the Town has since executed a purchase and sale option on lots and wastewater capacity within the Lavin property subdivision. Lots 1, and 5-8 are to be purchased outright and the wastewater capacity of Lot 2 also provided to the Town.

   Long range planning efforts should be focused on investigation of parcels with soils that are mapped similar to Allenholm and Lavin. These are shown on **Figure 12**. If the site investigations demonstrate larger, onsite disposal capacity is available, these properties should also be targeted for land acquisition.

3. Package Treatment with Spray Disposal – A large parcel of land is required for both the treatment system and effluent disposal. The preliminary design presented earlier in this report outlined the need for approximately 10 to 20 acres of land. Although you could have a scenario where the treatment site is separate from the disposal, it is not recommended for South Hero, as the conveyance system to any treatment site will require the use of a low pressure sewer anyway. Potential sites are shown in **Figure 13.**

f. **Potential Construction Problems –** South Hero Village has a densely developed corridor along Route 2. Construction challenges in this area would include:

- Shallow Depth to Bedrock
- Shallow Depth to the Groundwater Table
- Federal Requirements for working in and along US Route 2
- Existing Public Water System Infrastructure (SHFD4)
- Existing Buried Utilities (Electric, Phone, TV, Fiber Optic, Gas)
- Existing overhead utilities and associated poles
- Large, mature trees and other pertinent landscaping
- Sidewalks, curbing, and associated drainage systems
- Crossings of wetlands, streams, and other environmental features
- Proximity to historic and archaeological sensitivity

g. **Sustainability Considerations –** The USEPA recommends a review of the following items for sustainable infrastructure:

i. Water and Energy Efficiency

1. Do Nothing – Water and Energy use is determined by the individual property uses.

2. Cluster Wastewater Disposal Systems – Water use is not anticipated to be affected, though a small amount of increased flow could occur through redevelopment and infill within the village center. Multiple, small scale community pump stations would be constructed to handle moderate amounts of wastewater flow. Energy use is considered low to moderate and not anticipated to be significantly more than the "Do Nothing" alternative, as nearly all of the replacement systems currently within the village are effluent based pumping systems. There is no energy use anticipated for treatment.

3. Package Treatment with Spray Disposal – This scenario would result in an increase in water demand, both at the package plant and as a result of the needs of the plant and throughout the existing service area for South Hero Fire District No. 4. Energy use is considered moderate to high.

ii. Green infrastructure

1. Do Nothing – This scenario does not provide green infrastructure.

2. Cluster Wastewater Disposal Systems – Wastewater pumps can be selected for energy efficiency. Piping and other physical components of the system can be selected, where applicable, as green infrastructure.

3. Package Treatment with Spray Disposal – This scenario will have the highest levels of energy use but provides the greatest opportunity for green Infrastructure to be incorporated into the design and long-term sustainability of the infrastructure. If selected, the treatment facility should consider operational energy efficiency, building envelope energy efficiency and minimization of residuals. Additionally, many of the potential sites for this type of system involve large, open areas of land which would be conducive to the construction of solar arrays or other green energy infrastructure.

iii. Other

The community has identified the need for infill development and growth within the designated Village Centers of Keeler Bay and South Hero. Overall, housing, and affordable housing are limited and there is a significant need in this community, and throughout Vermont, to increase the availability of housing. The do nothing alternative will not allow for these community desires to be achieved.

h. **Cost Estimates –** Construction cost estimates were prepared for each of the alternatives presented above. These estimates, although detailed, are based on the preliminary criteria identified within this report, the engineers' experience with municipal infrastructure projects of similar size, scope, and estimates of the current bid climate. Cost estimates for the do nothing alternative are included in **Appendix P.** These estimates are based on engineers' experience with similar projects for residential and small scale property owners. A typical value was applied on a per property basis to estimate the total cost. Detailed construction cost estimates were prepared for the cluster wastewater disposal systems. These, along with estimates for the pressure force mains to convey to each field are also included in **Appendix P.**

It is important to note that the Covid-19 global pandemic had and continues to have a disruption on supply chains. The influx of federal stimulus funds to support construction of municipal infrastructure, coupled with a limited selection pool of contractors who are qualified to perform the work and familiar with the State and Federal contract requirements also has an impact on construction cost. The construction cost estimates were presented earlier in this report, and detailed cost estimates are included in the appropriate appendix section. **Table 8** below summarizes the anticipated capital costs of the disposal systems themselves, and the costs for conveyance.

Table 8
Construction Cost Estimates
Wastewater Treatment / Disposal for Both Villages

	Keeler Bay Village	South Hero Village	Cluster WW Systems in South Hero Village		Package WWTF	
	Do Nothing	Do Nothing	Phase I	Full Build	SHV	SHV & KBV Combined
Estimated Design Flow (gpd)	6,042	19,270	6,277	20,000	50,000	50,000
Construction Cost (Disposal)	$ 1,125,000	$ 3,510,000	$ 600,000	$ 1,250,000	$ 10,395,000	$ 10,395,000
Construction Cost (Conveyance)	$ 125,000	$ 390,000	$ 350,000	$ 2,750,000	$ 375,000	$ 381,000
Construction Cost (Village Interconnect)	$ -	$ -	$ -	$ -	$ -	$ 2,783,000
Contingency (20%)	$ 250,000	$ 780,000	$ 190,000	$ 800,000	$ 2,154,000	$ 2,711,800
Disposal Construction Cost	$ 1,500,000	$ 4,680,000	$ 1,140,000	$ 4,800,000	$ 12,924,000	$ 16,270,800
Disposal Cost per gallon of capacity	$248	$243	$182	$240	$258	$325
Collection System Cost	$0	$0	$1,588,000.00	$2,198,000.00	$2,198,000.00	$2,733,000.00
Collection Cost per gallon of capacity	$0	$0	$253	$110	$44	$55
Total Construction Cost	$ 1,500,000	$ 4,680,000	$ 2,728,000	$ 6,998,000	$ 15,122,000	$ 19,003,800
Total Cost per gallon of capacity	$248	$243	$435	$350	$302	$380

Notes:
1) Construction Costs are as outlined on the individual estimates and based in June 2025 dollars
2) Construction Cost for Village Interconnect assumes STEP collection system in each designated village center
3) No Additional Connections are included in "Conveyance Costs" though they could occur
4) 20% Project Contingency is an industry standard for this preliminary assesment.

As noted above, the highest capital cost involves construction of a 50,000 gpd package wastewater treatment facility to serve the villages of South Hero and Keeler Bay. This would provide the Town of South Hero with the greatest ability to meet the other goals and objectives of the community.

The in-kind replacement of wastewater systems has a cost associated with it, which will be directly borne by the individual property owner. The cost will vary depending on the site conditions of a particular property and the design flow. For comparison with the other alternatives, this has been standardized to the estimated cost of a single family homes septic system replacement. In many cases, specialized wastewater systems including pretreatment and recirculating sand filters may be required, at a much higher cost per home.

9.0 ALTERNATIVES CONSIDERED (KEELER BAY VILLAGE)

For the purpose of this report, we reviewed the existing land development, uses, and parcels in the immediate vicinity of Keeler Bay Village, which encompasses approximately 87 parcels.

Similar to South Hero Village, this area has been designated for growth and property owners generally support commercial development in this area.

Additional considerations for location include the zoning districts and bylaws adopted by the Town. While the Village is its own "Village" district, it also abuts rural/residential and shoreland districts. As stated previously, it is a desire of the Town and its residents to promote growth within the existing Village center.

Funding for Village wastewater solutions also identifies a path of providing reasonable growth. Reasonable growth considerations pertaining to planning analysis include the ability to connect properties to a community wastewater system, so long as they are within ¼ mile of the designated buffer.

Figure 4 identifies the Village Zoning District, the ACCD designated village center and ¼ mile buffer outside of the DVC.

a. **Description –** Scenarios available for Keeler Bay Village include:

1. Do Nothing **–** Do Not Construct a community wastewater system to serve Keeler Bay Village. Wastewater solutions would continue to be on site and the responsibility of individual landowners. This is the current configuration in Keeler Bay. The design capacity is limited on a per lot basis.

2. Cluster Wastewater Disposal Systems **–** A couple of properties were identified as being moderately conducive to wastewater disposal. These property owners were contacted but there was no interest in allowing test pits to be done. A cluster system is likely not a viable option for Keeler bay.

3. Package Treatment System with Spray Disposal **–** Construct a package wastewater treatment system with Spray Disposal. The package plant would provide secondary treatment, phosphorus removal, and effluent discharge through spray disposal. The design capacity of this system is up to 50,000 gpd. The community, however, does not have interest or desire in a spray disposal system to serve their wastewater needs.

b. **Design Criteria –** Design criteria include the following:

1. Keeler Bay has inherent site constraints due to a lack of topography which all but eliminates the potential for a gravity-based sewer system. Other constraints include the proximity of the Village to the shoreline of Lake Champlain, and generally high groundwater table. An additional challenge in Keeler Bay, not seen on the scale of South Hero Village, is the lack of suitable soils for onsite wastewater disposal. Refer back to **Figure 7** which provides a color-coded representation of the lack of capacity. Similar to South Hero Village, On going agricultural operations, including an abundance of property

which is either in current use programs or has established conservation easements also presents a constraint on any Village wastewater solution.

2. A number of properties within the investigation area are listed as "conserved". The conservation which has occurred is property by property specific, and the requirements of each conservation easement or document are unique. Conserved parcels were identified using data from the South Hero Land Trust website and are depicted on many of the drawings contained within this report. If a suitable wastewater solution involves conserved lands, it is prudent to initiate contact earlier with the entity that holds the conservation title and outline restrictions which could limit use. Unfortunately, community wastewater solutions require an adequate amount of land, isolated from other properties and environmentally sensitive receptors. These types of properties are also ideal for conservation.

3. The Vermont Department of Environmental Conservation (DEC) Drinking Water and Groundwater Protection Division (DWGPD) regulates most of the water and wastewater systems throughout the State. **Table 2**, shown previously, presents a summary of the different categories of systems that may be considered in developing community-based water and wastewater solutions for the Village Centers.

4. Design flows have been estimated for the designated village center based on a cursory assessment of use. Seasonal properties were assumed to have full-time flow to keep the estimate conservative.

   Residential flows were based on Table 8-1 in Vermont's Environmental Protection Rules Chapter 1, with each living unit being allotted 245 gpd.

   Commercial properties were found and either assigned flows based on use and Table 8-3 of the Wastewater System and Potable Water Supply Rules or their specific wastewater permits were found on the State's database and assigned with their permitted wastewater flow.

   Table 9 below outlines the disposal needs of Keeler Bay Village, within the confines of the Designated Village Center. The estimated flow is just over 6,000 gpd for this boundary. As also can be seen in **Table 9.** as the service area is expanded to include parcels within ¼ mile of the DVC, the residential population which would be served is drastically increased. Please note that these are not additive, but rather representative of a need for a particular land area.

Table 9 - Keeler Bay Village Disposal Needs					
Design Flows (DVC Only)					
Keeler Bay Village Residential	=	3 @ 420	gpd/home	1,260	gallons
Keeler Bay Village Commercial	=	(From WW Permits)		4,782	gallons
Subtotal				**6,042**	**gallons**
Quarter Mile Investigation Radius					
Keeler Bay Village Residential	=	19 @ 248	gpd/home	5,202	gallons
Keeler Bay Village Commercial	=	(From WW Permits)		8,487	gallons
			Subtotal =	**13,689**	**gallons**
Notes:					
1) Resident Design Flow based on Chapter 1 Table 8-1 of Vermont EPRs					

5. Disposal and treatment systems must be designed for compliance with the applicable standards of the Vermont Environmental Protection Rules and all State and Federal Regulations. For designs in excess of 6,500 gpd, Chapter 14, Indirect Discharge Rules is applicable. For designs less than 6,500 gpd, Chapter 1, Potable Water Supply and Wastewater Disposal Rules Apply.

6. Not cause an impact to environmentally sensitive receptors including Lake Champlain, wetlands, and other surface water resources.

7. Occur on lands which are either under the ownership or control of the Town of South Hero or can be obtained through traditional methods of land acquisition including direct purchase or permanent easement.

8. Facilities should be located reasonably close to the designated village center, to limit the overall capital investment required.

9. Collection systems should be constructed within existing highway rights of way for ease of future maintenance and replacement.

c. Maps

1. Do Nothing **–** There is no do nothing map for this scenario. It is the current configuration.

2. Cluster Wastewater Disposal Systems **–** A conceptual layout of the low pressure force main and potential disposal sites was not produced as no viable parcels were found.

3. Package Treatment with Spray Disposal **–** Potential spray disposal site was identified on **Figure 13.** A process flow diagram is included as **PW-2.** A conceptual layout of the facilities shown in the process flow diagram is provided as **Figure 14.**

d. Environmental Impacts

1. Do Nothing – There is potential for environmental impacts associated with failed, non-compliant wastewater systems. There is minimal improvement to the protection of human health and replacement of aging infrastructure. Sprawling development is likely to increase. The environmental impact of this scenario is considered low. There is negative to no environmental impact for this alternative.

2. Cluster Wastewater Disposal Systems – This scenario would provide substantial benefit for protection of human health, if there were viable land parcels for treatment, as the design of cluster systems will require full compliance with current and future environmental regulations. The environmental impact of this scenario would be considered low. The environmental benefit would be good, and it would provide a mitigation to sprawling development by allowing infill development to occur in targeted areas. When compared with the "do nothing" scenario, there is an increased protection of human health and the environment.

3. Package Treatment with Spray Disposal – This scenario provides a substantial benefit for the protection of human health and the environment. Under this scenario, a community wastewater system would be constructed which collects and treats the existing (and future) waste streams to the highest quality effluent. There is increased removal of BOD5, TSS, and phosphorus when compared with scenarios 1 and 2. The facility can be designed with reasonable future growth in mind, to not only allow for targeted infill development to occur, but also allow for the replacement of failed or aging on site wastewater systems.

e. Land Requirements

1. Do Nothing – There is no additional land required for this scenario.

2. Cluster Wastewater Disposal Systems – There is a finite amount of land with suitable soil. To date, no properties have been identified as a first phase of development.

3. Package Treatment with Spray Disposal – A large parcel of land is required for both the treatment system and effluent disposal. The preliminary design presented earlier in this report outlined the need for approximately 10 to 20 acres of land. Although you could have a scenario where the treatment site is separate from the disposal, it is not recommended for South Hero, as the conveyance system to any treatment site will require the use of a low pressure sewer anyway. Potential sites are shown in **Figure 13.**

f. **Potential Construction Problems –** Keeler Bay Village has a densely developed corridor along Route 2. Construction challenges in this area would include:

- Shallow Depth to Bedrock
- Shallow Depth to the Groundwater Table
- Federal Requirements for working in and along US Route 2
- Existing Buried Utilities (Electric, Phone, TV, Fiber Optic, Gas)
- Existing overhead utilities and associated poles
- Large, mature trees and other pertinent landscaping
- Curbing and associated drainage systems

- Crossings of wetlands, streams, and other environmental features
- Proximity to historic and archaeological sensitivity

g. **Sustainability Considerations –** The USEPA recommends a review of the following items for sustainable infrastructure:

i. Water and Energy Efficiency

1. Do Nothing **–** Water and Energy use is determined by the individual property uses.

2. Cluster Wastewater Disposal Systems **–** Water use is not anticipated to be affected, though a small amount of increased flow could occur through redevelopment and infill within the village center. Multiple, small scale community pump stations would be constructed to handle moderate amounts of wastewater flow. Energy use is considered low to moderate and not anticipated to be significantly more than the "Do Nothing" alternative, as nearly all of the replacement systems currently within the village are effluent based pumping systems. There is no energy use anticipated for treatment.

3. Package Treatment with Spray Disposal **–** This scenario would result in an increase in water demand, both at the package plant and as a result of the needs of the plant and throughout the existing service area for South Hero Fire District No. 4. Energy use is considered moderate to high.

ii. Green infrastructure

1. Do Nothing **–** This scenario does not provide green infrastructure.

2. Cluster Wastewater Disposal Systems **–** Wastewater pumps can be selected for energy efficiency. Piping and other physical components of the system can be selected, where applicable, as green infrastructure.

3. Package Treatment with Spray Disposal **–** This scenario will have the highest levels of energy use but provides the greatest opportunity for green Infrastructure to be incorporated into the design and long-term sustainability of the infrastructure. If selected, the treatment facility should consider operational energy efficiency, building envelope energy efficiency and minimization of residuals. Additionally, many of the potential sites for this type of system involve large, open areas of land which would be conducive to the construction of solar arrays or other green energy infrastructure.

iii. Other

The community has identified the need for infill development and growth within the designated Village Centers of Keeler Bay and South Hero. Overall, housing, and affordable housing are limited and there is a significant need in this community, and throughout Vermont, to increase the availability of housing. The do nothing alternative will not allow for these community desires to be achieved.

h. **Cost Estimates –** A Construction cost estimate was produced above in **Table 8**, with a cost estimate only shown for Keeler Bay's "Do Nothing" option and the package wastewater treatment facility. This is because there is no viable cluster wastewater treatment system for Keeler Bay.

10.0 SELECTION OF AN ALTERNATIVE

In selecting a recommended alternative, considerations of both monetary and non-monetary factors should be made. On the basis of capital cost alone, the least expensive alternative would be to do nothing. It is important to note that this does not address the long-term goals and desires of the community. The following factors are also considered:

a. Life Cycle Cost Analysis – In order to compare alternatives of different size, scope and monetary value, a life cycle cost analysis was conducted for each alternative. The results are included in **Appendix Q** but the total life cycle cost of the alternatives ranged from $3.38 million for the "do nothing" alternative and $19.16 million for a package wastewater treatment facility to serve both villages. All the alternative's life cycle analyses used a design life of 50 years for comparability, although some infrastructure would be anticipated to last longer than that.

Included in the life cycle cost analysis is the anticipated operations and maintenance needed along with the costs associated with it. Ease of operation and maintenance is critical to providing a long-term, cost-effective solution. In general, pump stations and force mains involve more risk of failures and result in more damaging consequences when a component does fail. Thus, they require more frequent maintenance, and more "hands on" operation than gravity sewers. Locating the equipment where it is accessible will improve the ease of O&M in the future. Effluent only sewer systems have less operation and maintenance requirements when compared to their solids handling counter parts.

b. Non-Monetary Factors – For sewer projects, construction considerations need to evaluate the number of utility conflicts, depth of excavation, depth to groundwater table, and complexity of the site constraints including the presence of shallow bedrock**. All of these factors impact the overall constructability of a particular alternative.**

Reasonable Growth / Development – The project area is located within South Hero and Keeler Bay Village which has been targeted as a desired area for reasonable growth and development given its historical settlement patterns and existing compact development. As such, the wastewater committee should consider a solution which enhances the vision of the Town's plan.

11.0 PROPOSED PROJECT

a. Preliminary Project Design – The recommended alternative is to proceed with the design and permitting of cluster systems mixed in with individual on-site disposal. South Hero Village has two sites which could be used for this Alternative, as both Allenholm and Lavin have expressed an interest in working with the Town of South Hero.

At this time, based on the information compiled within this report, and the discussions with the Committee, it appears that the design of this first phase would include wastewater disposal systems less than 6,500 gallons per day on the Lavin Property. Keeler Bay would follow along with the "Do Nothing" Alternative, as they have no viable cluster sites. This selected alternative is generally depicted as **Figure 15**.

b. Project Schedule – The project schedule is driven by the funding requirements and the desire of the Town of South Hero. The following is a list of key project milestones, over the next several months:

Preliminary Engineering Report Submission	October 2025
Preliminary Engineering Report Approval	December 2025
Final Design and Permitting	February 2026 thru June 2026
Archaeological Clearances	February thru April 2026
Environmental Review	February thru April 2026
Bond Vote	Fall 2026
Bid Phase	Winter 2026
Construction	Spring 2027 thru 2028

*Note: The schedule for bid and construction phases of this project will be based on receipt of funding authorization, the Town's readiness to proceed, and approval of engineering and construction documents by regulatory and funding agencies.

c. Permit Requirements – The project is anticipated to disturb less than 10-acres, and is similar in size and scope to other municipal infrastructure improvement projects, therefore a State of Vermont Act 250 permit is not anticipated. The following permits are anticipated at this time:

- Town of South Hero – Zoning Permit
- State of Vermont – Construction General Permit (for more than 1acre of earth disturbance)
- State of Vermont – Labor and Industry Permits
- State of Vermont – Water Supply and Wastewater Disposal Permit

d. Sustainability Considerations – The construction of community sewer and decentralized community wastewater disposal system is a more sustainable, long term solution for the Town than the current configuration of onsite septic systems even if there is just enough capacity at select sites to serve just the central densest parts of the Villages.

e. Total Project Cost Estimate – Beyond the construction cost of the proposed improvements, the total project cost includes:

i. **Technical Services –** Over the years, the Agency of Natural Resources and United States Department of Agriculture (Rural Development) have developed a technical services eligible fee "curve" for wastewater projects which is used as a general guideline during the planning and preliminary engineering phases of a project for estimating the cost of professional and technical services associated with a State or Federally funded project. For this particular project, technical services will include funding assistance, detailed surveys, geotechnical investigations and design, engineering design, permitting, bidding, construction administration and construction review services.

ii. **Legal/Fiscal/Administrative Expenses –** In addition to the technical costs, projects of this nature will incur modest costs for legal and accounting services. Also, based on the size and scope of the project, we anticipate that additional fiscal expenses for short-term (interim) financing will be required in order to bridge the gap between expenditures and the release of project funds.

iii. **Archaeological Investigation -** The Champlain Islands, including South Hero have a documented historical significance. The Town can expect significant impacts on project cost and schedule to provide the necessary archaeological and historic preservation clearances of any project which involves State and/or Federal Funding.

iv. **Contingency –** Given the early stage of this project, it is prudent to include a contingency in the overall budget to account for variability of construction, material and equipment costs, as well as unanticipated design considerations. An overall project contingency of 25% has been included at this phase in the project, and is consistent with industry standards for cost estimating.

v. **Land Acquisition –** For the recommended alternative, private easements will need to be obtained for portions of the collection / pump system, as well as the final location of the wastewater disposal areas. Projects which receive federal funding are required to obtain a "fair-market" appraisal in order to receive funds to pay for land easements and acquisition.

The total project cost is shown as **Table 10** below.

Table 10 Total Project Cost Estimate		
		Cluster WW System for South Hero Village Phase IA - Lavin
Estimated Design Flow (gpd)		6,277
Construction Cost - South Hero Village Collection System	$	1,588,000
Construction Cost - Lavin Site Disposal Field and Conveyance	$	950,000
Engineering Services	$	604,000
Archaeological Investigations	$	75,000
Legal / Fiscal / Administrative Expenses (2%)	$	64,340
Land Acquisition	$	750,000
Contingency (20%)	$	806,268
Total Construction Cost	$	4,837,608
Disposal Cost per gallon of capacity		$771
Notes:		
1) Construction Cost as previously presented and described, costs are based in June 2025 dollars		
2) Engineering Services estimated based on ANR Fee Curve		
3) Allowance for additional archaeological clearances. This is an estimate only, and not based on any conversations with SHPO to date		
4) Legal, Fiscal and Admin (including permit fees) estimated at 2% of total project cost		
5) Land Acquisition Cost of Lavin property, based on purchase and sale price of $840,000 less charitable contribution.		
6) 20% Project Contingency is an industry standard for this preliminary assesment.		

f. Annual Operating Budget – The Town of does not currently have a full-scale community water (portions are served by the South Hero Fire District 4 water system) or wastewater system, however, the expectation is that if the project proceeds, the Town will develop a Sewer Commission or similar entity with whom will be responsible for setting the annual operating budget.

i. Income – Since the Town does not currently have a water system, and the installation of water meters for billing based on usage is not practical, the expectation is that the Town will set a base fee for connecting customers, per Equivalent Residential Unit (ERU) as defined by the State Rules.

ii. **Annual O&M Costs –** Annual O&M expenses will include Administrative Support, Insurance, Pump Station O&M, and costs associated with contract wastewater operations as required.

iii. **Debt Repayments –** Currently, there are not any annual debt payments.

iv. **Reserves –** There are no current reserves. The expectation is that capital reserve fund will be developed by obtaining "connection fees" in advance of the project from prospective connections, and that additional reserves (or set asides) will be included in the annual operating budget for the wastewater system.

12.0 FUNDING OPTIONS

Funding for the publicly owned wastewater systems in Vermont is available from a variety of programs such as:

- The Vermont Agency of Natural Resources Clean Water State Revolving Fund: low interest (up to 2%) loans, with additional subsidy available for disadvantaged communities.

- USDA Rural Development (RD): grants and loans.

- Vermont Bond Bank: loans.

A goal of any public infrastructure improvement project is to make the necessary improvements at the lowest resultant cost to the user without compromising quality and longevity. By optimizing grant funding, and minimizing the local share of the project, less debt retirement will be passed on to the individual system users.

The Town is eligible for funding from the programs listed above. In addition, it is an unprecedented time in our nation's history pertaining to the funding of public infrastructure / investment projects.

a. Clean Water State Revolving Fund for Water Supply Project (CWSRF) **–** The State of Vermont Water Investment Division (WID) administers a combined Federal (EPA) and State Revolving Loan Program for community wastewater system improvements. Various aspects of these programs are described as follows:

i. **Funding Priority List –** For a project to be eligible for CWSRF funding, it must be placed upon the Project Priority List. Projects are ranked to ensure that the most critical needs receive first consideration in awarding available dollars. Projects are funded based on their priority and ability to proceed. If a project is not ready to proceed, it must reapply for the next year's funding.

ii. **Funding Limitations –** The CWSRF program is limited by State Statutes (24 V.S.A. Chapters 76A and 117) and the system rule (Chapter 2) limit the ability to fund sewer extension projects. Essentially, the program can only fund sewer extensions or new construction when it is the only reasonable alternative available to correct a significant health or environmental hazard. Historically, the program has also considered emergent conditions, like the overlapping of isolation distances between water supplies and wastewater disposal systems as a significant potential health threat.

iii. **Planning Assistance –** Planning for most improvement projects requires investments in engineering services before actual construction of any improvements can occur. To help offset the "front end" burden on the system, the State can provide a CWSRF planning loan. CWSRF planning loans are not grants; they are 0% interest loans that must be paid back within 5 years or when the project goes to construction, whichever comes first.

When discussions of ownership of a service line arise, it is a requirement of the USDA Rural Development funding but *not* a requirement of the CWSRF, which only requires the ordinance to demonstrate that the entity has the ability to maintain the service line.

b. Rural Development – Funding for municipally owned wastewater projects is available through Rural Development (formerly known as the Farmer's Home Administration). To be eligible for funding, an applicant must be:

- A public entity (such as a Town, Village, or Fire District).
- Non Profit.
- Located in a community of less than 10,000 people.
- Unable to afford commercial credit.

There are also several requirements for a project to be eligible for Rural Development funding, specifically:

- The project must be financially feasible.
- It must be modest in size, cost, and design.
- The completed system must primarily serve residential users.
- The project should contain reasonable growth capacity.

Funding through Rural Development can take the form of either loans, grants or both. Loan rates are based upon financial need as determined by the municipalities (or systems) median household income (MHI). Interest rates are fixed for the life of the loan, which can range between 20 and 40 years for project and are subject to fluctuation until a funding commitment is provided, and accepted by the municipality.

Grant funding is based upon a variety of factors, including the number of projects requesting funding for that particular fiscal year and economic need. To be eligible for RD grants, the project must:

- Service a community whose median family income is less than the State's 2021 non-metropolitan median household income ($66,567) and,
- Result in "reasonable user fees" upon completion of the project.

Since South Hero's MHI was found to be over $100,000, they would not be eligible for grants under the current structure of the Rural Development Program.

Reasonable user fees are defined as:

- The debt service portion of the annual user fee does not exceed 1% of the median household income (MHI).

As indicated above, both loan and grant eligibility is based upon determination of the median household income for the Town or service area, whichever is most advantageous to the applicant.

As discussed, the proposed project will benefit all customers currently connected to the Town's wastewater system, by reducing O&M expenses.

c. **Vermont Bond Bank –** Financing for municipal infrastructure projects is available from the Vermont Bond Bank. The term for water projects is 30 years and the interest rate is fixed at the time of the bond sale. Current municipal rates are between 4% and 5%. Funding through State and Federal programs often provides the most advantageous route for municipalities throughout Vermont.

d. **Financing and Estimated User Rates –** At this time, it is recommended that the Town pursue both CWSRF and Rural Development funding for this project and select the funding source most advantageous to the users.

Table 11

Phase IA - Village Wastewater System on Lavin Property Financing Options				
	Funding / Financing Scenarios			
	RD Loan Only + Grants	RD Loan Only	CWSRF Loan + Grants	CWSRF Loan Only
Project Cost[1]	$4,837,608	$4,837,608	$4,837,608	$4,837,608
Base funding Package				
Total Financing Required	$4,837,608	$4,837,608	$4,837,608	$4,837,608
% Grant	0%	0%	0%	0%
Grant	$0	$0	$0	$0
Loan	$4,837,608	$4,837,608	$4,837,608	$4,837,608
Additional Funding				
ANR ARPA Grant Award	$ 800,000.00	$ -	$ 800,000.00	$ -
CRRP Grant	$ 239,203.00		$ 239,203.00	
Northern Borders	$ 500,000.00	$ -	$ 500,000.00	$ -
Other	$ -	$ -		$ -
Amount Borrowed	$3,298,405	$4,837,608	$3,298,405	$4,837,608
Interest Rate[6]	3.250%	3.250%	2.0%	2.0%
Loan Term[7]	40	40	30	30
Annual Debt Service Payment	**$148,520**	**$217,828**	**$147,274**	**$215,999**
Estimated Users	25	25	25	25
Annual Cost per User	$5,940.82	$8,713.10	$5,890.94	$8,639.95
Notes:				
General Notes:				
A determination of funding eligibility is required from both Rural Development (RD) and CWSRF				
Loan terms and conditions shown as estimates. Actual funding determination made with application approval.				
Costs are presented in 2025 dollars.				

Table 12 provides estimates on some grants which have been awarded and are potential available to the Town. As can be shown, the calculated per user cost, associated with the debt service only of this alternative ranges between $5,900 and $8,700 per year. Municipal Wastewater rates are generally considered affordable when they range between 1 and 2 % of the communities MHI. The 2023 ACS MHI for the Town of South Hero is 131,458 per annum. The Statewide MHI is 74,014 and therefore South Hero cannot expect substantial forms of traditional subsidy. Even with such a high MHI, affordable user rates would be considered between $1,300 and $2,600 per year.

In order to make the project affordable, OCE considered alternative funding strategies. There are numerous ways for municipally owned water and wastewater utilities to be developed, and an infinite number of solutions for how they can be paid for. Often, in Vermont especially, utility fees for water and wastewater are paid directly by the customers (and connections) who utilize that service. As demonstrated above in Table 11, the anticipated user rates are too high for the project cost to be born entirely by the users of the system. Some communities consider the importance of municipal water and wastewater service to maintaining and developing their Village and Growth centers. As such, they assess a tax on the entire Town, as a way of ensuring that water and wastewater service can be provided at an affordable rate. This is shown as "Projected Costs as a Grandlist Tax" in **Table 12.** Under this financial model, the Town would fund the initial capital investment through a tax assessment on the grand list, and the annual operating costs of the system would be born by the users.

Table 12	
Town of South Hero	
Community Wastewater Feasibility Study	
Total Project Cost Summary with Funding Options (CWSRF Funding with known Subsidies)	
	Phase 1 to Serve Village Core Property
Alternative No.	**1A**
Wastewater Alternative	**Lavin Property (6,277 gpd)**
Total Initial Costs	$4,837,608
Subsidy (Loan Forgiveness)	$1,039,203
Loan	$3,798,405
Amount Borrowed	$3,798,405
Interest Rate	2.0%
Loan Term	30
Annual Debt Service Payment	**$169,598**
Projected Annual O&M Expenses	$20,000
Total Annual Costs	**$189,598**
PROJECTED COSTS AS A GRAND LIST TAX FOR CAPITAL INVESTMENTS	
Increase in Tax Rate ($ per hundred of valve)	$0.0337
Annual Cost for $350,000 property (Debt service only)	**$118.11**
PROJECTED COSTS AS EQUIVALENT RESIDENTIAL UNITS (ERUs)	
Capacity of System - Total Number of ERUs Served	**25**
Annual Cost of O&M Per ERU at Full Buildout	**$800**
Notes:	
1. Clean Water State Revolving Fund (CWSRF) loans are issued at 2% for 20 years, with a potential to extend to 30 years provided the useful life of the equipment is at least 30 years. Eligibility is determined from an Intended Use Plan based on a yearly Priority List.	
2. Estimates of tax rates are based on an estimated Grand List Value of $502,562,400.	
3. Estimates are based in June 2025 dollars.	

e. Short Lived Asset Reserve – As a condition of funding from CWSRF to Rural Development, and as good practice, the Town will need to show the annual budget includes a set aside line item for repair and/or replacement of short-term assets, such as equipment at pump stations. The values of these assets can be better determined during final design and permitting (Step 2) of this process.

f. Additional Cost Saving Considerations - The Total Project Cost above presents the construction costs with 1,500 gallon STEP tanks provided by, and subsequently owned, operated and maintained by the Town of South Hero. A strategy to reduce the initial capital investment costs would be to place the financial burden of the pump station on service connections on the customer. This would reduce the budget by approximately $600,000.

13.0 CONCLUSIONS/RECOMMENDATIONS/NEXT STEPS

The following actions are recommended regarding community-type wastewater solutions for the Designated Village Centers of South Hero and Keeler Bay.

- It is the opinion of Otter Creek Engineering that a combination of both expansion of the public community water supply for the village, and decentralized wastewater solution will provide the greatest long-term benefit to the Village of South Hero, and can be completed with both reasonable capital and operations expenses with adequate grant funding and community support.

- Unfortunately, investigations conducted as part of this report did not yield any community solution for the village of Keeler Bay, unless it were to be combined with a large scale community system for the Village of South Hero. As such, recommendations for Keeler Bay are to remain on individual, on site wastewater disposal systems.

- Investigations thus far have resulted in potential disposal capacity on both the Allenholm property and Lavin Property in South Hero. The onsite soils investigations have yielded capacity for the construction of a community mound wastewater disposal system on each lot.

- In both instances, the project has been supported by the Landowner. During the course of our investigation and preliminary engineering study, the Town executed an option to buy a portion of the Lavin Subdivision. A copy of the engineering analysis, including a copy of the purchase and sale agreement, titled the Lavin Memo, is provided in **Appendix R.**

- The Lavin property acquisition is unique. It provides opportunities for the Town of South Hero to construct an initial phase of wastewater development, in very close proximity to US Route 2.

- The property itself has been subdivided already, and has existing permitted wastewater capacity. The investigations thus far have yielded a potential of 6,277 gpd.

- The total acreage of land acquired by the Town is approximately 92 acres. The land could be utilized for the development of community facilities and the wastewater system.

- The Town should consider providing public outreach and information to residents on the benefits of septic system maintenance, including periodic pumping of septic tanks, and encourage installation and maintenance of effluent filters in septic tanks to keep solids from overflowing, and increase the useful life of the existing systems.

- With community interest, the Town should consider applying for Step II funds through the Clean Water State Revolving Fund for the design and permitting of community-based wastewater solutions for South Hero.

- During final design and permitting of the initial phase, Otter Creek Engineering recommends that the Lavin Site be investigated for its potential as an indirect discharge site. This should be done as

an addendum to this preliminary engineering report. The addendum should include a full review the properties historical and archaeological significance and a formal wetland delineation by a licensed wetlands ecologist. The potential for the property to support an indirect discharge system should be summarized, with anticipated capital and operational costs.

- Provide a copy of this report (when approved by the CWSRF program) to the USDA Rural Development Engineering Section for review and comment.

- Apply for construction funding through the Rural Development Program. Application enrollment has historically occurred two times per year, with the close of applications occurring in November and April. Given that the Town has completed planning, submitting an application for construction funding in November is reasonable.

- OCE recommends additional public outreach, through the use of mailings, open forum discussions and Selectboard meetings to discuss whatever project moves forward.

FIGURES



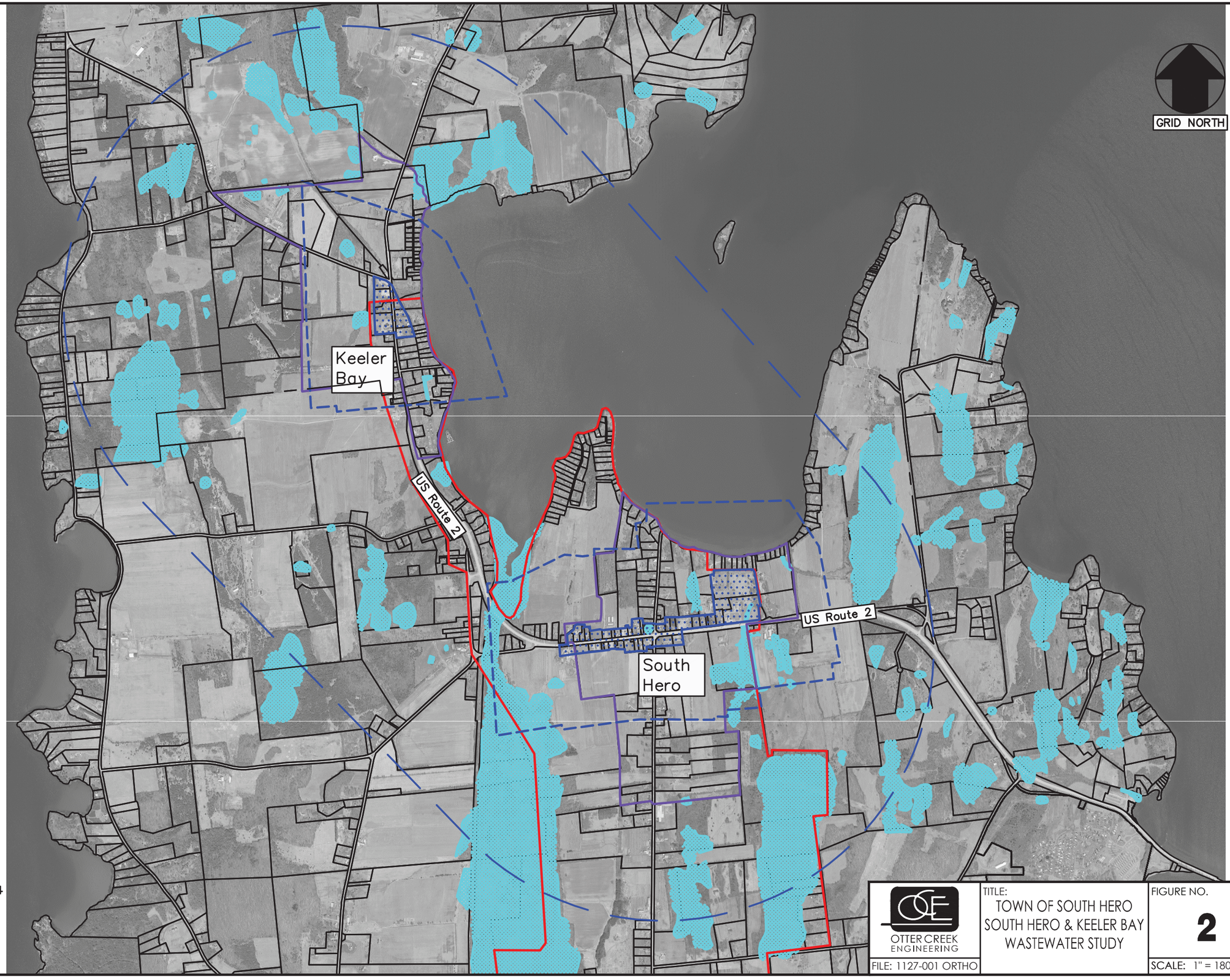
OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE:
TOWN OF SOUTH HERO
SOUTH HERO & KEELER BAY
WASTEWATER STUDY

FIGURE NO.
1

SCALE: 1" = 5,000'



LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area
- South Hero Fire District 4 service area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE:
TOWN OF SOUTH HERO
SOUTH HERO & KEELER BAY
WASTEWATER STUDY

FIGURE NO.
2

SCALE: 1" = 1800'

GRID NORTH

US Route 2

Sunset View Road

Iodine Spring Street

Tracy Road

Tracy Road

South Hero

Hill Road

US Route 2

Kibbe Point Road

Station Road

South Road

Lake View Road

London Road

LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area
- South Hero Fire District 4 service area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: SOUTH HERO VILLAGE MAP

FIGURE NO. 3

SCALE: 1" = 1000'

GRID NORTH

VT Route 314

West Shore Road

Eagle Camp Road

VT Route 314

US Route 2

West Shore Road

Keeler Bay

US Route 2

Sunset View Road

Sunset View Road

LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area
- South Hero Fire District 4 service area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: KEELER BAY VILLAGE MAP

FIGURE NO. 4

SCALE: 1" = 1000'

WW-6-1367
10 HILL ROAD
1,540 GPD

WW-6-0326-3
316 US ROUTE 2
1,836 GPD

WW-6-2361-7
38 COMMUNITY LANE
3,000 GPD

WW-6-2361-6
10 CARTER LANE
4,000 GPD

WW-6-2858
275 US ROUTE 2
5,320 GPD

GRID NORTH

US Route 2
Sunset View Road
Iodine Spring Street
Tracy Road
Tracy Road
South Hero
Hill Road
US Route 2
Kibbe Point Road
Station Road
South Road
Sunset View Road
Landon Road

LEGEND

- failed septic system
- well and 200' isolation shield
- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area
- South Hero Fire District 4 service area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE:
EXISTING WATER AND WASTEWATER SYSTEMS SOUTH HERO VILLAGE

FIGURE NO.
5

SCALE: 1" = 1000'

GRID NORTH

VT Route 314

West Shore Road

Eagle Camp Road

VT Route 314

US Route 2

WW-6-0093
564 US ROUTE 2
1,140 GPD

WW-6-0521
1 FERRY ROAD
1,440 GPD

WW-6-3395
513 US ROUTE 2
1,797 GPD

WW-6-0092
488 US ROUTE 2
1,755 GPD

WW-6-2515-6
466&456 US ROUTE 2
2,916 GPD

Keeler Bay

West Shore Road

US Route 2

Sunset View Road

Sunset View Road

LEGEND

- failed septic system
- well and 200' isolation shield
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE:
EXISTING WATER AND WASTEWATER SYSTEMS
KEELER BAY VILLAGE

FIGURE NO.
6

SCALE: 1" = 1000'

GRID NORTH

AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
AREA 6
AREA 7

LEGEND

- ON SITE SEWAGE DISPOSAL RATING 1
- ON SITE SEWAGE DISPOSAL RATING 2
- ON SITE SEWAGE DISPOSAL RATING 3
- ON SITE SEWAGE DISPOSAL RATING 4
- ON SITE SEWAGE DISPOSAL RATING 5
- POTENTIAL SOIL INVESTIGATION AREA
- village center
- village zoning boundary
- village center boundary
- investigation area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: SOILS MAP

FIGURE NO. 7

SCALE: 1" = 1000'


GRID NORTH
n/f Brenda & Guy M II Goulet Life Tenant
n/f Lighthouse Estates LLC
US Route 2
Sunset View Road
Iodine Spring Street
Tracy Road
n/f David & Susan Indell
n/f Islandacres Farm LLC
n/f Gardner Construction
Hill Road
South Hero
n/f Ralph W. Lawrence Jr.
n/f Hse Realty LLC
n/f Martin & Patricia Lavin
Kibbe Point Road
n/f Sunset Lake Farm #2 LLC
Station Road
South Road
n/f Brent Hazen Trust
Lake View Road
n/f Roy Family Trust
n/f Reynold & Celia Hackett
n/f Ray W. Allen
n/f Ruth Cameron & Children
Landon Road
LEGEND
AaB SOIL MAP UNIT SYMBOL
failed septic system
POTENTIAL WASTEWATER SITE
village center
village zoning boundary
village center boundary
investigation area
conserved land
n/f Brent Hazen Trust landowner
OTTER CREEK ENGINEERING
TITLE:
POTENTIAL SITES FOR SOUTH HERO VILLAGE
FIGURE NO.
8
FILE: 1127-001 ORTHO
SCALE: 1" = 1000'

GRID NORTH

LEGEND

- AaB — SOIL MAP UNIT SYMBOL
- failed septic system
- POTENTIAL WASTEWATER SITE
- village center
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- n/f Brent Hazen Trust — landowner

VT Route 314
West Shore Road
Eagle Camp Road
US Route 2
Sunset View Road
Keeler Bay
n/f Timothy E. & Jill H. Maxham
n/f Trust Company of VT
n/f Glenn & Kimberly Ravdin Family Rev Trust
n/f Brenda & Guy M II Goulet Life Tenant
n/f David & Doris Brownell
n/f Sharon Dubuque
n/f Lighthouse Estates LLC

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: POTENTIAL SITES FOR KEELER BAY VILLAGE

FIGURE NO. 9

SCALE: 1" = 1000'

GRID NORTH

US Route 2

Sunset View Road

Iodine Spring Street

Tracy Road

Tracy Road

South Hero

Hill Road

US Route 2

Kibbe Point Road

Station Road

Lake View Road

South Road

Landon Road

LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- LOW PRESSURE FORCE MAIN

OTTER CREEK ENGINEERING

TITLE:

SOUTH HERO FORCE MAIN

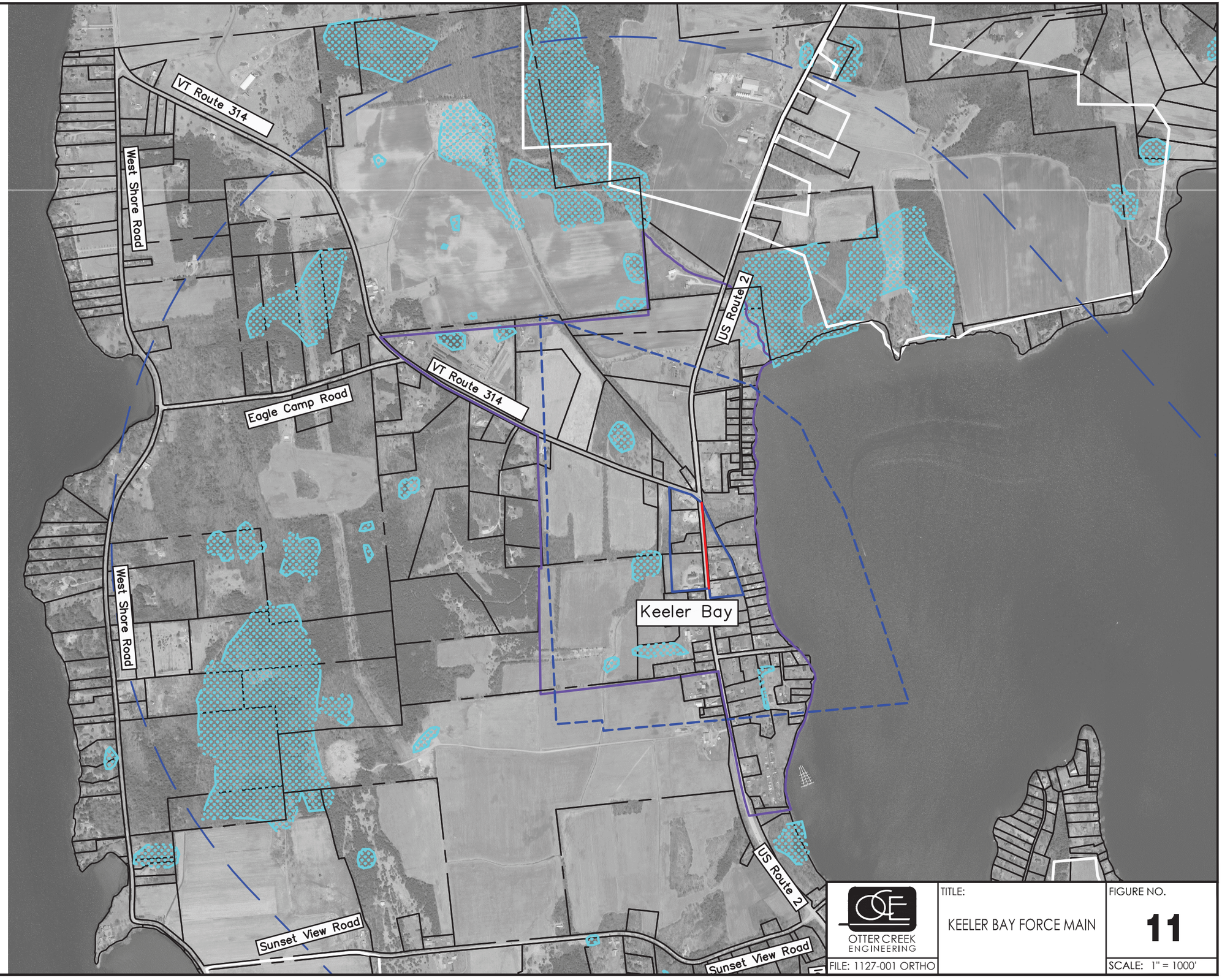
FIGURE NO.

10

FILE: 1127-001 ORTHO

SCALE: 1" = 1000'

GRID NORTH



LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- LOW PRESSURE FORCE MAIN

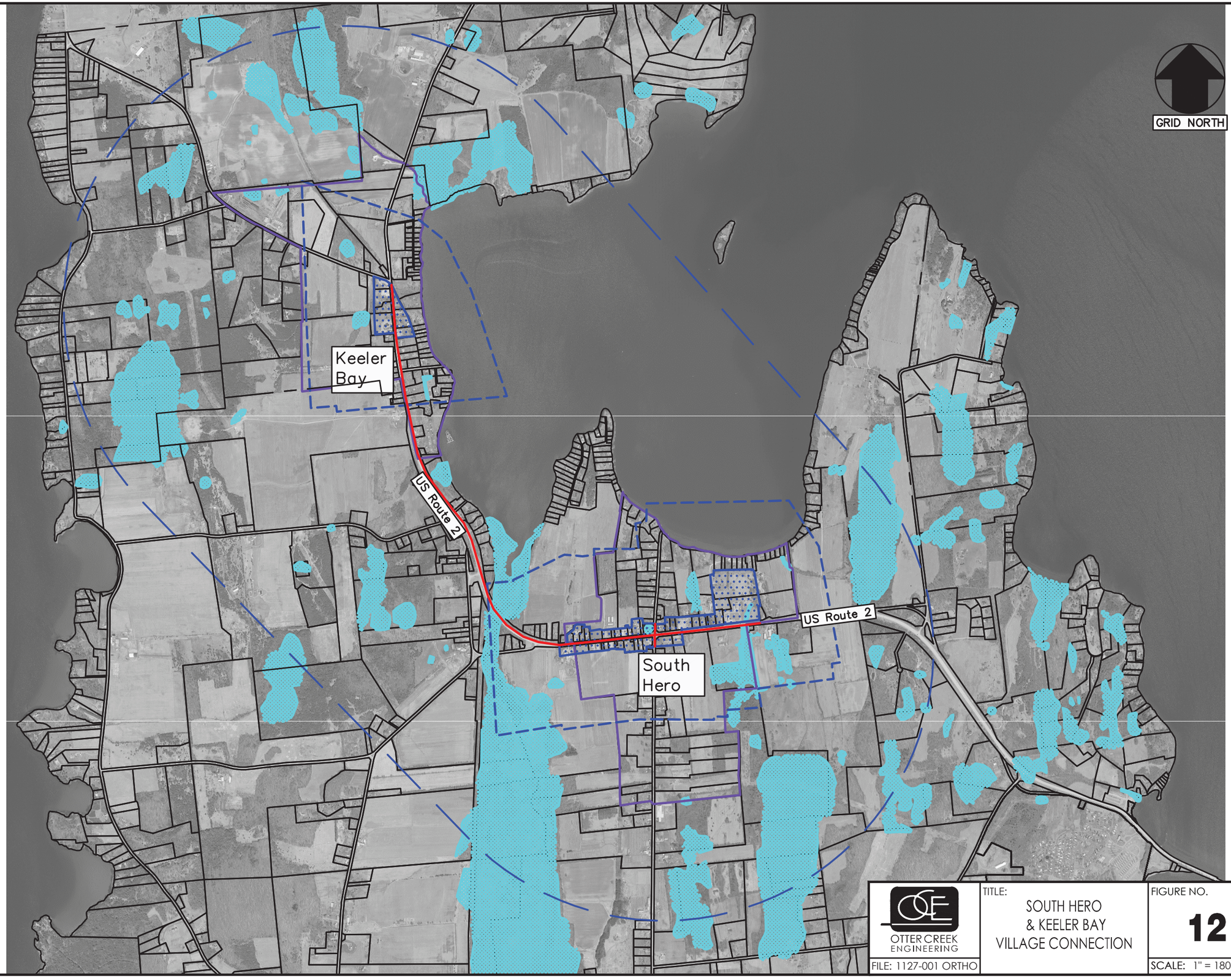
OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: KEELER BAY FORCE MAIN

FIGURE NO. 11

SCALE: 1" = 1000'



LEGEND

- VSWI mapped wetland
- village center
- village zoning boundary
- village center boundary
- 5000' investigation area
- 1320' investigation area

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE:

SOUTH HERO & KEELER BAY VILLAGE CONNECTION

FIGURE NO.

12

SCALE: 1" = 1800'

FUTURE PHASE FOR EAST SIDE OF VILLAGE AND INFILL DEVELOPMENT

FUTURE PHASE FOR WEST SIDE OF VILLAGE AND INFILL DEVELOPMENT

PHASE 1 ALLENHOLM PROPERTY

PHASE 1 LAVIN PROPERTY

GRID NORTH

US Route 2

Sunset View Road

Iodine Spring Street

Tracy Road

Hill Road

South Road

Station Road

Lake View Road

Kibbe Point Road

Landon Road

South Hero

n/f Brenda & Guy M II Goulet Life Tenant

n/f Lighthouse Estates LLC

n/f David & Susan Allen

n/f Islandacres Farm LLC

n/f Gardner Construction

n/f Ralph W. Lawrence Jr.

n/f Hse Realty LLC

n/f Martin & Patricia Lavin

n/f Sunset Lake Farm #2 LLC

n/f Brent Hazen Trust

n/f Roy Family Trust

n/f Reynold & Celia Hackett

n/f Ray W. Allen

n/f Ruth Cameron & Children

LEGEND

- AaB — SOIL MAP UNIT SYMBOL
- failed septic system
- POTENTIAL WASTEWATER SITE
- village center
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- n/f Brent Hazen Trust — landowner

OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: SOUTH HERO VILLAGE ON SITE DISPOSAL ALTERNATIVE NO. 1 CLUSTER SYSTEMS - PHASE

FIGURE NO. 13

SCALE: 1" = 1000'

GRID NORTH

n/f Brenda & Guy M II Goulet Life Tenant

n/f Lighthouse Estates LLC

n/f David & Susan Indell

n/f Islandacres Farm LLC

n/f Gardner Construction

n/f Ralph W. Lawrence Jr.

n/f Hse Realty LLC

n/f Martin & Patricia Lavin

n/f Sunset Lake Farm #2 LLC

n/f Brent Hazen Trust

n/f Roy Family Trust

n/f Reynold & Celia Hackett

n/f Ruth Cameron & Children

n/f Ray W. Allen

US Route 2

Sunset View Road

Iodine Spring Street

Tracy Road

Hill Road

Kibbe Point Road

Station Road

South Road

Lake View Road

Landon Road

South Hero

LEGEND

- AaB — SOIL MAP UNIT SYMBOL
- failed septic system
- POTENTIAL SPRAYFIELD
- village center
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- n/f Brent Hazen Trust — landowner

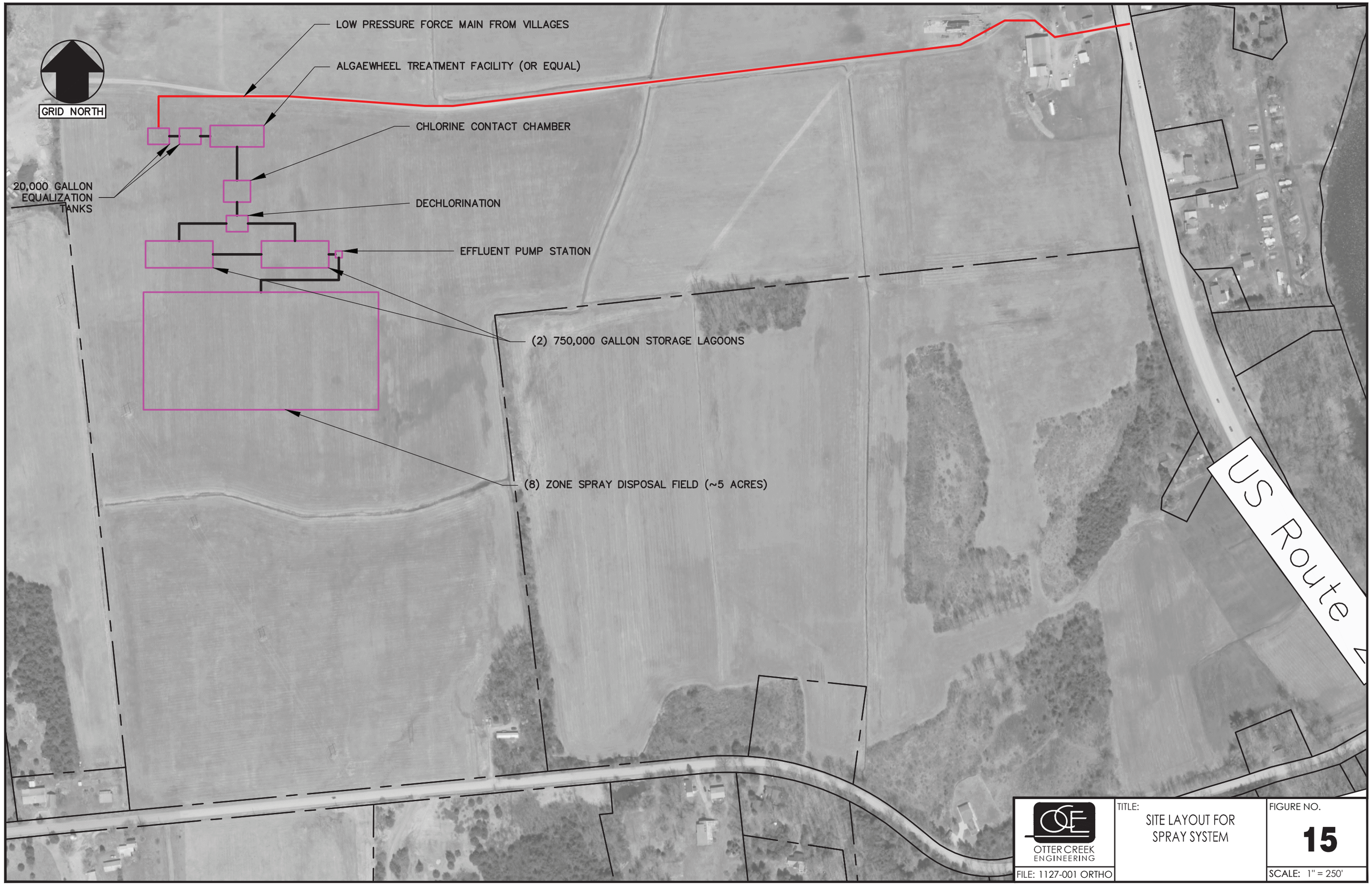
OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

TITLE: POTENTIAL SITES FOR SPRAYFIELDS

FIGURE NO. 14

SCALE: 1" = 1000'



OTTER CREEK ENGINEERING

FILE: 1127-001 ORTHO

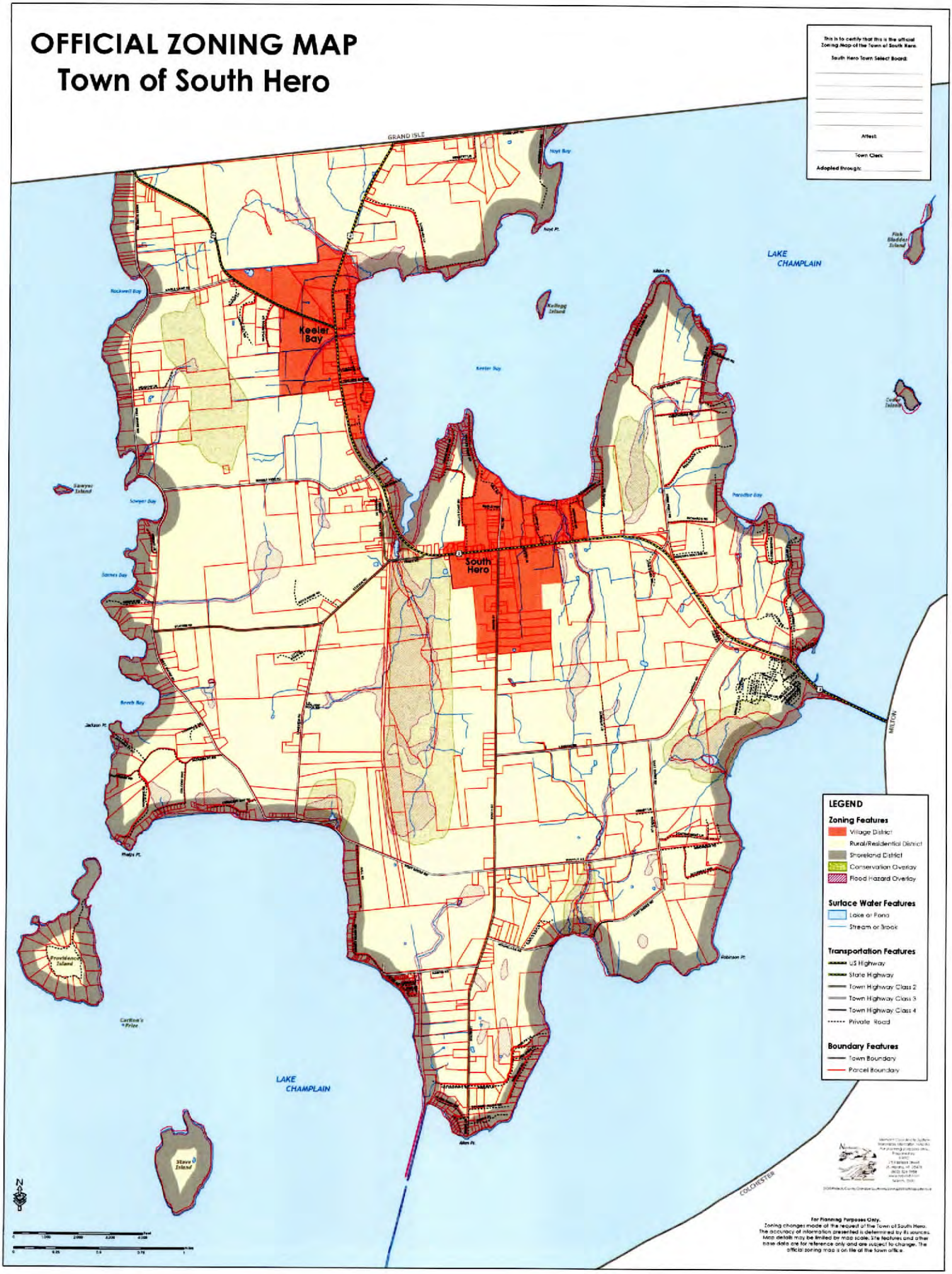
TITLE: SITE LAYOUT FOR SPRAY SYSTEM

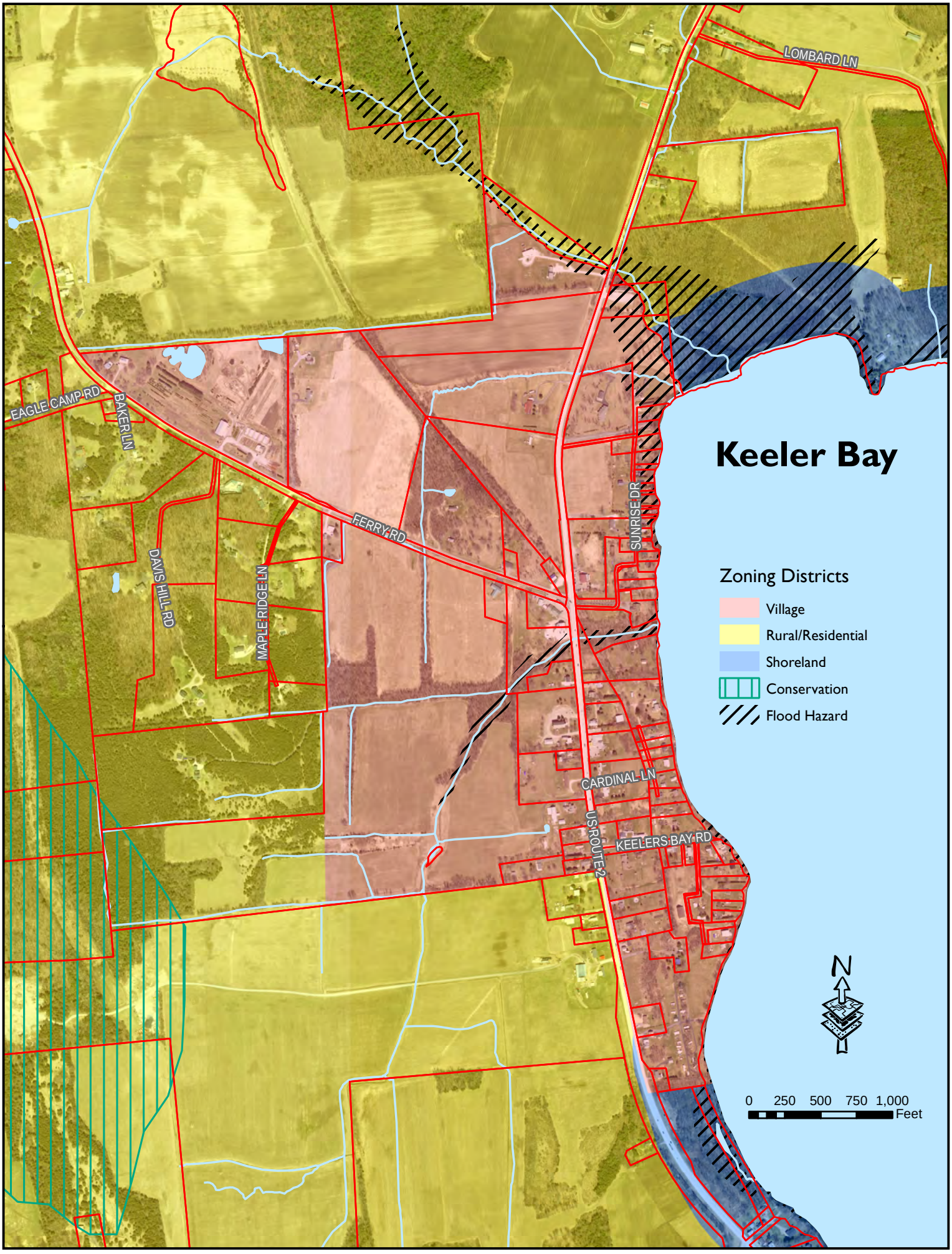
FIGURE NO. 15

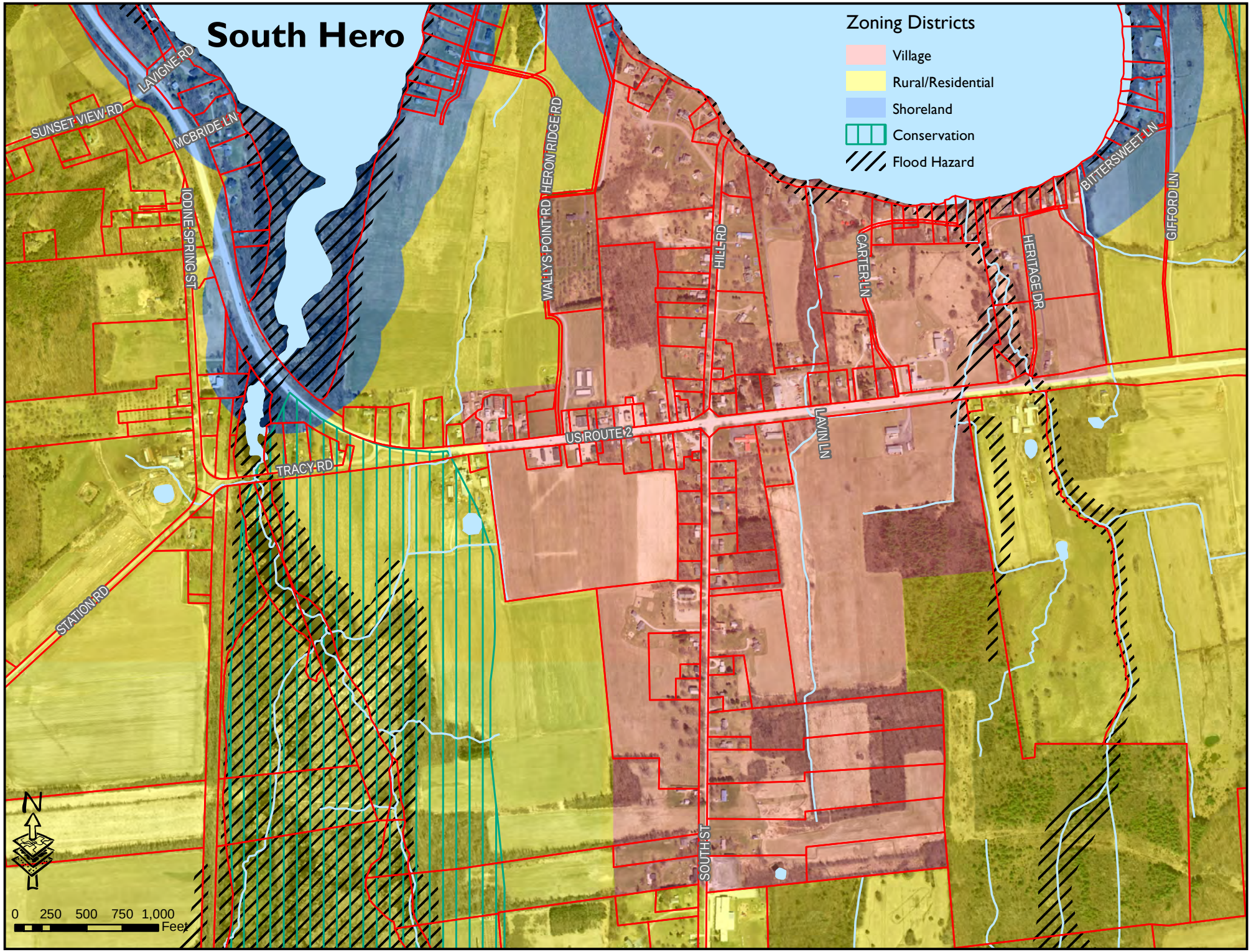
SCALE: 1" = 250'

APPENDIX A – ZONING MAPS

OFFICIAL ZONING MAP
Town of South Hero



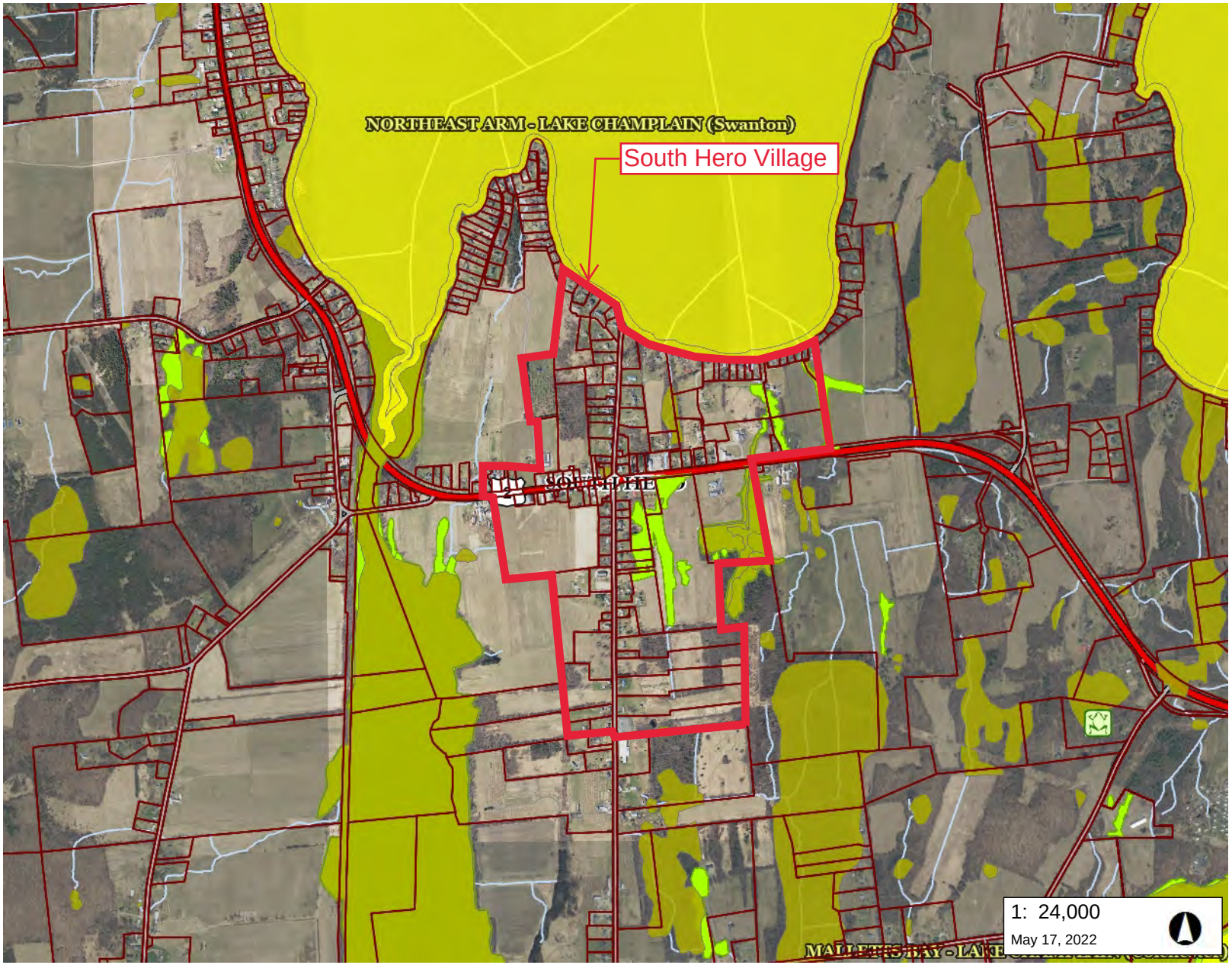

Keeler Bay
LOMBARD LN
EAGLE CAMP RD
BAKER LN
FERRY RD
DAVIS HILL RD
MAPLE RIDGE LN
SUNRISE DR
CARDINAL LN
US ROUTE 2
KEELERS BAY RD
Zoning Districts
Village
Rural/Residential
Shoreland
Conservation
Flood Hazard
N
0 250 500 750 1,000
Feet


South Hero
Zoning Districts
Village
Rural/Residential
Shoreland
Conservation
Flood Hazard
LAVIGNE RD
SUNSET VIEW RD
MCBRIDE LN
IODINE SPRING ST
WALLYS POINT RD
HERON RIDGE RD
HILL RD
CARTER LN
HERITAGE DR
BITTERSWEET LN
GIFFORD LN
US ROUTE 2
LAVIN LN
TRACY RD
STATION RD
SOUTH ST
N
0 250 500 750 1,000
Feet

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LEGEND

- Vernal Pools Confirmed – AE/V
- Vernal Pools Unconfirmed – AI
- 303(d) List of Impaired Stream
- 303(d) List of Impaired Lakes a
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Wetlands Advisory Layer
- Parcels (standardized)
- 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
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

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THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

Vermont Agency of Natural Resources

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LEGEND

- Landfills
  - OPERATING
  - CLOSED
- Hazardous Site
- Hazardous Waste Generators
- Salvage Yard
- Dry Cleaner
- Parcels (standardized)
- 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
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

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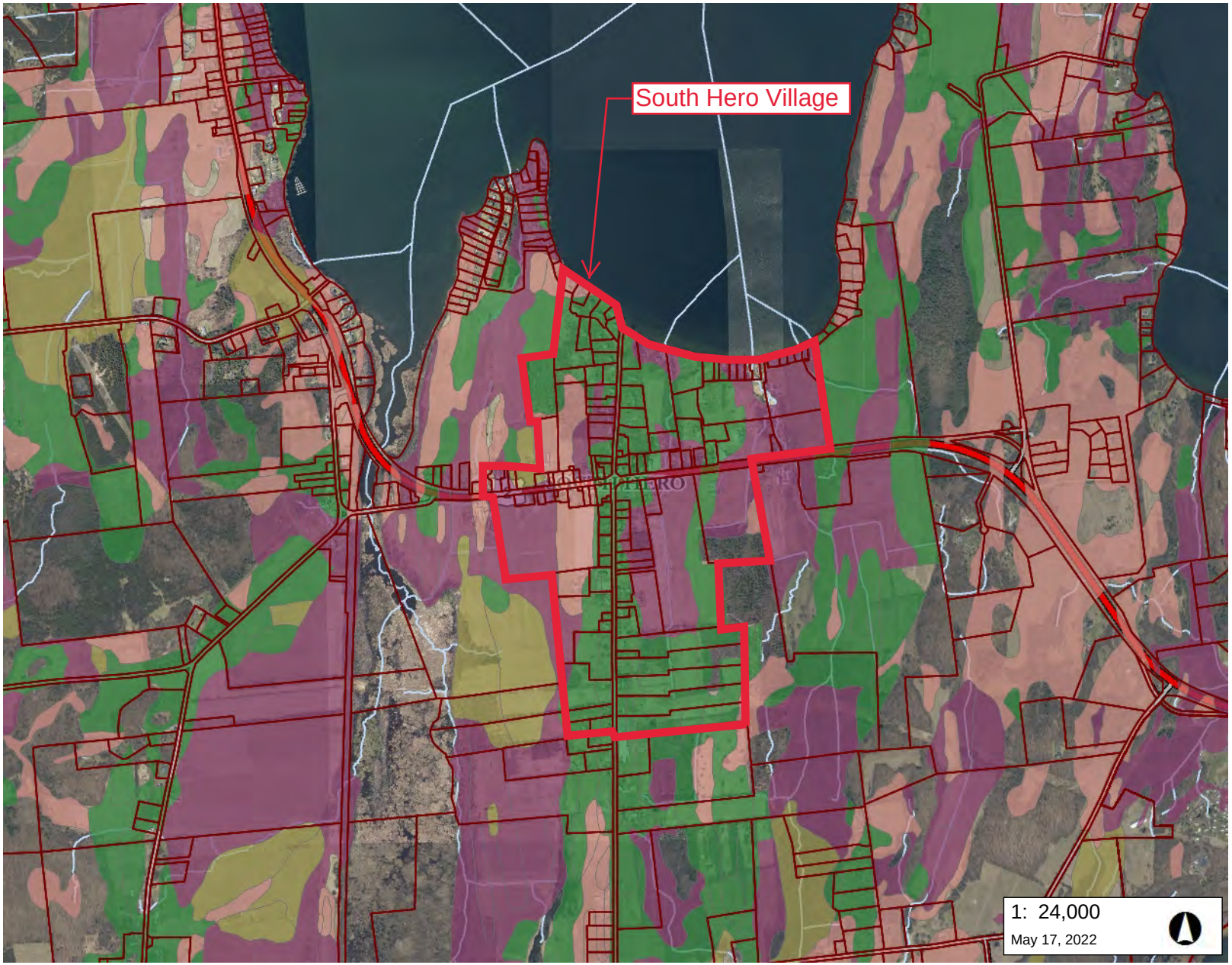
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Vermont Agency of Natural Resources

Vermont Agency of Natural Resources

vermont.gov





LEGEND

Soils - Prime Agricultural

- Local
- Local (b)
- Not rated
- Prime
- Prime (b)
- Prime (f)
- Statewide
- Statewide (a)
- Statewide (b)
- Statewide (c)

Parcels (standardized)

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

Stream/River

- Stream
- Intermittent Stream

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

© Vermont Agency of Natural Resources

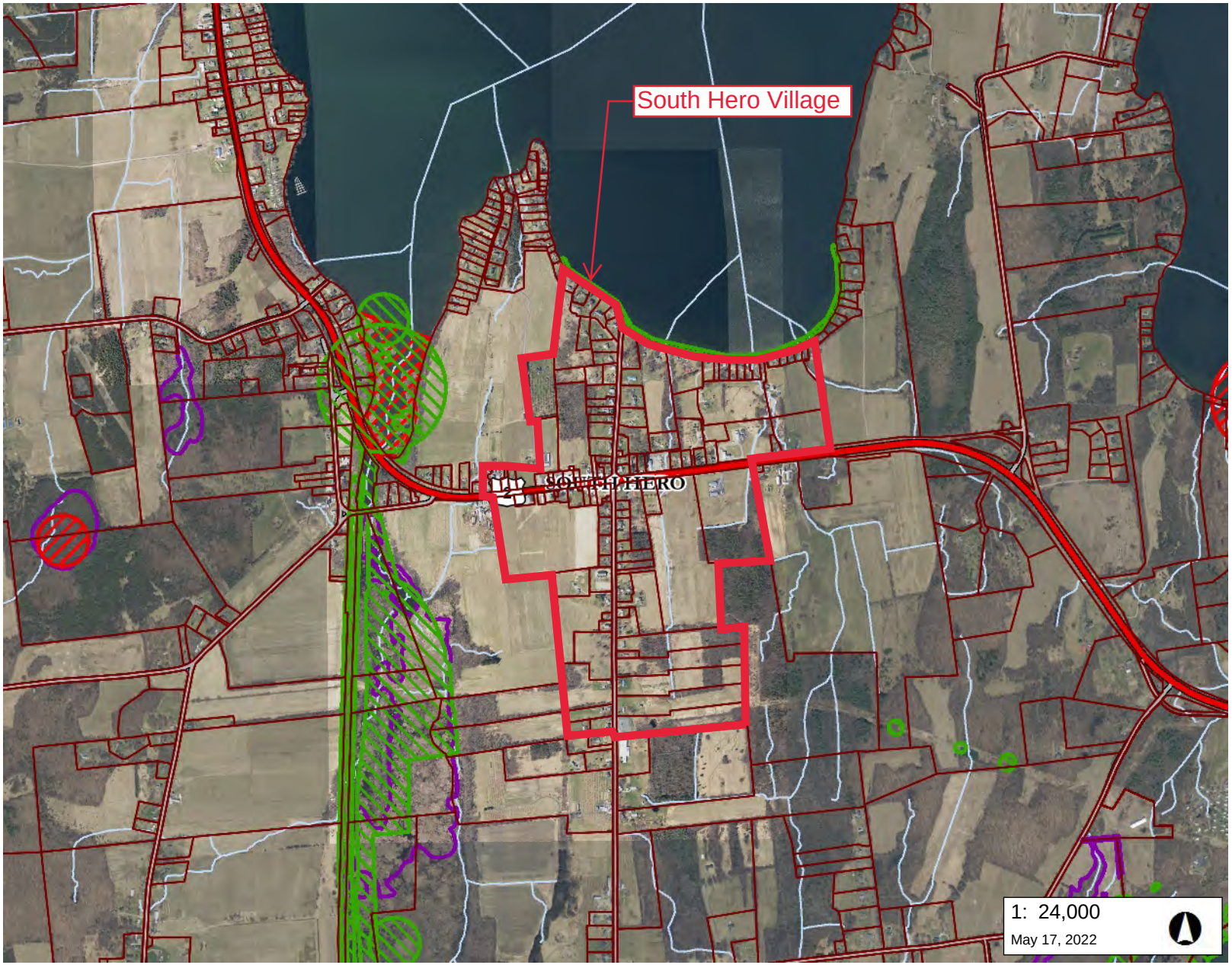
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Vermont Agency of Natural Resources

Vermont Agency of Natural Resources

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LEGEND

- Rare Threatened Endangered
  - Threatened or Endangered
  - Rare
- Significant Natural Community
- Parcels (standardized)
- 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
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

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VERMONT

State of Vermont

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Waste Management Division
103 South Main Street/West Building
Waterbury, VT 05671-0404
(802) 241-3731
FAX (802) 241-3296
Ashley.Desmond@state.vt.us

February 3, 2010

St. Rose of Lima Parish
Attn: Bette Grenon
501 US Route 2
South Hero, VT 05486

RE: Petroleum Contamination
Site: St. Rose of Lima Parish, 501 US Route 2, South Hero, VT (SMS Site #2009-4015)

Dear Ms. Grenon,

The Sites Management Section (SMS) has received the *Underground Storage Tank (UST) Closure Assessment and Site Investigation Report*, which was submitted by Environmental Products & Services of VT (EPS VT) and dated November 30, 2009. Petroleum contamination was recently encountered at this property during the removal of a heating oil UST.

On October 7, 2009, EPS VT oversaw the removal of one 3,000-gallon #2 heating oil UST. Soil surrounding the tank was screened for petroleum vapors using a photoionization detector (PID) and had a peak reading of 464 parts per million (ppm). After the removal of approximately 16 tons of petroleum contaminated soil, PID readings were found to be below 1 ppm throughout the excavation. No substantial groundwater impacts were observed during the soil removal activity. Bedrock was encountered at 7 feet below grade.

Based on the results of the UST removal, no additional subsurface investigation work is required at this property. The onsite soil stockpile should remain polyencapsulated until. The stockpile can either be monitored while contaminants naturally degrade, or it can be transported to an approved offsite disposal facility. If you choose to monitor the stockpile, your environmental consultant should screen the soils periodically to determine if it meets the criteria for onsite spreading (no elevated PID readings, no visual or olfactory evidence of petroleum contamination). The upfront costs for disposal of the soils would be greater, though the total costs would likely be similar to long-term monitoring of the stockpile. Also, any drinking water supplies located within a 500-foot radius of the site should be sampled for volatile organic compounds (VOCs) using EPA Method 524.2. A brief work plan should be submitted for the above work within the next fifteen days. Drinking water samples should be collected within the next month.

Please feel free to call me with any questions you may have. I can be reached at (802) 241-3731.

Sincerely,

Ashley Desmond, Environmental Analyst
Sites Management Section

c: Jerry Howell, EPS VT (sent via e-mail)
DEC Regional Office – Essex Junction (sent via e-mail)
South Hero Selectboard
South Hero Health Officer

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

OCT 2 5 1995

October 24, 1995

Ms. Linda Elliot, Site Manager
Hazardous Materials Management Division
Department of Environmental Conservation
103 Sonth Main Street
Waterbury, Vermont 05671-0404

Re: Allen's Garage, South Hero, Vermont
DEC Site #951857, JCO #1-1953-4 (054)

Dear Linda:

Following please find the results of laboratory analysis of soil samples collected on September 27, 1995 from the referenced site. The sampling and laboratory analysis were conducted pursuant to your approval letter of September 22, 1995.

SUMMARY

Three soil samples were collected from the north side of Allen's Garage on September 27, 1995 for chemical analysis, to ascertain whether soil removal and enhanced ex-situ biodegradation would be an appropriate remedial mechanism. The results of the laboratory analysis indicate that:

A. none of the metals which were tested for, were reported to be present at concentrations in excess of EPA risk-based standards for industrial sites, nor were any reported metals concentration values outside of published ranges of values for uncontaminated soils;

B. One volatile organic compound (VOC, tetrachloroethylene) was reported from one soil sample closest to the floor drain outlet, at a reported concentration below EPA risk based standards for soils beneath industrial and residential sites;

C. No PCB compounds were reported from any soil sample at concentrations above the method detection limits;

D. Total Petroleum Hydrocarbon concentrations reported in the soil samples ranged from <1 mg/kg to 283 mg/kg.

Based upon these findings, we recommend that some of the soils that presently exist north of the existing building, be removed and treated via enhanced static pile method. The guidance for whether soils are removed should be the DEC's published threshold of 10 ppmV as measured on a photoionization device during a field headspace analysis. Soils which are reported to be contaminated, but which do not exceed 10 ppmV during the field headspace analysis, are proposed to remain in-place. It should be noted that the prospective purchaser of this property proposes to construct a building on a concrete slab over the area in question, and as a result, the residual soils will be covered with and surrounded by concrete structures. This should minimize future environmental exposure of the soils once the building is constructed, but may necessitate health and safety precautions for workers during the excavation and concrete work.

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

OCT 2 5 1995

October 24, 1995

Ms. Linda Elliot, Site Manager
Hazardous Materials Management Division
Department of Environmental Conservation
103 Sonth Main Street
Waterbury, Vermont 05671-0404

Re: Allen's Garage, South Hero, Vermont
DEC Site #951857, JCO #1-1953-4 (054)

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SAMPLE COLLECTION

Three sets of soil samples were collected from the north side of the referenced site by The Johnson Company on September 27. The sampling locations are indicated on the attached Schematic Site Sketch. The intent of the soil sample collection and analysis was to characterize the existing soil conditions in three locations on the north side of the building:

A) immediately adjacent to the floor drain outlet (SS-1);
B) beneath the former junk vehicle storage area (SS-2); and
C) a "background" or uncontaminated location from the vicinity (SS-3).

Each soil sample was collected using a shovel and trowel which were decontaminated before use and between uses.

SAMPLE ANALYSIS

Each soil sample was analyzed for selected metals via matrix digestion (Arsenic, Barium, Cadmium, Chromium, Copper, Iron, Lead, Zinc); and for organic compounds (Volatiles via Method 8260; PCBs via Method 8081; and Total Petroleum Hydrocarbons via Modified Method 8100). Samples which were collected for analysis of total metals were delivered to Green Mountain Laboratories, Inc. in Middlesex, Vermont on September 27. Samples which were collected for analysis of organic compounds were delivered via Courier to Analytics Environmental Laboratories Inc. of Portsmouth, New Hampshire on September 29, 1995. Copies of the reports from each of these laboratories are attached.

RESULTS OF SAMPLE ANALYSIS

Table 1 lists the range of laboratory-reported concentrations for each analyte in soil samples. Analytes and compounds which were tested for but which are not listed in the following table, were not reported above detection limits. The appropriate EPA Region III Risk-based industrial site standard and "normal uncontaminated soil" analyte concentration ranges are provided for comparative purposes. Where more than one "normal" range of analyte concentration in soil was available, the most conservative (i.e., narrowest) is provided.

Table 1: Laboratory Reported Analytes and Compounds in Soil Samples Collected on September 27, 1995

Reported Analyte or Compound	SS-1 Reported Concentration (mg/kg unless noted) ppm	SS-2 Reported Concentration (mg/kg unless noted) ppm	SS-3 Reported Concentration (mg/kg unless noted) ppm	Normal Soil Published Range (mg/kg) ppm	EPA Region III Industrial Site Standard (4) (mg/kg) ppm
Arsenic	1.3	0.64	1.0	1-50 (1)	3.3
Barium	100	100	120	100-500 (1)	140,000
Cadmium	0.70	0.44	0.22	0.01-7 (3)	1,000
Chromium	22	13	16	0.02-1,000 (3)	10,000
Copper	58	30	26	5-100 (1)	76,000
Iron	23,000	19,000	15,000	5,000-50,000 (2)	(none)
Lead	<0.005	77	0.83	10-200 (2)	(none)
Zinc	180	120	100	50-300 (2)	610,000
Tetrachloro-ethene	109 ug/kg ppb	< 22 ug/kg	< 26 ug/kg	--	110 mg/kg (12 mg/kg residential)
TPH	81	283	< 1	--	(none)

20x GW Standard PPM

1000
20
100
1000
20
6
400/ DOH 300
100
14
1000 ppm

Footnotes:

1 Reference: Brady, 1974, "The Nature and Properties of Soils", 8th Edition, MacMillan Publishing Company, page 23.
2 Reference: Mason, 1966, "Principles of Geochemistry", 3rd Edition, John Wiley and Sons, page 152.
3 Reference: Bohn, 1979, "Soil Chemistry", John Wiley and Sons, pages 298-299.
4 Reference: USEPA, February 1995, "Region III Risk Based Concentration Tables"

All of the reported inorganic testing results fell within the limits of the published ranges for uncontaminated soils. Additionally, written guidance from the Vermont Department of ~~Environmental~~ Health (see attached memo) recommends an action level for lead in soils of 300 ppm, above which in-place management or interim controls are required. The highest reported lead concentration from these soils is less than 300 ppm, and therefore no action is recommended due to reported lead concentrations.

Also as indicated in Table 1, one VOC (tetrachloroethylene) was reported from sample SS-1 at a concentration of 109 ppb. The state of Vermont presently has no published soil standards for organic compounds, however, the U.S. E.P.A. Region III Risk Based standards are an alternative which had previously been used by the DEC. The Region III soil standards for tetrachloroethylene are 110

mg/kg in industrial settings and 12 mg/kg in residential settings. These standards are three and two orders of magnitude higher, respectively, than is the reported concentration of tetrachloroethylene in SS-1. Also, the reported concentration of tetrachloroethylene in SS-1 would not induce a failing TCLP extraction even if 100% of the compound were extracted during the test (see attached calculations). Given that this concentration is far below the EPA risk-based concentration for this compound in an industrial or residential setting, and that the reported concentration indicates that it could not fail a TCLP test, we recommend that no further action be taken besides the proposed overall remedial action.

RECOMMENDATIONS

Based upon the additional data and information provided by this work, we recommend that the contaminated soils on the north side of the building which exceed the excavation thresholds mentioned above, be excavated and replaced with clean backfill. These soils can be polyencapsulated as provided for in the DEC's "Agency Guidelines for Petroleum Contaminated Soil and Carbon Media". We recommend that an admix of 3 parts soil to 1 part cow manure be placed on and covered with plastic sheeting to provide nutrients, organic matter and bacteria to hasten the bioremediation process. Appropriate samples of excavated and residual soils can be collected before or during the excavation process to provide a baseline for remedial progress. An appropriate pile monitoring schedule and methodology will be created to monitor remedial progress.

Due to the residential surroundings, the probable length of time needed for bioremediation (several years) and the relative lack of available space on-site, we recommend that these soils be polyencapsulated at an off-site location. The Town of South Hero has offered the use of their now-closed landfill site for this soil pile. This site is located in an extremely isolated portion of the Town of South Hero, approximately 1,000 feet from the nearest residence, surface water body or water supply well. This site contains sufficient room for a large soil pile (30' x 40' x 6' deep needed), is not visible from any public right of way or private residence, and offers secured access as well.

Please review this information and do not hesitate to contact me at (802) 229-4600 if you have any questions. If you approve of this course of action, we can prepare a corrective action plan for the site which includes detailed and specific information on the proposed remedial work. Thank you.

Sincerely,

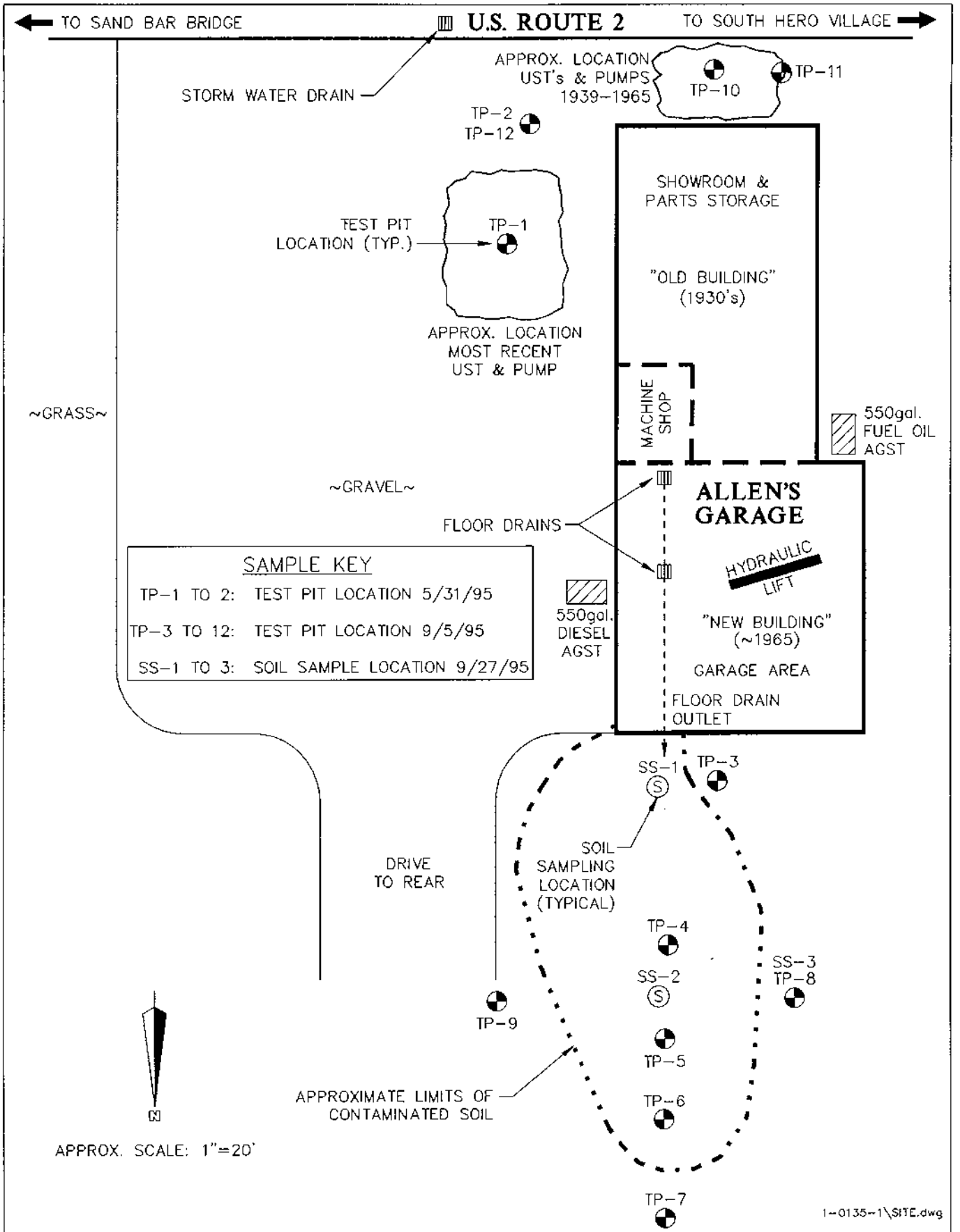
THE JOHNSON COMPANY, INC.

By: _____

Alan R. Liptak
Senior Scientist

Enclosure

cc: Mr. Malcolm Allen, Allen's Garage
Mr. Warren Steadman, Town of South Hero



SCHEMATIC SITE SKETCH
ALLEN'S GARAGE
SOUTH HERO, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602

Green Mountain Laboratories, Inc.

RR#3, Box 5210
Montpelier, Vermont 05602
Phone: (802) 223-1468 Fax: (802) 223-8688

LABORATORY RESULTS

CLIENT NAME:	The Johnson Company	REF#:	0190
ADDRESS:	5 State Street Montpelier, VT 05602	PROJECT #:	na
SAMPLE LOCATION:	Allen's Garage	DATE OF SAMPLE:	9/27/95
SAMPLER:	Alan Liptak	DATE OF SAMPLE RECEIPT:	9/27/95
		DATE OF ANALYSIS:	10/5,9,12 & 13/95
ATTENTION:	Alan Liptak	DATE OF REPORT:	10/19/95

Metals Analysis by AA, flame/ ETA (mg/kg)

Parameter	Date	SS1	SS2	SS3	MDL mg/l	PQL mg/kg
Arsenic	10/19/95	1.3	0.64	1.0	0.005	0.5
Barium	10/19/95	100	100	120	0.01	1.0
Cadmium	10/19/95	0.70	0.44	0.22	0.0005	0.05
Chromium	10/19/95	22	13	16	0.005	0.5
Copper	10/19/95	58	30	26	0.05	5.0
Iron	10/19/95	23,000	19,000	15,000	0.05	5.0
Lead	10/19/95	BPQL	77	0.83	0.005	0.5
Zinc	10/19/95	180	120	100	0.05	5.0

Reviewed By

Althea L. Lindell
Director of Chemistry

analytics environmental laboratory, inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

RECEIVED
OCT - 9 1995
JOHNSON CO. INC.
MONTPELIER, VT

ARL

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

Re: Allens Garage, So. Hero Vt. **1-01356-1**

Enclosed are the results of the analyses on your sample(s). Please see individual reports for specific methodologies and references. Samples were received in acceptable condition, with the exeception noted on the chain of custody.

If you have any further question on the analytical methods or these results, do not hesitate to call.

Lab Number	Sample Date	Station Location	Analysis	Comments
35412-1	09/27/95	SS-1	Mod. EPA 8100	
	09/27/95	SS-1	EPA 8081 (PCBs only)	
	09/27/95	SS-1	EPA 8260	
35412-2	09/27/95	SS-2	Mod. EPA 8100	
	09/27/95	SS-2	EPA 8081 (PCBs only)	
	09/27/95	SS-2	EPA 8260	
35412-3	09/27/95	SS-3	Mod. EPA 8100	
	09/27/95	SS-3	EPA 8081 (PCBs only)	
	09/27/95	SS-3	EPA 8260	

Analytics Environmental Laboratory is certified by the states of New Hampshire, Maine, and Massachusetts. A list of actual certified tests is available upon request.

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-1

SAMPLE DATA

Lab #:	35412-1
Matrix:	Soil
Percent Solid:	75
Dilution Factor:	14
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Analysis Date:	10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
Vinyl chloride	28	ND	1,2-Dichloroethane	28	ND
1,1-Dichloroethene	28	ND	1,1,1-Trichloroethane	28	ND
cis-1,2-Dichloroethene	28	ND	1,1,2-Trichloroethane	28	ND
trans-1,2-Dichloroethene	28	ND	1,1,1,2-Tetrachloroethane	28	ND
Trichloroethene	28	ND	1,1,2,2-Tetrachloroethane	28	ND
Tetrachloroethene	28	109	Chlorobenzene	28	ND
Chloromethane	28	ND	Benzene	28	ND
Methylene chloride	28	ND	Toluene	28	ND
Chloroform	28	ND	Ethylbenzene	28	ND
Carbon tetrachloride	28	ND	o-Xylene	28	ND
Bromodichloromethane	28	ND	m,p-Xylene	28	ND
Dibromochloromethane	28	ND	Methyl t-butyl ether	28	ND
Bromoform	28	ND	o-Dichlorobenzene	28	ND
Chloroethane	28	ND	m-Dichlorobenzene	28	ND
1,1-Dichloroethane	28	ND	p-Dichlorobenzene	28	ND

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-1

SAMPLE DATA

Lab #:	35412-1
Matrix:	Soil
Percent Solid:	75
Dilution Factor:	14
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Analysis Date:	10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
1,2-Dichloropropane	28	ND	Dichlorodifluoromethane	28	ND
cis-1,3-Dichloropropene	28	ND	Trichlorofluoromethane	28	ND
trans-1,3-Dichloropropene	28	ND	Styrene	28	ND
n-Butylbenzene	28	ND	Naphthalene	28	ND
sec-Butylbenzene	28	ND	Bromobenzene	28	ND
tert-Butylbenzene	28	ND	Bromochloromethane	28	ND
2-Chlorotoluene	28	ND	Bromomethane	28	ND
4-Chlorotoluene	28	ND	1,2-Dibromo-3-chloropropane	28	ND
Isopropylbenzene	28	ND	1,2-Dibromoethane	28	ND
4-Isopropyltoluene	28	ND	Dibromomethane	28	ND
n-Propylbenzene	28	ND	1,3-Dichloropropane	28	ND
1,2,3-Trichlorobenzene	28	ND	2,2-Dichloropropane	28	ND
1,2,4-Trichlorobenzene	28	ND	1,1-Dichloropropene	28	ND
1,2,4-Trimethylbenzene	28	ND	Hexachlorobutadiene	28	ND
1,3,5-Trimethylbenzene	28	ND	1,2,3-Trichloropropane	28	ND

Surrogate Standard Recovery

d4-1,2-Dichloroethane	77 %	d8-Toluene	79 %	Bromofluorobenzene	90 %

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

COMMENTS: **Results are expressed on a dry weight basis.**

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-2

SAMPLE DATA

Lab #:	35412-2
Matrix:	Soil
Percent Solid:	92
Dilution Factor:	11
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Analysis Date:	10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
Vinyl chloride	22	ND	1,2-Dichloroethane	22	ND
1,1-Dichloroethene	22	ND	1,1,1-Trichloroethane	22	ND
cis-1,2-Dichloroethene	22	ND	1,1,2-Trichloroethane	22	ND
trans-1,2-Dichloroethene	22	ND	1,1,1,2-Tetrachloroethane	22	ND
Trichloroethene	22	ND	1,1,2,2-Tetrachloroethane	22	ND
Tetrachloroethene	22	ND	Chlorobenzene	22	ND
Chloromethane	22	ND	Benzene	22	ND
Methylene chloride	22	ND	Toluene	22	ND
Chloroform	22	ND	Ethylbenzene	22	ND
Carbon tetrachloride	22	ND	o-Xylene	22	ND
Bromodichloromethane	22	ND	m,p-Xylene	22	ND
Dibromochloromethane	22	ND	Methyl t-butyl ether	22	ND
Bromoform	22	ND	o-Dichlorobenzene	22	ND
Chloroethane	22	ND	m-Dichlorobenzene	22	ND
1,1-Dichloroethane	22	ND	p-Dichlorobenzene	22	ND

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-2

SAMPLE DATA

Lab #:	35412-2
Matrix:	Soil
Percent Solid:	92
Dilution Factor:	11
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Analysis Date:	10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
1,2-Dichloropropane	22	ND	Dichlorodifluoromethane	22	ND
cis-1,3-Dichloropropene	22	ND	Trichlorofluoromethane	22	ND
trans-1,3-Dichloropropene	22	ND	Styrene	22	ND
n-Butylbenzene	22	ND	Naphthalene	22	ND
sec-Butylbenzene	22	ND	Bromobenzene	22	ND
tert-Butylbenzene	22	ND	Bromochloromethane	22	ND
2-Chlorotoluene	22	ND	Bromomethane	22	ND
4-Chlorotoluene	22	ND	1,2-Dibromo-3-chloropropane	22	ND
Isopropylbenzene	22	ND	1,2-Dibromoethane	22	ND
4-Isopropyltoluene	22	ND	Dibromomethane	22	ND
n-Propylbenzene	22	ND	1,3-Dichloropropane	22	ND
1,2,3-Trichlorobenzene	22	ND	2,2-Dichloropropane	22	ND
1,2,4-Trichlorobenzene	22	ND	1,1-Dichloropropene	22	ND
1,2,4-Trimethylbenzene	22	ND	Hexachlorobutadiene	22	ND
1,3,5-Trimethylbenzene	22	ND	1,2,3-Trichloropropane	22	ND

Surrogate Standard Recovery

d4-1,2-Dichloroethane	81 %	d8-Toluene	86 %	Bromofluorobenzene	95 %

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

COMMENTS: Results are expressed on a dry weight basis.

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-3

SAMPLE DATA

Lab #:	35412-3
Matrix:	Soil
Percent Solid:	80
Dilution Factor:	13
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Analysis Date:	10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
Vinyl chloride	26	ND	1,2-Dichloroethane	26	ND
1,1-Dichloroethene	26	ND	1,1,1-Trichloroethane	26	ND
cis-1,2-Dichloroethene	26	ND	1,1,2-Trichloroethane	26	ND
trans-1,2-Dichloroethene	26	ND	1,1,1,2-Tetrachloroethane	26	ND
Trichloroethene	26	ND	1,1,2,2-Tetrachloroethane	26	ND
Tetrachloroethene	26	ND	Chlorobenzene	26	ND
Chloromethane	26	ND	Benzene	26	ND
Methylene chloride	26	ND	Toluene	26	ND
Chloroform	26	ND	Ethylbenzene	26	ND
Carbon tetrachloride	26	ND	o-Xylene	26	ND
Bromodichloromethane	26	ND	m,p-Xylene	26	ND
Dibromochloromethane	26	ND	Methyl t-butyl ether	26	ND
Bromoform	26	ND	o-Dichlorobenzene	26	ND
Chloroethane	26	ND	m-Dichlorobenzene	26	ND
1,1-Dichloroethane	26	ND	p-Dichlorobenzene	26	ND

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

Authorized signature

analytics environmental laboratory inc.

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603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-3

SAMPLE DATA

Lab #: 35412-3
Matrix: Soil
Percent Solid: 80
Dilution Factor: 13
Collection Date: 09/27/95
Lab Receipt Date: 09/29/95
Analysis Date: 10/02/95

ANALYTICAL RESULTS VOLATILE ORGANICS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg	COMPOUND	Detection Limit: µg/kg	Result: µg/kg
1,2-Dichloropropane	26	ND	Dichlorodifluoromethane	26	ND
cis-1,3-Dichloropropene	26	ND	Trichlorofluoromethane	26	ND
trans-1,3-Dichloropropene	26	ND	Styrene	26	ND
n-Butylbenzene	26	ND	Naphthalene	26	ND
sec-Butylbenzene	26	ND	Bromobenzene	26	ND
tert-Butylbenzene	26	ND	Bromochloromethane	26	ND
2-Chlorotoluene	26	ND	Bromomethane	26	ND
4-Chlorotoluene	26	ND	1,2-Dibromo-3-chloropropane	26	ND
Isopropylbenzene	26	ND	1,2-Dibromoethane	26	ND
4-Isopropyltoluene	26	ND	Dibromomethane	26	ND
n-Propylbenzene	26	ND	1,3-Dichloropropane	26	ND
1,2,3-Trichlorobenzene	26	ND	2,2-Dichloropropane	26	ND
1,2,4-Trichlorobenzene	26	ND	1,1-Dichloropropene	26	ND
1,2,4-Trimethylbenzene	26	ND	Hexachlorobutadiene	26	ND
1,3,5-Trimethylbenzene	26	ND	1,2,3-Trichloropropane	26	ND

Surrogate Standard Recovery

d4-1,2-Dichloroethane	86 %	d8-Toluene	90 %	Bromofluorobenzene	102 %

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample analysis was conducted according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8260."

COMMENTS: Results are expressed on a dry weight basis.

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-1

Lab #: 35412-1
Matrix: Soil
Percent Solid: 75
Dilution Factor: 1.3
Collection Date: 09/27/95
Lab Receipt Date: 09/29/95
Extraction Date: 10/02/95
Analysis Date: 10/02/95

TOTAL PETROLEUM HYDROCARBON ANALYSIS

Sample	Result	Units	Detection Limit
35412-1	**81**	mg/kg	1

Surrogate Standard Recovery

m-Terphenyl	73 %

Methodology: Water samples prepared by Separatory Funnel Liquid/Liquid Extraction, "Test Methods for Evaluating Solid Waste," Method 3510; other matrices prepared by Sonication Extraction, "Test Methods for Evaluating Solid Waste," Method 3550.

All matrices were analyzed according to "Test Methods for Evaluating Solid Waste, Modified SW-846 Method 8100."

Comments: **Results expressed on a dry weight basis. Quantitation performed based on a No. 2 Fuel Oil standard.**

Authorized signature _____

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-2

Lab #:	35412-2
Matrix:	Soil
Percent Solid:	92
Dilution Factor:	1.1
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Extraction Date:	10/02/95
Analysis Date:	10/02/95

TOTAL PETROLEUM HYDROCARBON ANALYSIS

Sample	Result	Units	Detection Limit
35412-2	283	mg/kg	1

Surrogate Standard Recovery

m-Terphenyl	* %

Methodology: Water samples prepared by Separatory Funnel Liquid/Liquid Extraction, "Test Methods for Evaluating Solid Waste," Method 3510; other matrices prepared by Sonication Extraction, "Test Methods for Evaluating Solid Waste," Method 3550.

All matrices were analyzed according to "Test Methods for Evaluating Solid Waste, Modified SW-846 Method 8100."

Comments: **Results expressed on a dry weight basis. Quantitation performed based on a No. 2 Fuel Oil standard. *Surrogate recovery affected by sample matrix.**

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

October 5, 1995

Client Project: Allens Garage, So. Hero Vt.

Project Number: 1-0135-1
Station ID: SS-3

Lab #:	35412-3
Matrix:	Soil
Percent Solid:	80
Dilution Factor:	1.2
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Extraction Date:	10/02/95
Analysis Date:	10/02/95

TOTAL PETROLEUM HYDROCARBON ANALYSIS

Sample	Result	Units	Detection Limit
35412-3	ND	mg/kg	1

ND denotes none detected.

Surrogate Standard Recovery

m-Terphenyl	69 %

Methodology: Water samples prepared by Separatory Funnel Liquid/Liquid Extraction, "Test Methods for Evaluating Solid Waste," Method 3510; other matrices prepared by Sonication Extraction, "Test Methods for Evaluating Solid Waste," Method 3550.

All matrices were analyzed according to "Test Methods for Evaluating Solid Waste, Modified SW-846 Method 8100."

Comments: **Results are expressed on a dry weight basis.**

Authorized signature _____

Analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

October 5, 1995

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.
Project Number: 1-0135-1
Station ID: SS-1

SAMPLE DATA

Lab #:	35412-1
Matrix:	Soil
Percent Solid:	75
Dilution Factor:	1.3
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Extraction Date:	10/02/95
Analysis Date:	10/04/95

ANALYTICAL RESULTS POLYCHLORINATED BIPHENYLS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg
PCB-1016	65	ND
PCB-1221	65	ND
PCB-1232	65	ND
PCB-1242	65	ND
PCB-1248	65	ND
PCB-1254	65	ND
PCB-1260	65	ND
PCB-1262	65	ND

Surrogate Standard Recovery

2,4,5,6-Tetrachloro-m-xylene	112%
Decachlorobiphenyl	131%

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample was analyzed according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8081."

COMMENTS: **Results are expressed on a dry weight basis.**

Authorized signature

analytics environmental laboratory inc.

195 Commerce Way
Portsmouth, New Hampshire 03801
603-436-5111 Fax 603-430-2151
800-929-9906

October 5, 1995

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.
Project Number: 1-0135-1
Station ID: SS-2

SAMPLE DATA

Lab #:	35412-2
Matrix:	Soil
Percent Solid:	92
Dilution Factor:	1.1
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Extraction Date:	10/02/95
Analysis Date:	10/04/95

ANALYTICAL RESULTS POLYCHLORINATED BIPHENYLS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg
PCB-1016	55	ND
PCB-1221	55	ND
PCB-1232	55	ND
PCB-1242	55	ND
PCB-1248	55	ND
PCB-1254	55	ND
PCB-1260	55	ND
PCB-1262	55	ND

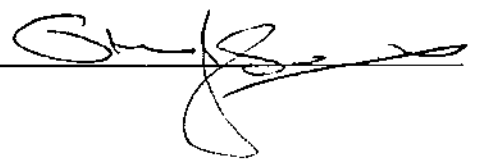
Surrogate Standard Recovery

2,4,5,6-Tetrachloro-m-xylene	97%
Decachlorobiphenyl	90%

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample was analyzed according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8081."

COMMENTS: Results are expressed on a dry weight basis.

Authorized signature 

analytics environmental laboratory inc.

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Portsmouth, New Hampshire 03801
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800-929-9906

October 5, 1995

Mr. Alan Liptak
The Johnson Company, Inc.
100 State Street
Montpelier, VT 05602

CLIENT SAMPLE ID

Client Project: Allens Garage, So. Hero Vt.
Project Number: 1-0135-1
Station ID: SS-3

SAMPLE DATA

Lab #:	35412-3
Matrix:	Soil
Percent Solid:	80
Dilution Factor:	1.2
Collection Date:	09/27/95
Lab Receipt Date:	09/29/95
Extraction Date:	10/02/95
Analysis Date:	10/04/95

ANALYTICAL RESULTS POLYCHLORINATED BIPHENYLS

COMPOUND	Detection Limit: µg/kg	Result: µg/kg
PCB-1016	60	ND
PCB-1221	60	ND
PCB-1232	60	ND
PCB-1242	60	ND
PCB-1248	60	ND
PCB-1254	60	ND
PCB-1260	60	ND
PCB-1262	60	ND

Surrogate Standard Recovery

2,4,5,6-Tetrachloro-m-xylene	90%
Decachlorobiphenyl	133%

ND=None Detected <=Less than >=Greater than

METHODOLOGY: Sample was analyzed according to "Test Methods for Evaluating Solid Waste, SW-846 Method 8081."

COMMENTS: **Results are expressed on a dry weight basis.**

Authorized signature

RM ✓
SWS ✓
SMK ✓
GW ✓
CGA ✓
BV ✓
MGW ✓
Chris ✓

State of Vermont

AGENCY OF HUMAN SERVICES

VERMONT DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
108 Cherry Street, P.O. Box 70
Burlington, Vermont 05402
Telephone: (802) 863-7220

RECEIVED
MAY 12 1995
JOHNSON CO. INC.
MONTPELIER, VT
HAZARDOUS MATERIALS
Aug 11 2 24 PM '94

MEMORANDUM

TO: Peter Marshall, Chief
Management and Prevention Section

FROM: Karen Garbarino, VG Manager
Childhood Lead Poisoning Prevention Program

DATE: August 10, 1994

RE: Lead in soil

It was a pleasure meeting you at the New England Lead Coordinating Committee meeting in Boston last week.

I met with Bob O'Grady, Environmental Health Division Director, Bill Bress, State Toxicologist, and Karen Crampton, Asbestos/Lead Certification Program, yesterday to discuss implementing the EPA soil guidance issued last month. We have decided to change our "action level" of 300 ppm to EPA's guidance level of 400 - 5000 ppm. We will recommend in-place management or interim controls for soils in the 400 - 5000 ppm range. We will advise those who wish to remove soil with levels exceeding 5000 ppm to assume the soil is hazardous and dispose of it accordingly. Those who wish to remove soil with lead levels below 5000 ppm will be advised to have a TCLP performed to determine if the soil needs to be treated as hazardous. Homeowners are exempt from any disposal requirements or regulations. ?!

I am in the process of re-writing our Lead in Soil Fact Sheet, and will send you a copy for review prior to having it printed.

Thank you for your help.

cc: Bob O'Grady, Division Director
Bill Bress, State Toxicologist
Chris Vollaro, CLPPP
John Mazzucco, CLPPP
Karen Crampton, Asbestos/Lead Certification

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 1
To ALAN LIPCATE	From M SMITH
Co. The Johnson Co	Co. VT DEC
Dept.	Phone # 241-3849
Fax # 229-5876	Fax #

THE JOHNSON CO., INC.
100 State Street, Suite 600
MONTPELIER, VERMONT 05602
(802) 229-4600

JOB Allen's Garage, So Hero Vt 1-0135-1
SHEET NO. 1 OF 1
CALCULATED BY APL DATE 10-24-95
CHECKED BY _____ DATE _____
SCALE _____

Calculate TCLP potential concentration SS-1

Reported perchloroethylene concentration = 109 ug/kg

$$TCLP = \frac{100\ g\ sample}{2000\ ml\ fluid} \rightarrow \text{Assume 100\% extraction}$$

$$\frac{109\ ug}{1\ kg} = \frac{10.9\ ug}{100\ g} = \frac{10.9\ ug}{2\ l} = \frac{5.5\ ug}{l}$$

TCLP regulatory threshold for Tetrachloroethylene is 700 ug/l

∴ Value 100x less than TCLP Threshold

PRODUCT 204-1 (Single Sheets) 205-1 (Padded) Ness Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225 6380

M E M O R A N D U M

TO: File #567

THRU: Chuck Schwer, Program Coordinator
Petroleum Sites Management Section

FROM: Marc Coleman, Environmental Technician
Petroelum Sites Management Section

DATE: October 12, 1990

RE: Tank pull at L.F.J. South Hero, VT

On August 20, 1990, I was on site to monitor the removal and excavation of two 2,000 gallon UST's. Soil type is sandy silt.

HNU vapor levels were 200 to 300 ppm. I encountered a clay layer at 11 1/2 feet. At 12 feet this clay was compressed into a rock hard silt layer. There are no effected receptors. All soils were returned to the excavation pending monitoring results from the well installed in the excavation pit.

MC/lb575

H
W N
Wagner, Heindel, and Noyes, Inc.
• Consulting Hydrogeologists
• Engineers
• Environmental Scientists
P.O. Box 1629 Burlington, Vermont 05402-1629 802-658-0820
FAX: 802-860-1014

February 15, 1995

Approved by Joe Merone March 10, 1995

Mr. Michael W. Young
Sites Management Section
Hazardous Materials Management Division
Agency of Natural Resources
103 South Main Street
Waterbury, VT 05671

RE: Former Moon and Sons Site
South Hero, Vermont (Site #90-0414)
Site Assessment Report

Dear Mike:

This letter/report summarizes work completed by Wagner, Heindel, and Noyes, Inc. at the former Moon & Sons property in South Hero, Vermont (previously the McDonough Service Station; currently the South Hero Mobil and Quick Stop), as specified in the work plan approved by your office on May 2, 1994. I have organized the information collected in accordance with work items 1 - 4 on page 2 of your January 10, 1994 letter.

1. **Additional monitor wells should be installed along the northern side of Route 2 to determine if the utility trench is indeed intercepting groundwater flowing to the north as suspected.**

As specified in the work plan, monitor wells MW-15 and MW-16 were installed on the north side of Route 2. Authorization was obtained from the Agency of Transportation in August 1994 to install these wells in the right-of-way of Route 2. A third monitor well was installed in a test pit located at the west extremity of the site, as described in the work plan.

A water table map based on measurements collected September 16, 1994 can be found on page 1 of Appendix 1. Elevations have been calculated from the October 21, 1994 survey (Appendix 1, page 5), which was necessitated by the shifting of wells as previously discussed. The water table map, based on measurements from the three new wells and from pre-existing shallow wells at the site, confirms that the dominant groundwater flow direction is to the northwest. The monitoring well array is not tight enough to show whether the water table is diverted or otherwise influenced by the presence of the utility trench.

Water quality samples were collected from all monitoring wells on the site on September 16, 1994. A contaminant distribution map can be found on page 2 of Appendix 1, followed by a summary of water quality results on page 3. Laboratory reports can be found in Appendix 2.

While contamination was observed in wells south of the trench (MW-7, MW-14), the new wells north of Route 2 (MW-15, MW-16) showed no contamination whatsoever. Thus, the contaminant distribution map does suggest that the utility trench serves as a barrier or interceptor to the northward migration of contaminants.

2. It needs to be determined if contamination is actually entering the storm drain or water supply system lines. Samples should be collected at points along the storm drain outfall to determine if Keeler Bay or wetlands have been impacted by site contamination.

On September 20, 1994, water quality samples were collected from two locations along the storm drain (the southeast storm drain and the northwest storm drain indicated on the attached maps). Results are summarized on page 3 of Appendix 1; laboratory reports can be found in Appendix 3. No contaminants were detected in these samples. The sample collected from the Keeler Bay outfall from the storm drain system was also uncontaminated.

Samples were also collected from four locations along the water supply line (laboratory reports in Appendix 4). The tap sample collected from the town office serves as an upgradient station; no contaminants were detected in this sample. Three water quality samples were collected from residences connected to the water system at locations downgradient of the Moon & Sons site. As summarized in the table on page 3 of Appendix 1, no contaminants were noted at the Robinson Hardware, Robinson residence, or Winona Robinson residence.

The samples collected from the storm drain system and the water supply system thus provide no evidence that contaminants had actually entered these pipelines at the time of sampling. However, the fact that contamination was detected in the utility trench in the past indicates that these pipelines remain at risk of future contamination.

3. The extent of utility trench contamination needs to be determined.

As proposed, a test pit was excavated at a location 75 feet west (downgradient) of pre-existing monitor wells MW-6 and MW-14. During this test pit excavation, which took place on September 9, 1994, PID readings of 0.2 ppm were recorded between 6" and 6' below ground surface (bgs). From 6 - 7' bgs, PID readings of 0.8 - 1.0 were recorded; the soils were moist in this interval. The storm drain line was encountered at 7' bgs. All soils were reported as "clean".

The monitor well installed in this excavation was sampled at the same time as the other wells on the site (September 16, 1994). As shown in the summary table and on the contaminant distribution map, no petroleum products were detected in the sample from this location. Since this location was "clean", no additional test pits were excavated.

The test pit excavation and sampling suggests that contamination has not migrated very rapidly along the utility trench.

At the original test pit excavation, 140 feet to the east, PID readings of 10 - 20 ppm were noted in the abandoned 2" water line bedding; similar readings, as well as a light petroleum sheen, were noted in soils in the area of the 8" active water line; and PID readings of 100 - 180 ppm as well as a heavy petroleum sheen were observed during excavation of the 18" storm drain line.

4. Due to possible sample labelling error, monitor wells 8s and 8d need to be resampled.

As specified in the final approved work plan, additional water quality samples were collected from all monitoring wells on the site. Wells MW-8d and MW-8s showed the same pattern in contaminant distribution as observed previously (August 16, 1993). That is, a significantly higher level of contamination was noted in the deep piezometer (8d). In addition, September 16, 1994 measurements of the total well depths confirmed that the wells are correctly labelled as "shallow" and "deep"; that is the total depth of MW-8s is 8.33 feet below top of pipe (btp), while that of MW-8d is 15.98 feet btp. Thus it appears that neither the sample bottles nor the wells themselves were mislabelled.

The consistent data from this well pair suggests that contaminants have penetrated to much greater depths on the site than previously anticipated; therefore the volume of soil affected by the former leaking underground storage tanks is concomitantly greater.

Other Observations

A summary table has been prepared showing all water quality analytical results since project initiation (page 4 of Appendix 1). This table includes results from 1990-91, when the site was referred to as the McDonough Service Station.

Historic data shows a dramatic improvement in water quality at MW-1, located immediately upgradient of the former UST area. Since the tanks have been removed, contamination at this location has virtually disappeared; this is probably attributable to continued flushing by groundwater. Contaminant concentrations also appear to be declining (albeit more slowly) at MW-3, just downgradient of the UST area. The presence of petroleum products at MW-12, within the former UST area, indicates that the site remains a contaminant source and that downgradient sensitive receptors are still at risk.

The increase in contaminants at MW-7 from August 1993 to September 1994 is evidence that hazardous materials continue to migrate towards the utility trench.

Recommendations

As we concluded in our previous report (December 1993), it appears that natural attenuation and passive degradation alone are not likely to prevent impact to neighboring properties. While no petroleum products have thus far been detected in the storm drain or water supply line, the continued presence and northward and downward migration of contaminants indicate that these receptors remain at risk.

We are concerned that the past evidence of petroleum products in the utility trench and the possibility of future contamination may pose an unacceptable risk to the 8" water line. This line is a component of the South Hero Fire District public community water system, which has approximately 200 connections (2/14/95 conservation with Mr. Guy Winch, a Prudential Committee member).

Given the circumstances, we feel it makes sense to attempt to intercept contaminants moving from the former UST area towards the utility trench. If the Sites Management Section agrees that this is important, we can discuss potential remediation options with you. It is also the ANR Water Supply Division's policy, in the case of a LUST near a water line for a public supply, that the Vermont Department of Health, the Water Supply Division, and the party responsible for the water system (in this case the Fire District) should all be made aware of the situation. At your direction, we will provide the appropriate notification.

If you have any questions regarding the information in this letter/report, or would like to discuss remediation options, please feel free to contact me or Jeff Noyes. We look forward to continued work with you on this and other projects.

Sincerely,

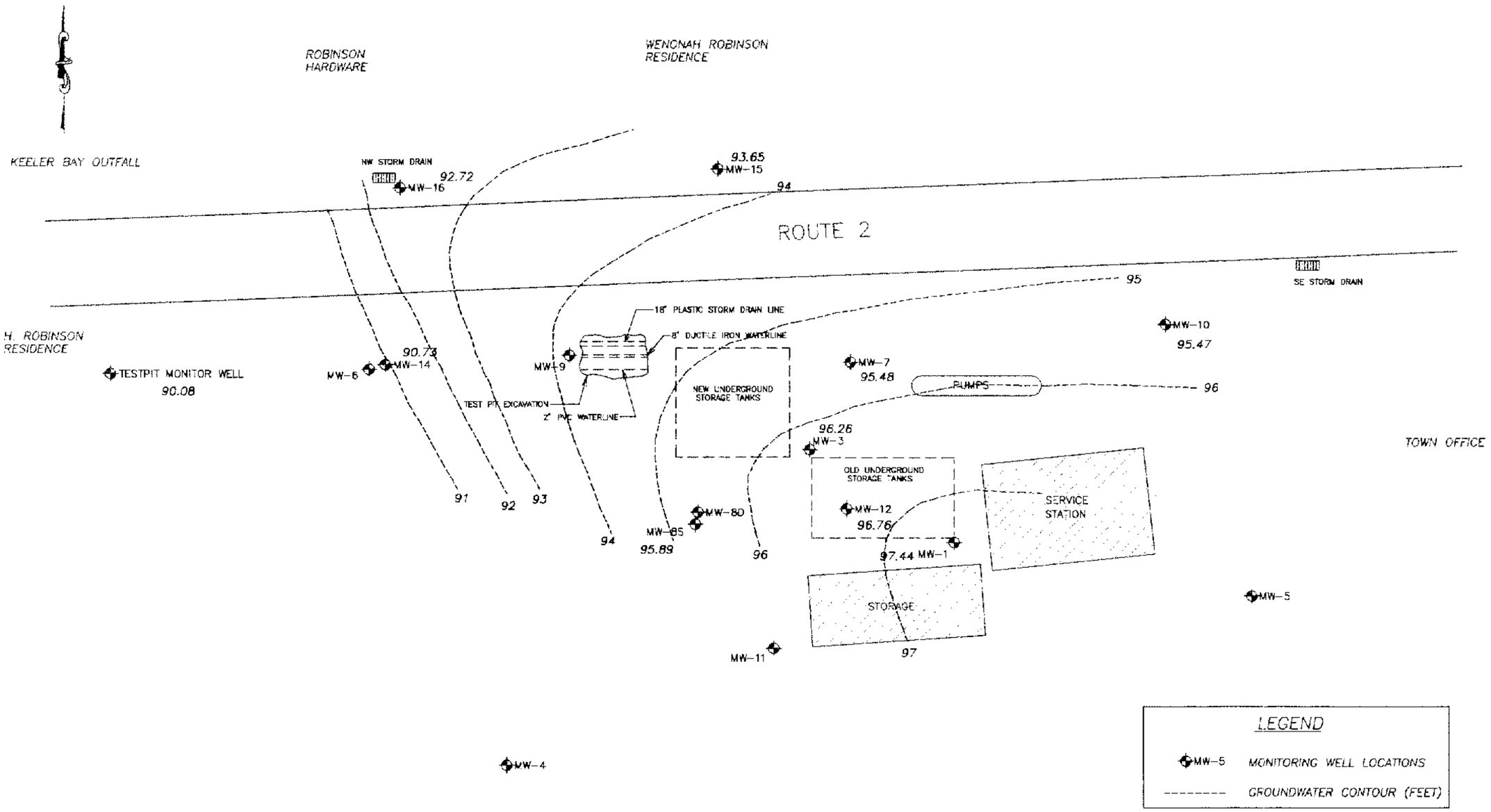
Nancy J. Caplow
Hydrogeologist

NJC/ew

Attachments

cc: Joe Merone, Midway Oil Corp.

[YOUNG.L1/NCAPLOW]



LEGEND

MW-5 MONITORING WELL LOCATIONS

GROUNDWATER CONTOUR (FEET)

NOTES:

- MONITOR WELL 15, 16, AND TESTPIT MONITOR WELL LOCATIONS SURVEYED BY M. MILLER AND D. REESE OF WAGNER, HEINDEL, AND NOYES, INC., ON SEPTEMBER 16, 1994.
- ONLY WELLS SCREENED IN SHALLOW AQUIFER WERE USED IN CONSTRUCTING THIS GROUNDWATER CONTOUR MAP.

DRAWN BY: M. Luman

APPROVED: N. Coplon

PROJECT NO. 93164

FILE: C:\MERONE\SITEPLAN

Wagner, Heindel, and Noyes, Inc.

CONSULTING SCIENTISTS AND ENGINEERS

• Hydrogeology • Ecology •

• Environmental Engineering •

P.O. BOX 1629 BURLINGTON, VERMONT 05402

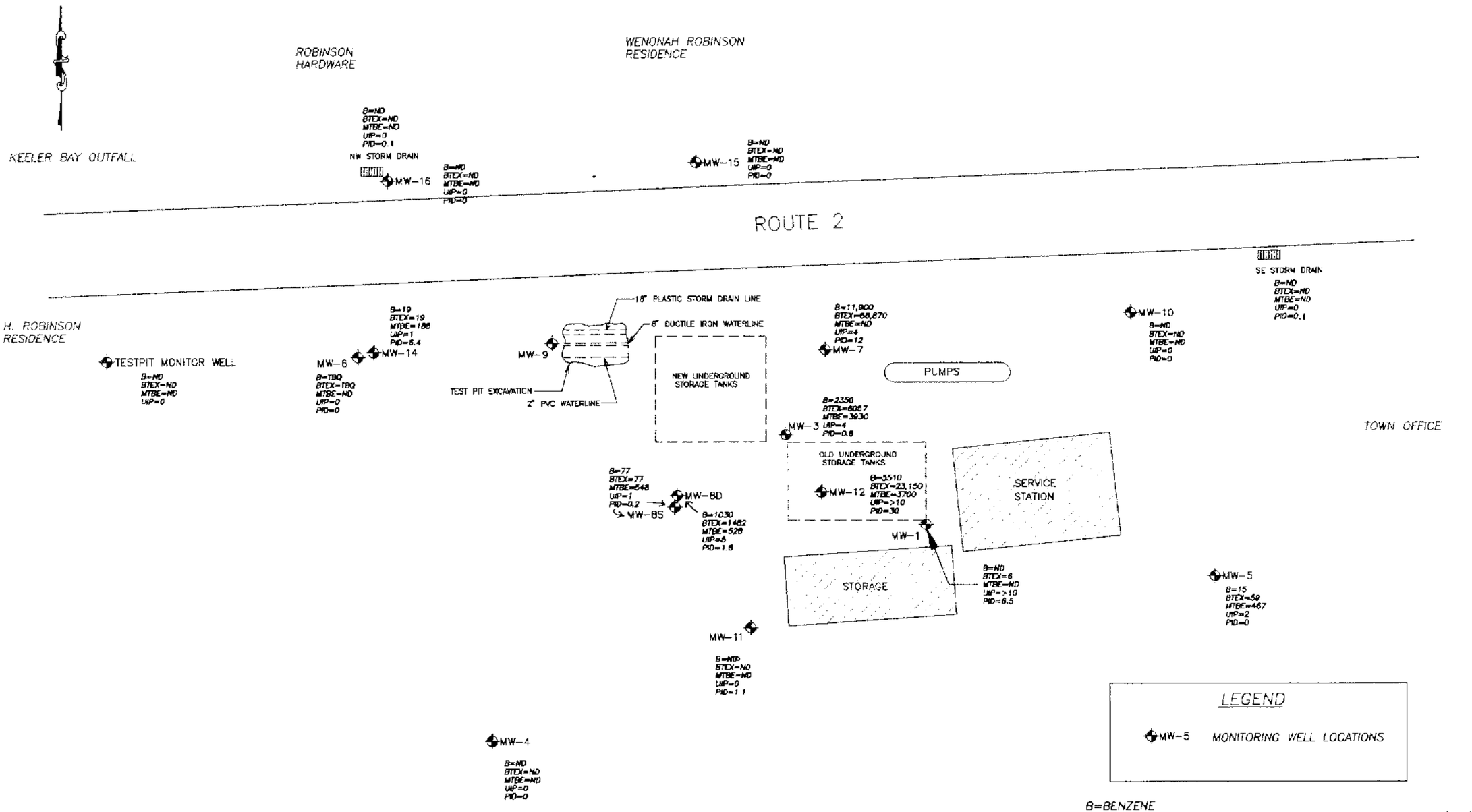
MERONE/MOON & SONS

SOUTH HERO, VERMONT

GROUNDWATER CONTOUR MAP (SEPTEMBER 16, 1994)

SCALE: 1"=30'

DATE: FEBRUARY 10, 1995



LEGEND

MW-5 MONITORING WELL LOCATIONS

B=BENZENE
BTEX=BENZENE + TOLUENE + ETHYLBENZENE + XYLENES (ppb)
MTBE=METHYL TERT BUTYL ETHER (ppb)
UIP=UNIDENTIFIED PEAKS
ND=NONE DETECTED
TBQ=TRACE BELOW QUANTITATION
PID=ppm

NOTES:

- MONITOR WELL 15, 16, AND TESTPIT MONITOR WELL LOCATIONS SURVEYED BY M. MILLER AND D. REESE OF WAGNER, HEINDEL, AND NOYES, INC., ON SEPTEMBER 16, 1994.
- ONLY WELLS SCREENED IN SHALLOW AQUIFER WERE USED IN CONSTRUCTING THIS GROUNDWATER CONTOUR MAP.

MERONE/MOON & SONS
SOUTH HERO, VERMONT
CONTAMINANTS IN GROUNDWATER (SEPTEMBER 16, 1994)

PROJECT NO. 93164
FILE: C:\MERONE\SITEPLAN
DRAWN BY: M. Luman
APPROVED: M. Caplow
DATE: FEBRUARY 10, 1995
SCALE: 1"=30'

Wagner, Heindel, and Noyes, Inc.
CONSULTING SCIENTISTS AND ENGINEERS
• Hydrogeology • Ecology •
• Environmental Engineering •
P.O. BOX 1629 BURLINGTON, VERMONT 05402

Moon & Sons
Water Quality
Summary Table

Sampled: September 16, 1994

	Location	Compounds / Parameters						
		Benzene (ug/L)	Ethylbenzene (ug/L)	Toluene (ug/L)	Xylene (ug/L)	Total BTEX	MTBE (ug/L)	Unidentified Peaks
Groundwater Monitoring Well Sampling	MW - 1	ND	ND	ND	6	6	ND	> 10
	MW - 3	2,350	677	1,330	1,700	6,057	3,930	4
	MW - 4	ND	ND	ND	ND	ND	ND	0
	MW - 5	15	ND	30	14	59	467	2
	MW - 6	TBQ	ND	ND	ND	TBQ	ND	0
	MW - 7	11,900	3,470	32,900	18,600	66,870	ND	4
	MW - 8d	1,030	193	56	203	1,482	528	5
	MW - 8s	77	ND	ND	ND	77	548	1
	MW - 10	ND	ND	ND	ND	ND	ND	0
	MW - 11	ND	ND	ND	ND	ND	ND	0
	MW - 12	5,510	2,690	2,250	12,700	23,150	3,700	> 10
	MW - 12 dup	5,350	2,500	2,100	11,900	21,850	3,650	> 10
	MW - 14	19	ND	ND	ND	19	188	1
	MW - 15	ND	ND	ND	ND	ND	ND	0
	MW - 16	ND	ND	ND	ND	ND	ND	0
	Test Pit Well	ND	ND	ND	ND	ND	ND	0
Drinking Water System Tap Sampling	Town Office	ND	ND	ND	ND	ND	ND	0
	Robinson H Dwre	ND	ND	ND	ND	ND	ND	0
	H. Robinson Residence	ND	ND	ND	ND	ND	ND	0
	Wenonah Robinson	ND	ND	ND	ND	ND	ND	0
Storm Drain System Sampling	Keeler Bay Outfall	ND	ND	ND	ND	ND	ND	0
	SE Storm Drain	ND	ND	ND	ND	ND	ND	0
	NW Storm Drain	ND	ND	ND	ND	ND	ND	0

NOTES
ND = None Detected
TBQ = Trace Below Quantitation limit

Former Moon & Sons Service Station
(McDonough Service Station; South Hero Mobil & Quick Stop)

Summary of Water Quality Sampling
(all concentrations in ug/L, ppb)

Date	Contaminant	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8s	MW-8d	MW-9	MW-10	MW-11	MW-12	MW-14	MW-15	MW-16	TP well
04/3/90	Benzene	970	890	665	1.3	ND	ND											
	Ethylbenzene	390	240	140	ND	ND	ND											
	Toluene	3,670	1,010	346	2.1	ND	1.3											
	Xylenes	14,810	3,000	902	ND	ND	ND											
	Total BTEX	19,840	5,140	2,053	3.4	ND	1.3											
	MTBE	29,260	2,450	2,830	ND	18.1	10.6											
	UIP	NA	NA	NA	NA	NA	NA											
06/26/90	Benzene	921	2,180	1,960	ND	ND	ND											
	Ethylbenzene	76	103	93	ND	ND	ND											
	Toluene	3,820	772	1,160	ND	ND	ND											
	Xylenes	13,500	3,790	1,540	ND	ND	ND											
	Total BTEX	18,317	6,845	4,773	ND	ND	ND											
	MTBE	21,300	2,670	7,760	ND	425	7.04											
	UIP	NA	NA	NA	NA	NA	NA											
10/08/90	Benzene	802		8,000	ND	ND	ND											
	Ethylbenzene	480		2,830	ND	ND	ND											
	Toluene	7,070		13,000	ND	ND	ND											
	Xylenes	15,300		12,600	ND	ND	ND											
	Total BTEX	23,752		37,430	ND	ND	ND											
	MTBE	3,050		21,400	ND	1,020	ND											
	UIP	NA		NA	NA	NA	NA											
01/18/91	Benzene	467		5,450	ND	ND	ND											
	Ethylbenzene	429		1,260	ND	ND	ND											
	Toluene	4,890		5,580	ND	ND	ND											
	Xylenes	12,800		6,150	ND	ND	ND											
	Total BTEX	18,806		18,460	ND	ND	ND											
	MTBE	1,470		15,300	ND	854	ND											
	UIP	2		5	0	0	0											
08/16/93	Benzene	TBQ		6,810	ND	1.3	ND	7,540	174	1,180	88.2	ND	ND	4,780	731			
	Ethylbenzene	17.4		2,940	ND	ND	ND	2,880	33.3	1,090	233	ND	ND	292	189			
	Toluene	13		5,320	ND	ND	ND	27,500	63.7	4,340	58.6	1.3	ND	2,740	337			
	Xylenes	486		9,850	ND	ND	ND	20,500	138	5,950	971	5.3	ND	13,000	570			
	Total BTEX	516		27,920	ND	1.3	ND	58,420	439	12,560	1,351	6.6	ND	20,812	1,827			
	MTBE	ND		5,750	ND	137	ND	1,450	307	525	1,380	10.3	ND	2,400	275			
	UIP	>25		12	0	0	0	18	24	>25	>25	3	0	>25	18			
08/18/94	Benzene	ND		2,350	ND	15	TBQ	11,900	77	1,030		ND	ND	5,510	19	ND	ND	ND
	Ethylbenzene	ND		677	ND	ND	ND	3,470	ND	193		ND	ND	2,890	ND	ND	ND	ND
	Toluene	ND		1,330	ND	30	ND	32,900	ND	58		ND	ND	2,250	ND	ND	ND	ND
	Xylenes	6		1,700	ND	14	ND	18,800	ND	203		ND	ND	12,700	ND	ND	ND	ND
	Total BTEX	6		6,057	ND	59	TBQ	66,870	77	1,482		ND	ND	23,150	19	ND	ND	ND
	MTBE	ND		3,930	ND	467	ND	ND	548	528		ND	ND	3,700	186	ND	ND	ND
	UIP	>10		4	0	2	0	4	1	5		0	0	>10	1	0	0	0

NA Not Available
ND = None Detected
UIP = Unidentified Peaks

NOTES: MW-2 paved over between June and October 1990
MW-8 buried by gravel between August 1993 and September 1994

U:\WCAPLOW\SPROSHT\MOONSONS\WQSUM.WQ1

Merone, Moon & Sons
South Hero, Vermont

Well #	Assumed Elev.* (ft)	Top of pipe Elev. (1) (ft)	Top of pipe Elev. (2) (ft)	Depth to Groundwater, 9/16/94 (ft btp)	Groundwater Elev. (2) 9/16/94 (ft btp)
TBM	100.00			-	-
1		99.20	100.00	2.56	97.44
3		98.18	98.98	2.72	96.26
4		96.91	97.71	7.88	89.83
5		98.88	99.68	8.42	91.26
6		97.58	98.38	8.09	90.29
7		97.92	98.72	3.24	95.48
8s		98.17	98.97	3.08	95.89
8d		97.83	98.63	2.70	95.93
9	Could not locate under new gravel.				
10		98.87	99.67	4.20	95.47
11		98.17	98.97	2.75	96.22
12		98.67	99.47	2.71	96.76
14		95.42	96.22	5.49	90.73
15		96.60	97.40	3.75	93.65
16		95.81	96.61	3.89	92.72
Test Pit MW		94.38	95.18	5.10	90.08

Notes:
Survey performed by M. Miller and D. Reese on October 21, 1994.
* Temporary Benchmark established at corner of garage on concrete footing.
(1) Based on TBM established on 10/21/94.
(2) Corrected to original survey, with assumed elevation for MW-1 as 100.00 feet.

FILE: U:\MM\LLER\SPRDSHT\MERMOON2.WQ1

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
REVISED REPORT: October 4, 1994

PROJECT CODE: HNMS1506
REF.#: 64,637 - 64,657

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated preservation with NaN_3.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results. Due to holding time constraints, samples 64,653, 64,654, 65,655 were analyzed by EPA Mehtod 8240.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,649
STATION: MW1
TIME SAMPLED: 17:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	6.1
MTBE	10	ND

Bromobenzene Surrogate Recovery: 91%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:
1 None detected

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,650
STATION: MW3
TIME SAMPLED: 18:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	100	2,350.
Chlorobenzene	100	ND[2]
1,2-Dichlorobenzene	100	ND
1,3-Dichlorobenzene	100	ND
1,4-Dichlorobenzene	100	ND
Ethylbenzene	100	677.
Toluene	100	1,330.
Xylenes	100	1,700.
MTBE	1000	3,930.

Bromobenzene Surrogate Recovery: 103%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 4

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 1% dilution.

2 None detected

ENDYNE, INC.

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,644
STATION: MW4
TIME SAMPLED: 15:45
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 79%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,643
STATION: MW5
TIME SAMPLED: 16:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	5	15.3
Chlorobenzene	5	ND[2]
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND
Ethylbenzene	5	ND
Toluene	5	29.5
Xylenes	5	13.7
MTBE	50	467.

Bromobenzene Surrogate Recovery: 122%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 2

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 20% dilution.

2 None detected

ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,638
STATION: MW6
TIME SAMPLED: 11:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	TBQ[1]
Chlorobenzene	1	ND[2]
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 76%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 Trace below quantitation limit

2 None detected

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,648
STATION: MW7
TIME SAMPLED: 17:15
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	500	11,900.
Chlorobenzene	500	ND[2]
1,2-Dichlorobenzene	500	ND
1,3-Dichlorobenzene	500	ND
1,4-Dichlorobenzene	500	ND
Ethylbenzene	500	3,470.
Toluene	500	32,900.
Xylenes	500	18,600.
MTBE	5000	ND

Bromobenzene Surrogate Recovery: 115%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 4

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 0.2% dilution.

2 None detected

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,646
STATION: MW8S
TIME SAMPLED: 17:00
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	5	76.6
Chlorobenzene	5	ND[2]
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND
Ethylbenzene	5	ND
Toluene	5	ND
Xylenes	5	ND
MTBE	50	548.

Bromobenzene Surrogate Recovery: 84%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 20% dilution.

2 None detected

ENDYNE, INC.

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,647
STATION: MW8D
TIME SAMPLED: 17:50
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	20	1,030.
Chlorobenzene	20	ND[2]
1,2-Dichlorobenzene	20	ND
1,3-Dichlorobenzene	20	ND
1,4-Dichlorobenzene	20	ND
Ethylbenzene	20	193.
Toluene	20	55.8
Xylenes	20	203.
MTBE	200	528.

Bromobenzene Surrogate Recovery: 90%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 5

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 5% dilution.

2 None detected

ENDYNE, INC.

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,642
STATION: MW10
TIME SAMPLED: 15:15
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 73%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,645
STATION: MW11
TIME SAMPLED: 16:20
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 77%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,651
STATION: MW12
TIME SAMPLED: 18:50
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	100	5,510.
Chlorobenzene	100	ND[2]
1,2-Dichlorobenzene	100	ND
1,3-Dichlorobenzene	100	ND
1,4-Dichlorobenzene	100	ND
Ethylbenzene	100	2,690.
Toluene	100	2,250.
Xylenes	100	12,700.
MTBE	1000	3,700.

Bromobenzene Surrogate Recovery: 109%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 1% dilution.

2 None detected

ENDYNE, INC.

Laboratory Services

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(802) 879-4333
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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,652
STATION: MW12 Dup1
TIME SAMPLED: 18:50
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	100	5,350.
Chlorobenzene	100	ND[2]
1,2-Dichlorobenzene	100	ND
1,3-Dichlorobenzene	100	ND
1,4-Dichlorobenzene	100	ND
Ethylbenzene	100	2,500.
Toluene	100	2,100.
Xylenes	100	11,900.
MTBE	1000	3,650.

Bromobenzene Surrogate Recovery: 107%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 1% dilution.

2 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,639
STATION: MW14
TIME SAMPLED: 13:15
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)[1]	Concentration (ug/L)
Benzene	5	18.9
Chlorobenzene	5	ND[2]
1,2-Dichlorobenzene	5	ND
1,3-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND
Ethylbenzene	5	ND
Toluene	5	ND
Xylenes	5	ND
MTBE	50	188.

Bromobenzene Surrogate Recovery: 95%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 20% dilution.

2 None detected

ENDYNE, INC.

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,641
STATION: MW15
TIME SAMPLED: 14:10
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 70%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,640
STATION: MW16
TIME SAMPLED: 14:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 84%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 29, 1994

PROJECT CODE: HNMS1506
REF.#: 64,637
STATION: Test Pit
TIME SAMPLED: 12:45
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 74%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994

PROJECT CODE: HNMS1506
REF.#: 64,656
STATION: Trip Blank
TIME SAMPLED: 8:00
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromofluorobenzene Surrogate Recovery: 85%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8010/8020 COMPOUNDS BY EPA METHOD 8240

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Merone Moon and Son
REPORT DATE: September 29, 1994
DATE SAMPLED: September 20, 1994
DATE RECEIVED: September 20, 1994
ANALYSIS DATE: September 28, 1994

PROJECT CODE: HNMS1522
REF.#: 64,683
STATION: Town Office
TIME SAMPLED: 8:30
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Dichlorodifluoromethane	10	ND[1]
Chloromethane	10	ND
Vinyl Chloride	10	ND
Bromomethane	5	ND
Chloroethane	5	ND
Trichlorofluoromethane	2	ND
Acetone	50	ND
1,1-Dichloroethene	2	ND
Methylene Chloride	20	ND
Carbon Disulfide	7	ND
MTBE	3	ND
trans-1,2-Dichloroethene	2	ND
1,1-Dichloroethane	2	ND
2-Butanone	20	ND
Chloroform	10	75.0
1,1,1-Trichloroethane	1	ND
Carbon Tetrachloride	1	ND
1,2-Dichloroethane	1	ND
Benzene	1	ND
Trichloroethene	1	ND
1,2-Dichloropropane	1	ND
Bromodichloromethane	1	4.4

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REF.#: 64,683

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
4-Methyl-2-Pentanone	10	ND
cis-1,3-Dichloropropene	1	ND
Toluene	2	ND
trans-1,3-Dichloropropene	1	ND
1,1,2-Trichloroethane	2	ND
2-Hexanone	10	ND
Tetrachloroethene	2	ND
Dibromochloromethane	2	ND
Chlorobenzene	2	ND
Ethyl Benzene	1	ND
Total Xylenes	3	ND
Styrene	1	ND
Bromoform	5	ND
1,1,2,2-Tetrachloroethane	1	ND
1,3 Dichlorobenzene	2	ND
1,4 Dichlorobenzene	2	ND
1,2 Dichlorobenzene	2	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

ANALYTICAL SURROGATE RECOVERY:

1,2-Dichloroethane-d4 : 103.%
Toluene-d8 : 103.%
4-Bromofluorobenzene : 89.%

NOTES:

1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--COMPOUNDS BY EPA METHOD 8240

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994
REVISED REPORT: October 4, 1994

PROJECT CODE: HNMS1506
REF.#: 64,653
STATION: Robinson H Dwre
TIME SAMPLED: 15:50
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromofluorobenzene Surrogate Recovery: 88%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--COMPOUNDS BY EPA METHOD 8240

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994
REVISED REPORT: October 4, 1994

PROJECT CODE: HNMS1506
REF.#: 64,654
STATION: H. Robinson Res.
TIME SAMPLED: 16:10
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromofluorobenzene Surrogate Recovery: 86%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--COMPOUNDS BY EPA METHOD 8240

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994
REVISED REPORT: October 4, 1994

PROJECT CODE: HNMS1506
REF.#: 64,655
STATION: Wenonah Robinson
TIME SAMPLED: 16:20
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromofluorobenzene Surrogate Recovery: 86%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--COMPOUNDS BY EPA METHOD 8240

CLIENT: Wagner, Heindel, and Noyes, Inc.
PROJECT NAME: Moon & Son
REPORT DATE: October 1, 1994
DATE SAMPLED: September 16, 1994
DATE RECEIVED: September 19, 1994
DATE ANALYZED: September 30, 1994
REVISED REPORT: October 4, 1994

PROJECT CODE: HNMS1506
REF.#: 64,655
STATION: Wenonah Robinson
TIME SAMPLED: 16:20
SAMPLER: D. Reese

Parameter	Detection Limit (ug/L)	Concentration (ug/L)
Benzene	1	ND[1]
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromofluorobenzene Surrogate Recovery: 86%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:
1 None detected

Consulting

JUN 1 6

◆HOFFER & ASSOCIATES◆

Environmental
and Hydrogeologic
Services

Hydrogeologists

P.O. Box 428
Waterbury, VT 05676
802/244-5573
fax 802/244-1123

June 14, 1995

Richard Spiese, Acting Supervisor
Sites Management Section
VT DEC - Hazardous Materials Management Division
103 So. Main Street/West Building
Waterbury, Vermont 05671-0404

Re: Report on UST Site Investigation,
Former South Hero Grocery, So. Hero, VT, SMS Site #94-1730

Dear Mr. Spiese:

On behalf of S.B. Collins, Inc., we are submitting the enclosed report on a UST site investigation performed at the former South Hero Grocery in South Hero.

If you have any questions, please give us a call.

Sincerely,

HOFFER & ASSOCIATES

Jefferson P. Hoffer
Principal Hydrogeologist

enc.

cc: Carl Ruprecht, S.B. Collins

REPORT ON UST SITE INVESTIGATION

FORMER SOUTH HERO GROCERY
SOUTH HERO, VERMONT

SMS SITE # 94-1730

Report Date: June 12, 1995

Prepared For:

Carl Ruprecht, UST Manager
S.B. Collins, Inc.
54 Lower Welden Street
St. Albans, Vermont 05478
(802) 527-0116

Prepared by:

Hoffer & Associates
Consulting Hydrogeologists
P.O. Box 428
Waterbury, Vermont 05676
(802) 244-5573

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1.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Three underground storage tanks (USTs) were closed in November 1994 at the former South Hero Grocery in South Hero, Vermont. Holes were observed in the two tanks removed from the site. A third tank was closed in place because it is partially located underneath the building. Elevated photoionization detector (PID) readings were measured in soils surrounding and underlying the tanks during the closure excavations. A sample collected from an existing monitoring well was found to contain benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl-tert-butyl-ether (MTBE) at concentrations exceeding Vermont Groundwater Enforcement Standards. A site investigation was implemented to define the extent of petroleum contamination at the site. Seven groundwater monitoring wells were installed during two rounds of well drilling at the site.

The site stratigraphy includes fine-grained lacustrine or marine sediments, ranging from silty fine sands to silty clay. The water table at the site occurs at a depth of 16 to 17 feet, although one well has exhibited an anomalous water level (10 - 12 feet) indicative of a perched zone. Considering the water levels measured in the other site wells, groundwater flow direction appears to be to the northwest.

Groundwater sampling results indicate high concentrations of BTEX and MTBE in the vicinity of the former USTs and pump island. Monitoring wells on the perimeter of the site show trace or no contamination. Considering the fine-grained nature of site soils and the lack of contamination in perimeter monitoring wells, groundwater contamination at the site appears to be limited to a small area in the vicinity of the former USTs and pump island.

As presently defined, site contamination does not appear to pose a threat to any sensitive receptors such as water supplies or surface water. Residences and businesses in the vicinity are served by municipal water. The nearest surface water feature is over 2000 feet from the site.

Based on the site investigation results, we recommend quarterly groundwater monitoring to further evaluate groundwater flow directions and to monitor contaminant concentrations.

2.0 BACKGROUND INFORMATION

2.1 Introduction And Site History

On November 22, 1994, two underground storage tanks, one 3,000-gallon gasoline and one 2,000-gallon diesel fuel, were closed at the former South Hero Grocery in South Hero, Vermont. A third tank, a 4,000-gallon gasoline tank, is partially located underneath a structure and was closed in place. The three single-walled steel USTs were owned and maintained by S. B. Collins, Inc., of St. Albans, Vermont. The USTs had not been in use for two years prior to their removal.

The 3,000-gallon steel tank was found to be lined with fiberglass. A fiberglass patch was visible on top of the tank, suggesting that the fiberglass surface had been applied while the tank was in place. A number of corrosion holes were found on the western bottom of the tank. The fiberglass was visible through the holes in the steel. These observations suggest that historical leaks from this tank may have prompted the fiberglass lining effort. Corrosion holes were also found in the 2,000-gallon diesel tank, which was not fiberglass-lined. The corrosion holes were distributed uniformly along the lower 1/3 of the tank. Since the 4,000-gallon tank was closed in place, it was not possible to visually examine the entire exterior surface of the tank. The visible portion of the tank appeared to be in good condition, and personnel from the tank-cleaning contractor (Environmental Products & Services) indicated that the interior surface of the tank was in good condition and free of pitting or corrosion.

Two soil types were observed during the UST excavations; a dense reddish-brown gravelly silty sand believed to have been used as backfill during the UST installations, and

a dense silty clay believed to be native soil. No groundwater was encountered during the excavation of the tanks.

Soils surrounding and underlying the USTs were screened with a PID[1]. Readings in soil beneath and alongside the 3,000-gallon tank exceeded the maximum capacity (2500 ppm) of the instrument. All soil removed during the UST closures was placed back into the excavation after removal of the tanks.

Five leak-detection monitoring wells were in place at the site at the time of the UST closures. Each of the monitoring wells was approximately 13 feet deep, and were equipped with a petroleum vapor sensor. One of the wells was destroyed during excavation of the USTs. During the UST closure activities, water was measured in only one of the remaining four wells (MW-3), at a depth of 11.85 feet below the top of the casing. This well was located on the western edge of the former pump island, and a sample collected from this well was found to contain benzene (5960 ug/L), toluene (8750 ug/L), ethylbenzene (1610 ug/L), xylenes (15380 ug/L), and MTBE (392).

Based on these observations, a site investigation was implemented to define the extent of contamination at the site, and to evaluate the threat posed by site contamination to sensitive receptors. At the request of S.B. Collins, the site investigation was initiated by Hoffer & Associates under the Vermont Sites Management Section's "Expressway" program. Initially, three monitoring wells were constructed at the site and sampled in December (1994) and January (1995). Based on these results, a status report and scope of work for additional work (see Appendix A) was submitted to the Sites Management Section. Four additional monitoring wells were installed at the site in April 1995. A

[1] MicroTIP HL-2000, 10.6 eV lamp, set to respond to isobutylene, readings in parts per million (ppm) isobutylene equivalents.

complete round of groundwater monitoring was performed on April 19, 1995. This report presents the results of all investigative efforts at the site.

2.2 Site Environmental Setting

The former South Hero Grocery is located in a residential and commercial setting along U.S. Route 2 in the Town of South Hero, Vermont (see Figure 1). The South Hero Grocery has not been in operation for two years. The structure that housed the store is a two-story concrete-block building. The store was located on the first floor, and the second floor contains rental apartments. The structure is connected to a building which currently houses the Island Video store. A small craft store is located immediately east of the Island Video store. A seasonal fast food and ice cream shop is located immediately west of the property. McGregors' Island Pharmacy is located further to the west along Route 2. Undeveloped agricultural lands are present behind (north) the site. Properties across Route 2 from the site include residences, the South Hero Rescue Squad, the Town Clerk's office, and the South Hero Mobil. An investigation of petroleum contamination at the South Hero Mobil (SMS Site #90-0414) has been on-going. The Island Bait Shop, which is located across Route 2 from the site, is planning to relocate to the space formerly occupied by the South Hero Grocery. Property boundaries in the vicinity are shown on Figure 2, which was taken from the South Hero tax maps. Figure 3 presents a site map.

The site is situated within the Champlain Islands region, and the surrounding landscape is relatively flat. Keeler Bay of Lake Champlain is located about 2,500 feet north of the site. Lowland marshes and wetlands are present 3,000 feet west of the site. According to the USGS topographic map of the region, elevation at the site is approximately 140 feet, which is about 40 feet higher than the mean elevation of Lake Champlain. Topography in the vicinity of the site grades gently to the west and to the north.

The surficial geology of the area has been mapped by Stewart (1974) as lacustrine and marine clays and silts, and glacial till. The bedrock geology of the vicinity is described by Stewart (1974) as interbedded slate, dolomite, shale sandstone, and limestone. The Centennial Geologic Map of Vermont (Doll, 1961) has the Ordovician Stony Point Formation (calcareous black shales grading into limestone) mapped beneath the site.

The area between the building at the site and Route 2 is paved. Catch-basins along Route 2 collect runoff in the vicinity. Stormwater flow direction is believed to be westward along Route 2 toward a discharge point at the lowland marshes and wetlands 3,000 feet west of the site.

The site and surrounding buildings are served by municipal water. During the site investigation, a survey of the surrounding properties did not locate any domestic drinking water wells in use within a 500-foot radius of the site. Interviews with individuals in the town office confirmed that there are no known water wells in use in this area. The nearest water supply wells identified in the Water Supply Division's well inventory database are shown on Figure 4. The closest well is located about 1000 feet southwest of the site.

3.0 FIELD PROCEDURES

3.1 Monitoring Well Installations

Three monitoring wells (MW-102, MW-103, and MW-105) were installed by Adams Engineering in December of 1994. These wells were installed at the same locations of original leak-detection wells MW-2, MW-3, and MW-5. Drilling procedures were documented in the March 1, 1995 letter to Carl Ruprecht of S.B. Collins from Hoffer & Associates (see Appendix A).

Four additional monitoring wells were installed at the site in April 1995. Drilling services were provided by Tri-State Drilling and Boring, of West Burke, Vermont. The four additional monitoring wells were installed in order to more accurately determine the direction of groundwater flow and the extent of contamination at the site.

The locations of the new monitoring wells (MW-106, MW-107, MW-108, and MW-109), are shown on Figure 3. Boreholes were advanced using 4.25-inch hollow-stem augers. Soil samples were obtained at 5-foot intervals and when a change in stratigraphy was noted, both for soil characterization and for PID soil headspace measurements. Soil samples were described using the USDA/Soil Conservation Service classification scheme. Soil headspace analysis was conducted by placing representative soil samples in plastic zip-lock bags, and measuring the headspace with the PID.

Soil borings were advanced through the water table before the wells were constructed. The total depth of the soil borings averaged about 20 feet. Wells were constructed with 2-inch diameter PVC well screens (10 foot sections of 10-slot screen) and riser pipe. The wells were positioned in an attempt to straddle the inferred water table, with 5 feet of

screen below the water table. A sandpack, consisting of #1 grade sand, was placed by gravity in the annular space from the base of the borehole to at least one foot above the top of the screen. A bentonite seal was placed above the sandpack. The remaining annular space was backfilled with cuttings generated during drilling. The wells were finished with steel covers and cemented in place. Soil boring and monitoring well construction logs are provided in Appendix B.

Prior to sampling, the wells were developed using dedicated 2-inch bailers. Where possible, three well volumes were removed from the wells during development efforts. Volumes removed during development ranged from 0.5 to 3.25 gallons. Water generated during the bailing effort was contained on-site in a 55-gallon drum.

3.2 Groundwater Sampling and Analysis

A complete round of groundwater sampling for BTEX and MTBE was conducted on April 19, 1995. Prior to sampling the wells, water level and PID well headspace measurements were obtained from each well. Water levels were taken from the top of the PVC riser pipe, and were used to calculate the volume of standing water present in each well. The wells were purged of standing water prior to sampling. The target volume for purging was three well volumes, although some of the wells began to go dry prior to three well volumes. These wells were sampled as the water level recovered. Water levels, PID headspace measurements, purge volumes, and other sampling data were recorded on a field data sampling sheet, which is included in Appendix C.

Sampling was conducted with either 1.5-inch PVC dedicated, or 2.0-inch polyethylene dedicated bailers, depending upon the size of the well. Groundwater samples were collected by either the use of a bottom-emptying device or by decanting directly from the

1.5-inch bailers into 40 mL vials. The sampling vials contained hydrochloric acid for sample preservation. Immediately after collection, the samples were placed in a cooler with ice. Quality assurance/quality control (QA/QC) samples included a trip blank, a field blank, and a blind duplicate sample. The trip blank consisted of two 40 mL vials filled with deionized water, which were prepared by the laboratory. The trip blanks were handled in a similar manner as the samples, and were returned to the laboratory for analysis with the samples. A field blank was collected at the conclusion of sampling by pouring deionized water into the vials at the site at the conclusion of the sampling event. The blind duplicate was collected according to the same sampling protocol as the samples, and was given a fictitious sample name and collection time. The duplicate was collected at MW-106, and was labeled MW-01.

The samples were submitted to Scitest Laboratory Services, of Randolph, Vermont, and were analyzed for BTEX and MTBE using EPA Method 8020. The laboratory reports and chain-of-custody are given in Appendix C.

3.3 PID Measurements

During monitoring well installations and groundwater sampling, a Photovac MicroTIP HL-2000 photoionization detector, equipped with a 10.6 eV lamp, was used to obtain soil and monitoring well headspace measurements, and to monitor worker breathing spaces for health and safety. Prior to each day's activities, the PID was calibrated and set to respond to isobutylene. Readings are reported as parts per million (ppm), and represent parts per million equivalents relative to isobutylene.

4.0 RESULTS

4.1 Monitoring Well Installations

Geologic and well construction logs are provided in Appendix B.

4.1.1 Stratigraphy

Soils observed during the UST closures consisted of dense reddish-brown gravelly silty sand interpreted as backfill during the UST installations, and a dense silty clay interpreted as native soil. During monitoring well drilling, two predominant soil types were identified; a dense silty clay, and a silty fine sand. In general, the silty clay soils were present from the surface to depths of 13 to 16 feet, underlain by silty fine sands. However, thin silt and clay lenses were observed in the silty fine sands, and some fine sand gravel was observed in the dense silty clay soils.

4.1.2 PID Measurements of Soil Sample Headspaces

PID headspace readings of soil samples collected during monitoring drilling are included on the well logs in Appendix B. The highest reading detected in soil sample headspaces was 9.9 ppm for a sample from 10 - 12 feet in MW-106.

4.2 Groundwater Elevations

Table 1 presents groundwater elevation data for the site monitoring wells. Depth to groundwater at the site has generally been in the 15 to 17 foot range, although water levels in MW-103 have been in the 10 to 12 foot range.

Figure 5 presents a groundwater elevation contour map for April 27, 1995. The anomalous water level in MW-103 was not included in the contouring, since this water level is believed to be the result of a perched zone in the vicinity of this well. Water levels in the remaining wells depict a relatively flat gradient, and display a northwestward direction of groundwater flow.

4.3 Groundwater Sampling Results

The results of the April 19, 1995 groundwater sampling event are presented in Table 2. Table 3 presents the data for each well, and includes data from the initial sampling round in January 1995. Isoconcentration contour maps for benzene and xylenes for the April 19 sampling event are shown on Figures 6 and 7.

Vermont Groundwater Enforcement Standards were exceeded in the three monitoring wells near the former USTs and pump island. Standards were exceeded for all BTEX constituents in MW-103, for benzene in MW-102, and for benzene and xylenes in MW-105.

Of the remaining four monitoring wells, only trace concentrations of BTEX and MTBE were observed. In MW-107, benzene and toluene was detected at 1 ug/L. In MW-109, xylenes were detected at 1 ug/L, and MTBE was detected at 2 ug/L. Aside from the detection in MW-109, MTBE was not detected in any other wells (although detection limits were relatively high in MW-102, MW-103, and MW-104) during this sampling

round. MTBE had been detected in MW-102, MW-103, and MW-105 in the January 1995 sampling round.

5.0 DISCUSSION OF RESULTS

5.1 Site Hydrogeology

Site soils include a reddish-brown gravelly silty sand present in the vicinity of the former USTs, interpreted to be UST backfill material. Two native soil types were observed during drilling efforts, a dense silty clay, and silty fine sands. The silty fine sands were generally present below depths ranging from 13 to 16 feet, although no discrete boundary between the two predominant soil types was observed. In general, soil samples collected during drilling efforts indicate that while site soils are not homogeneous, they are primarily fine-grained sediments. These soils are interpreted as marine or lacustrine in origin.

The depth to groundwater in site monitoring wells has ranged from about 10 - 12 feet in MW-103, and from 15 - 17 feet in the remaining wells. Water levels in MW-103 suggest that this well is located in a perched zone. During drilling of this well (which was drilled at the former location of original well MW-3), a dense silty clay was observed in a sample collected from 13.5 to 14.8 feet. By eliminating MW-103 measurements from the groundwater elevation contouring, the site groundwater elevations depict a shallow gradient (0.002) indicating a northwestward flow direction.

Although no measurements of hydraulic conductivity were taken at the site, recharge rates of the wells during sampling efforts were relatively low, reflecting the fine-grained nature of the site soils.

5.2 Source, Degree, and Extent of Contamination

Holes found in the two former site USTs indicate that petroleum releases likely occurred over time from these tanks. Fiberglass lining was observed in one of the tanks which

contained corrosion holes, suggesting that the tank had a history of leaking. Soil and groundwater sampling results also show contamination near the former pump island (MW-103), suggesting that releases may have also occurred at the pumps or from piping.

Relatively high levels of dissolved BTEX are currently present in groundwater in the vicinity of the former USTs and pump island. Vermont Groundwater Enforcement Standards were exceeded in the three monitoring wells nearest the former USTs and pump island during the latest sampling round. The highest concentrations were detected in MW-103, which is on the western side of the former pump island and is believed to be screened in a perched zone.

Of the four monitoring wells on the perimeter of the site property, only trace concentrations of contaminants were detected (in MW-107 and MW-109). Due to the fine-grained nature of site soils, contaminant migration at the site appears to limited to a small area near the source area.

5.3 Potential Receptors

Residences and business in the vicinity of the site are served by municipal water. The nearest water well is located 1000 feet southwest of the site and is completed in bedrock. Due to the northwesterly groundwater flow direction and limited area of contamination at the site, there does not appear to be any threat to drinking water supplies.

The nearest surface water bodies are Keeler Bay (2,500 feet north) and marshlands to the west (3,000 feet). Based on the fine-grained nature of site soils, transport of site contaminants to these receptors via groundwater flow is unlikely.

5.4 Recommendations

In order to further evaluate site groundwater conditions (flow directions and quality), a quarterly groundwater monitoring program is recommended. The monitoring should include water-level measurements in the site monitoring wells, and groundwater sampling and analysis for BTEX and MTBE by EPA Method 8020. A cost estimate for quarterly groundwater monitoring and reporting at the site is provided in Table 4.

6.0 REFERENCES

Doll, Charles G. (Ed.), 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey, State of Vermont.

Stewart, David P., 1974, *Geology for Environmental Planning in the Milton-St. Albans Region, Vermont*, Environmental Geology No. 5, Vermont Geological Survey.

TABLE 1

Groundwater elevation measurements,
former South Hero Grocery, South Hero, Vermont, SMS Site #94-1730.

DEPTH TO WATER
(feet below TOC)

WELL ID	Elev of TOC	1/4/95	4/17/95	4/19/95	4/27/95
MW-4	101.26	dry	dry	dry	dry
MW-102	101.67	17.09	16.58	16.48	16.46
MW-103	101.00	12.11	10.45	11.72	12.58
MW-105	101.66	17.03	16.54	16.40	16.48
MW-106	99.81	-	14.60	14.43	14.54
MW-107	101.22	-	16.04	16.85	15.96
MW-108	102.20	-	17.09	17.00	17.04
MW-109	100.47	-	15.71	15.46	15.46

GROUNDWATER ELEVATIONS (feet)

WELL ID	Elev of TOC	1/4/95	4/17/95	4/19/95	4/27/95
MW-4	101.26	dry	dry	dry	dry
MW-102	101.67	84.58	85.09	85.19	85.21
MW-103	101.00	88.89	90.55	89.28	88.42
MW-105	101.66	84.63	85.12	85.26	85.18
MW-106	99.81	-	85.21	85.38	85.27
MW-107	101.22	-	85.18	84.37	85.26
MW-108	102.20	-	85.11	85.20	85.16
MW-109	100.47	-	84.76	85.01	85.01

NOTES
TOC = top of casing (pvc)
Elevations are in feet relative to on-site datum of 100.00 feet.

TABLE 2

Groundwater sampling results for April 19, 1995,
former South Hero Grocery, South Hero, Vermont, SMS Site #94-1730
(results in ug/L)

WELL ID	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
MW-102	241	39	<10	17	<10
MW-103	2450	3890	1230	16100	<100
MW-105	688	383	<50	2000	<50
MW-106	<1/<1	<1/<1	<1/<1	<1/<1	<1/<1
MW-107	1	1	<1	<1	<1
MW-108	<1	<1	<1	<1	<1
MW-109	<1	<1	<1	1	2
Trip Blank	<1	<1	<1	<1	<1
Field Blank	<1	<1	<1	<1	<1

Notes:
< 1 = below a detection level of 1
<1 / <1 = sample result / field duplicate result

REGULATORY THRESHOLDS
(ug/L)

Standard	Benzene	Toluene	Ethylbenzene	Xylenes	MBTE
VT GES	5	2420	680	400	-
VT PAL	0.5	1210	340	200	-
VHA	1	1000	-	-	40
MCL	5	1000	700	10000	-

Notes:
VT GES = Vermont Groundwater Enforcement Standard
VT PAL = Vermont Preventative Action Limit
VHA = Vermont Health Advisory
MCL = Maximum Contaminant Level

TABLE 3

Groundwater analytical data by well,
former South Hero Grocery, South Hero, Vermont, SMS Site #94-1730.
(results in ug/L)

MW-102

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
1/4/95	258 / 247	89 / 81	<1 / <1	25 / 22	69 / 65
4/19/95	241	39	<10	17	<10

MW-103

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
11/22/94	5960	8750	1610	15380	392
1/4/95	4620	6940	1390	15700	255
4/19/95	2450	3890	1230	16100	<100

MW-105

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
1/4/95	1290	1290	363	3490	1640
4/19/95	688	383	<50	2000	<50

MW-106

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
4/19/95	<1 / <1	<1 / <1	<1 / <1	<1 / <1	<1 / <1

MW-107

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
4/19/95	1	1	<1	<1	<1

MW-108

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
4/19/95	<1	<1	<1	<1	<1

MW-109

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
4/19/95	<1	<1	<1	1	2

TABLE 3 (continued)
Groundwater analytical data by well,
former South Hero Grocery, South Hero, Vermont, SMS Site #94-1730.
(results in ug/L)

QA / QC

Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
1/4/95					
Duplicate (MW-102)	258 / 247	89 / 81	<1 / <1	25 / 22	69 / 65
Trip Blank	<1	<1	<1	<1	<1
Field Blank	<1	<1	<1	<1	<1
4/19/95					
Duplicate (MW-106)	<1 / <1	<1 / <1	<1 / <1	<1 / <1	<1 / <1
Trip Blank	<1	<1	<1	<1	<1
Field Blank	<1	<1	<1	<1	<1

Notes:
< 1 = below a detection level of 1
<1 / <1 = sample result / field duplicate result

TABLE 4

Cost estimate for quarterly groundwater monitoring,
former South Hero Grocery, South Hero, Vermont (SMS Site #94-1730).

LABOR

ITEM	Staff	Hours	Rate	Cost
Sampling Preparation	TFS	0.5	$30.00	$15.00
Field Sampling	TFS	5	$30.00	$150.00
Data Tabulation	HP	2	$15.00	$30.00
Figure Preparation	JPH	2	$40.00	$80.00
Quarterly Report Preparation	JPH	6	$40.00	$240.00

Sub-Total Labor **$515.00**

EXPENSES

ITEM	Quantity	Rate	Cost
Mileage, 1 trip, 90 miles round trip	90	$0.28	$25.20

Sub-Total Expenses **$25.20**

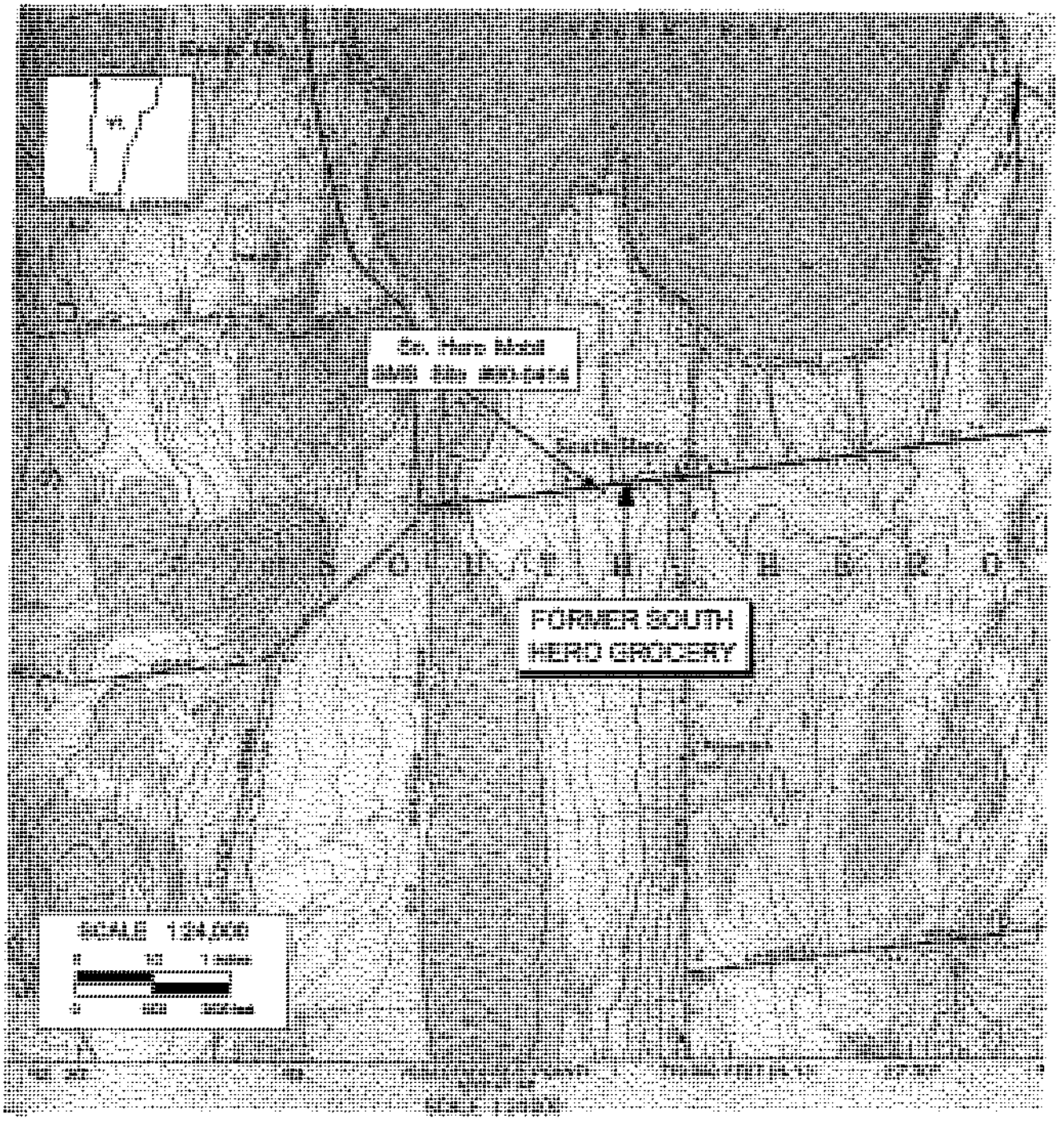
Total Hoffer & Associates **$540.20**

SUB-CONTRACTORS

Laboratory - Scitest Laboratory Services	Quantity	Rate	Cost
8020 analysis for BTEX/MTBE, groundwater, QA/QC	10	$55.00	$550.00

Total Sub-Contractors **$550.00**

ESTIMATED COST PER QUARTER **$1,090.20**



Base from U.S. Geological Survey, 1:24,000;
South Hero, VT-NY, VT, 1966

FIGURE 1
Site location map, former South Hero Grocery,
328 Route 2, South Hero, Vermont (SMS Site #94-1730).

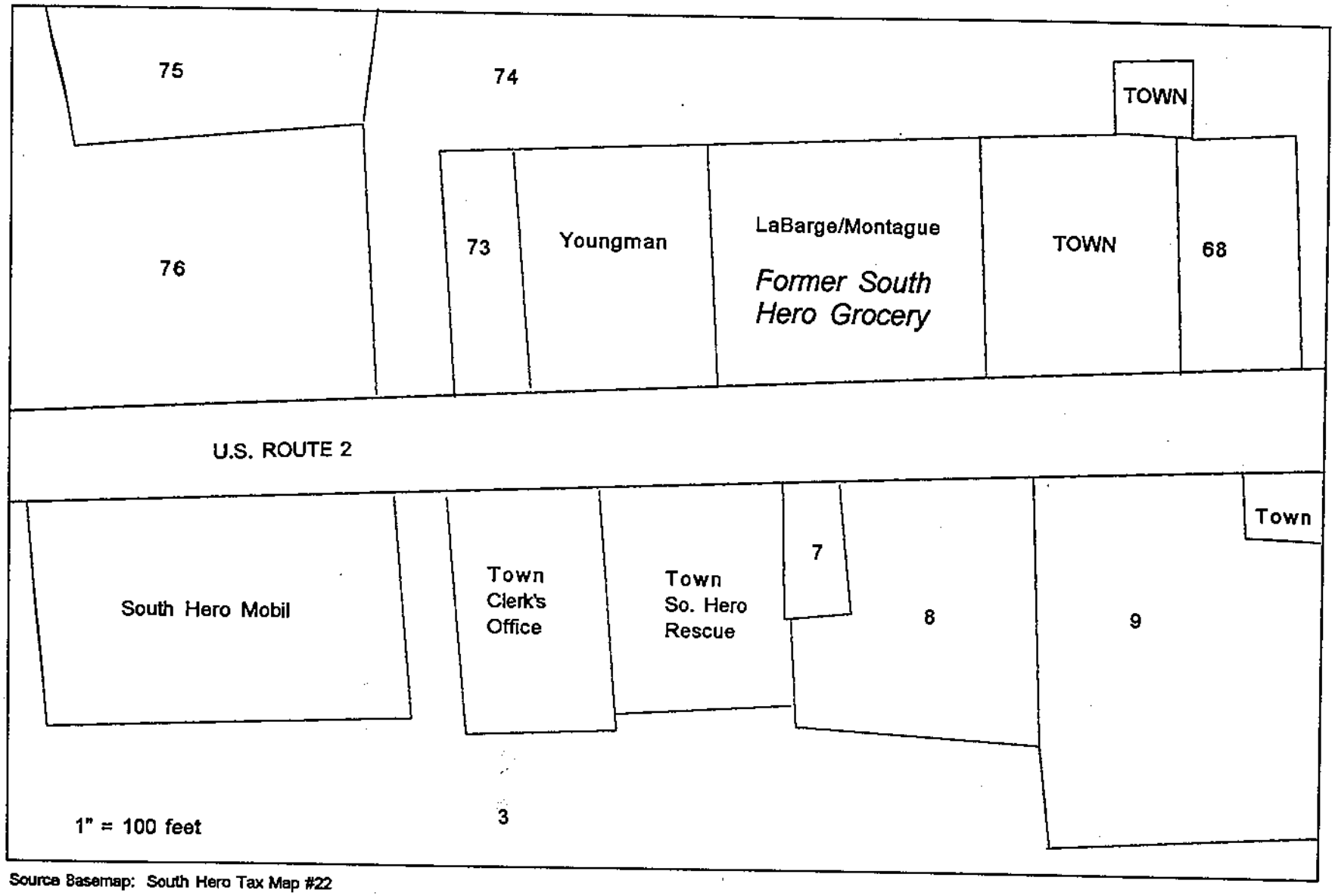


FIGURE 2
South Hero tax map showing location of former South Hero Grocery, South Hero Mobil, and surrounding property owners.

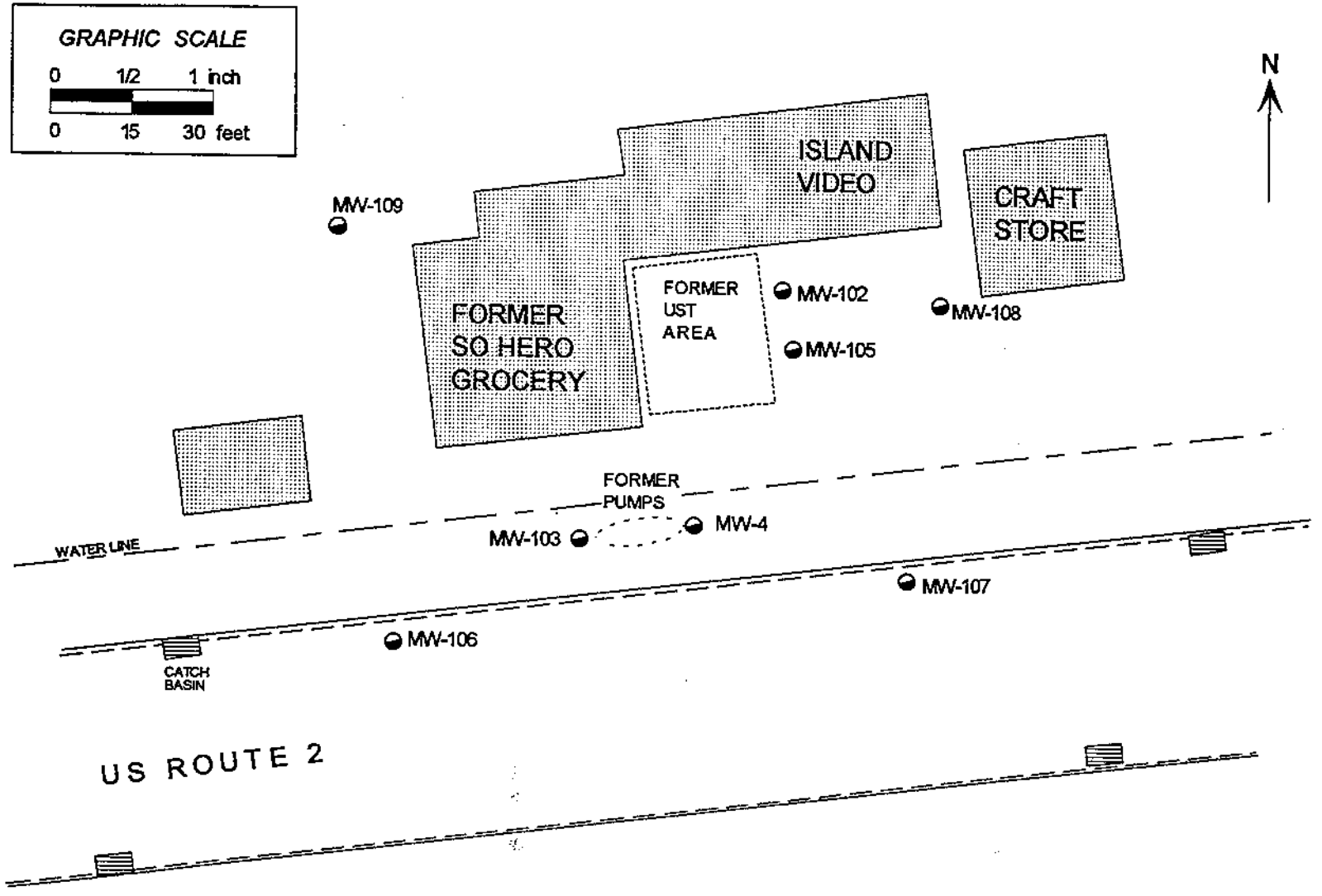
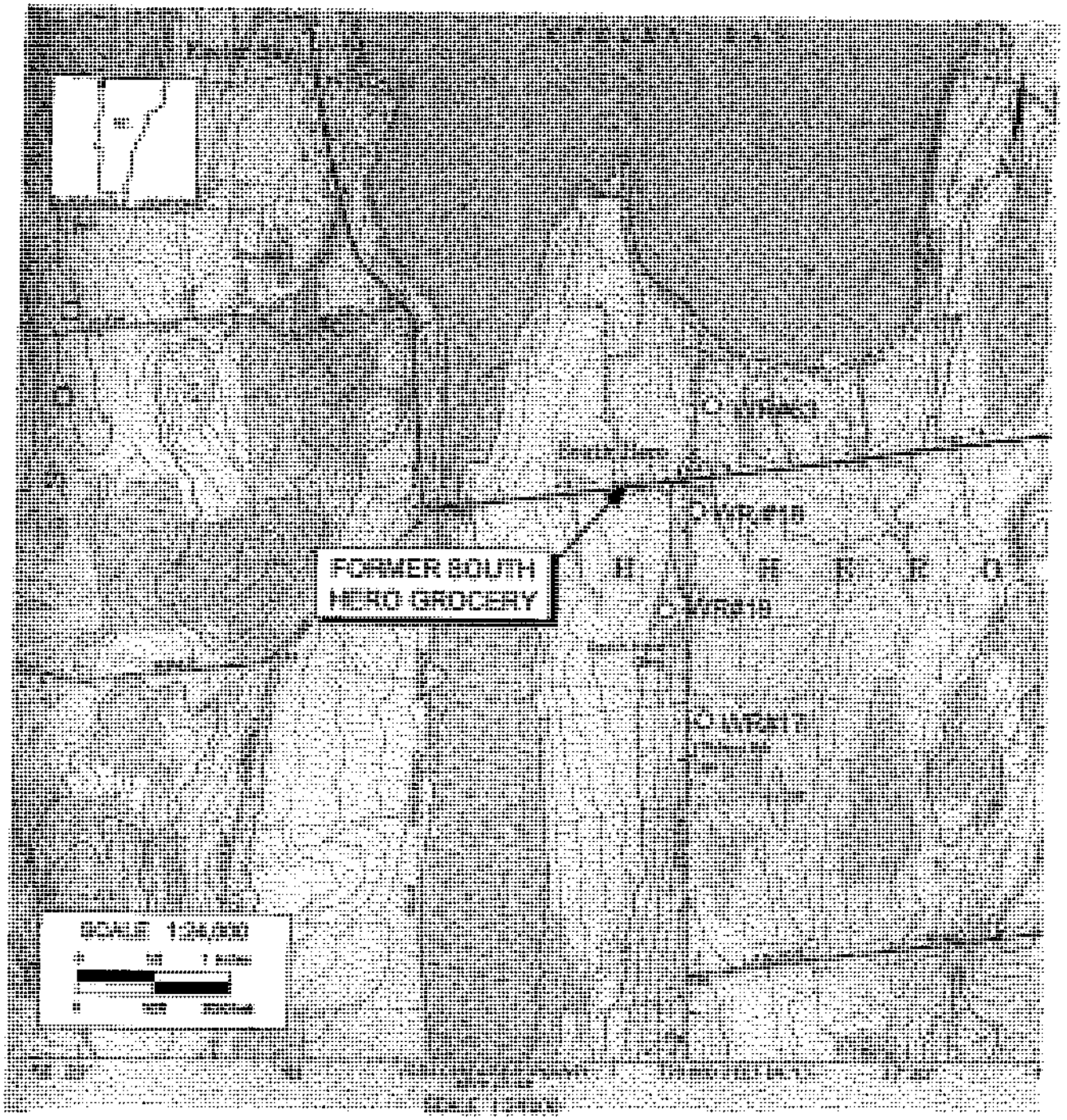


FIGURE 3
Site map, former South Hero Grocery,
South Hero, Vermont, SMS (Site #94-1730).



Base from U.S. Geological Survey, 1:24,000;
South Hero, VT-NY, VT, 1966

Well Locations from Vermont Water Supply Division's Well Inventory for South Hero, Vermont

O WR#17 - well location/log #

FIGURE 4
Locations of nearest private wells,
former South Hero Grocery UST site investigation,
South Hero, Vermont (SMS Site #94-1730).

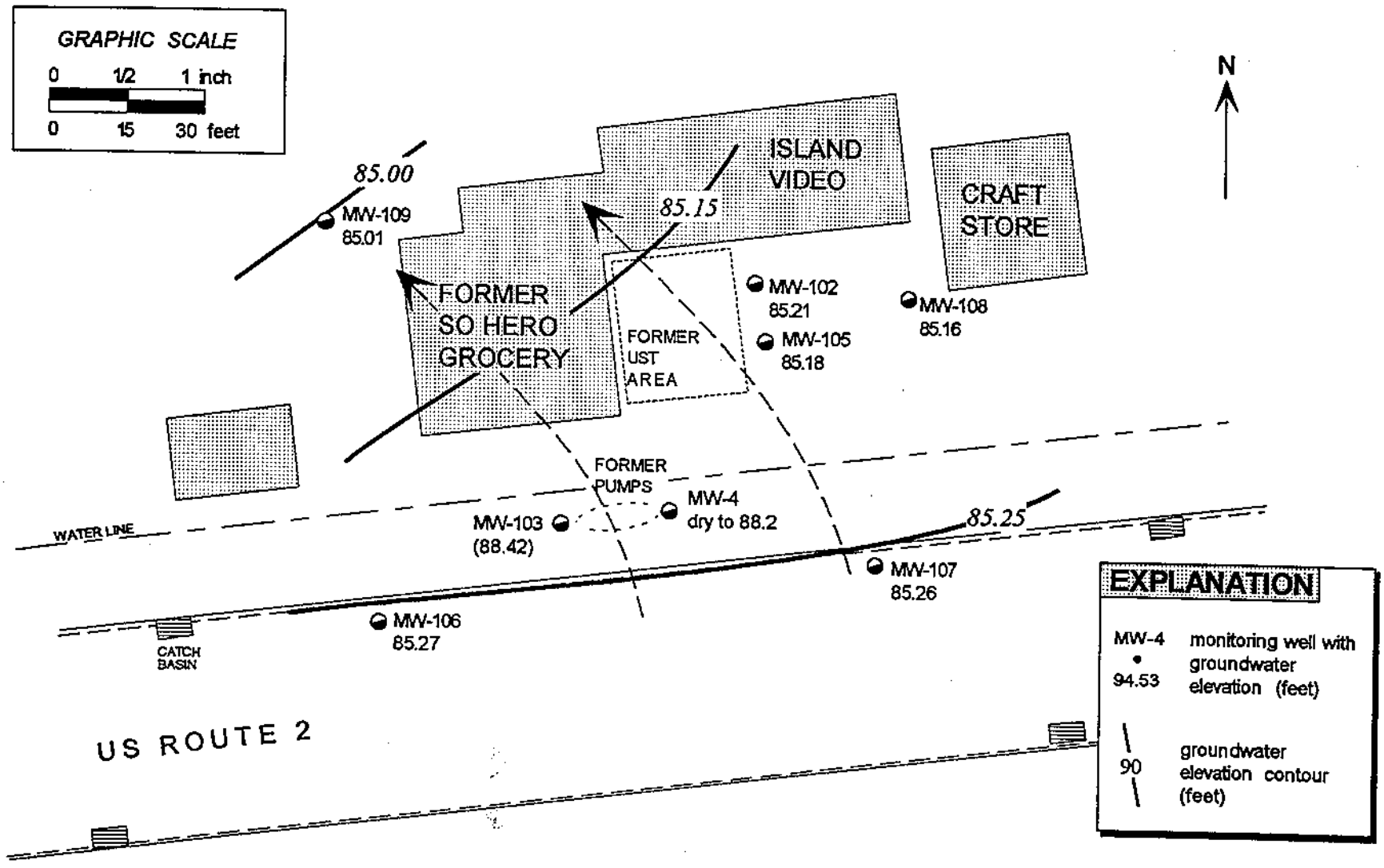


FIGURE 5
Groundwater elevation contour map, April 27, 1995,
former South Hero Grocery,
South Hero, Vermont, (SMS Site #94-1730).

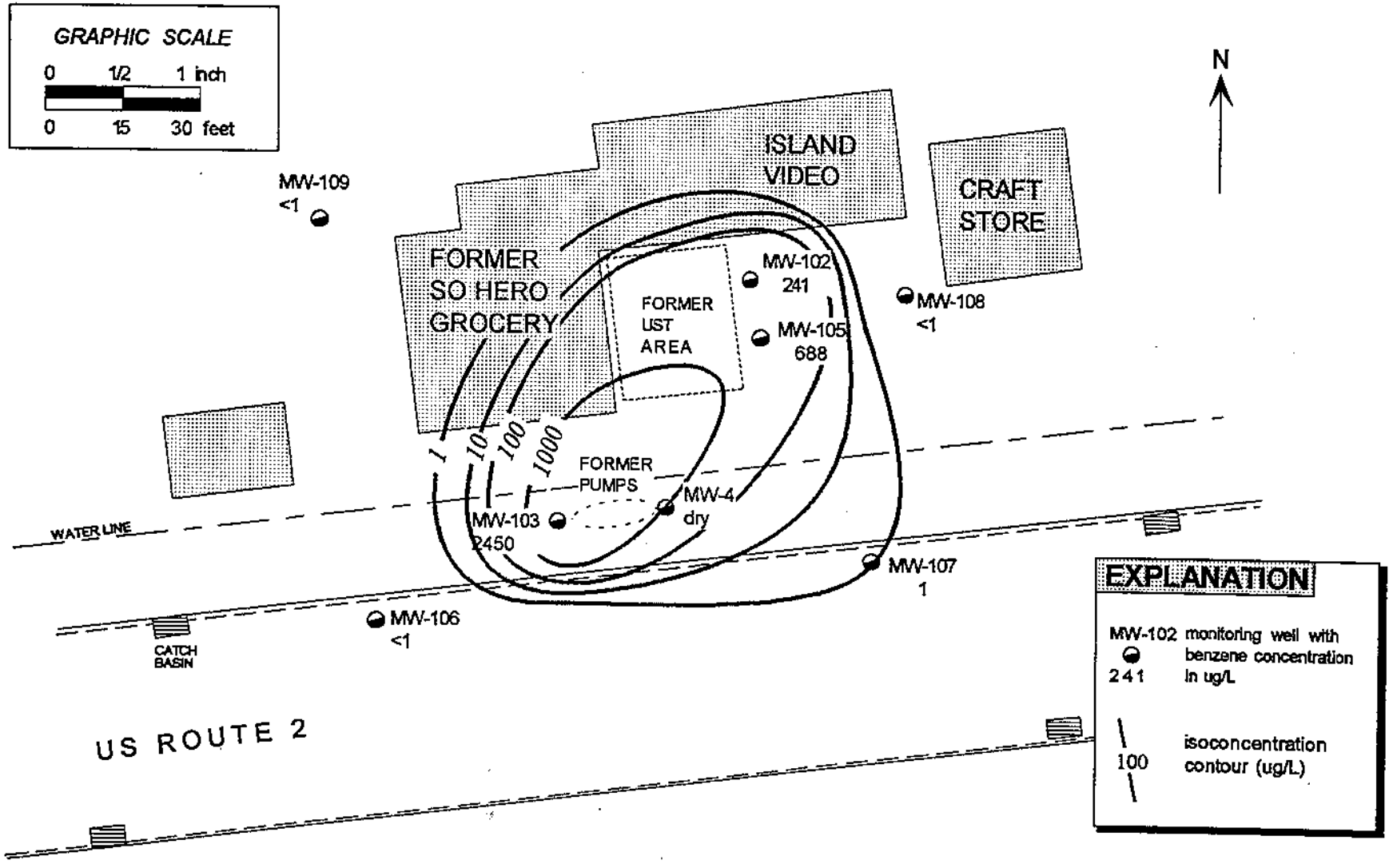


FIGURE 6
Isoconcentration contour map for benzene, April 19, 1995,
former South Hero Grocery,
South Hero, Vermont, (SMS Site #94-1730).

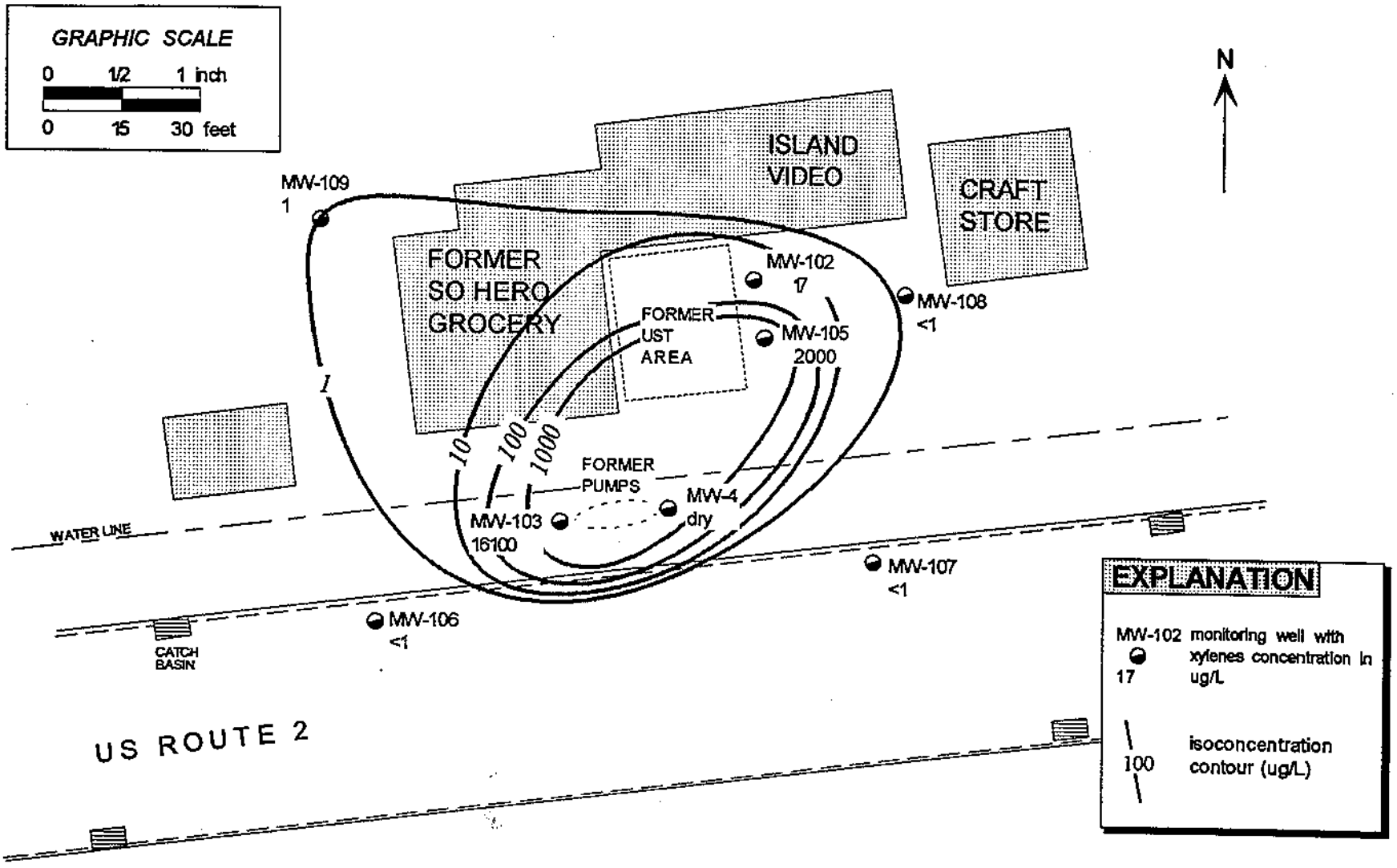


FIGURE 7
Isoconcentration contour map for xylenes, April 19, 1995,
former South Hero Grocery,
South Hero, Vermont, (SMS Site #94-1730).

State of Vermont

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street/West Office
Waterbury, Vermont 05671-0404
(802) 241-3888
FAX (802) 241-3296

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

March 29, 1995

Jefferson Hoffer
Hoffer & Associates
P.O. Box 428
Waterbury, VT 05676

RE: Status Report and Work Scope for Additional Investigation
Former South Hero Grocery, South Hero, VT
(Site #94-1730)

Dear Mr. Hoffer:

The Sites Management Section (SMS) has reviewed the Hoffer & Associates Status Report and Workscope for Additional Investigation dated March 1, 1995 that you have developed for the above referenced site. The status report of the expressway investigation indicated that all three monitoring wells, which were further developed and sampled, contained elevated concentrations of BTEX and MTBE compounds. Since the degree and extent of groundwater contamination has not been defined, the SMS concurs with Hoffer & Associates recommendation to further characterize the dissolved-phase contamination through the installation of an additional five monitoring wells. In addition to installing five monitoring wells, the Hoffer & Associates Workscope includes the sampling all eight wells using EPA Method 8020, completing the receptor survey by conducting a water well inventory, conducting a site survey for the production of a groundwater contour map and a base site map, and submitting a report that includes detailed well logs, analytical results, conclusions, and recommendations. The SMS approves the workscope as submitted for costs not to exceed $5,228.40, and requests that onsite work be initiated as soon as possible.

At future sites, please consider performing this additional work under the expressway before submitting a status report. Please refer to the "Site Investigation Guidance" for more information on this program.

The SMS looks forward to the completion of this work. If you have any questions, please feel free to call.

Sincerely,

Matthew Moran, Site Project Manager
Sites Management Section

cc: Carl Ruprecht, S.B. Collins, Inc.

mattm/wp/941730wp

March 1, 1995

Mr. Carl Ruprecht, UST Manager
S.B. Collins, Inc.
54 Lower Welden Street
St. Albans, VT 05478

Re: Status Report on Site Investigation
Work Scope for Additional Investigation
Former South Hero Grocery, South Hero, VT
Facility ID #3724266

Dear Carl:

This letter summarizes site investigation efforts at the former South Hero Grocery in South Hero, Vermont. The site investigation was prompted by evidence of a release of petroleum from site USTs which were removed in November of 1994. A site investigation expressway notification was submitted to the Sites Management Section (SMS), along with the UST closure report, at that time. The estimated date of completion of the site investigation was identified as February 1, 1995.

Three monitoring wells have been installed and sampled. Based on the data collected at the site to date, additional monitoring wells are needed to characterize the extent of contamination. As a result, we recommend proceeding with additional field efforts prior to preparing a formal site investigation report. This letter provides a status report on the work performed to date, and presents a scope of work and cost estimate for the additional field efforts. Figures, tables, well logs, and sampling results are attached.

Because the additional work will result in increased project costs, in excess of the SMS's fee schedule for initial site investigations, we should obtain the SMS's approval of the additional work items prior to proceeding.

Hoffer & Associates
Consulting Hydrogeologists

(802) 244 - 5573
P.O. Box 428, Waterbury, Vermont 05676

MONITORING WELL INSTALLATIONS

Prior to the UST closures in November of 1994, five existing wells at the site were used as vapor detection wells. These wells were screened from about 3 to 13 feet below grade, and were equipped with petroleum vapor sensing devices. During the UST closures, water was observed in only one of the wells (MW-3). A water sample collected from MW-3 at that time showed high concentrations of dissolved BTEX and slightly lower concentrations of MTBE.

Three of the existing wells (MW-2, and MW-3, and MW-5) were pulled on December 16, 1994, and new wells were drilled at the same locations (MW-102, MW-103, MW-105). Drilling services were provided by Adams Engineering using "mini-rig" drilling techniques, including four inch solid-stem augers, a 2 3/8-inch thin wall sampling tube, and small diameter split spoons.

In MW-103, a sample collected from the interval 12 to 15 feet showed saturated sand (former sand pack of MW-3) underlain by stiff, brown, sandy silt and clay. A strong gasoline odor was noted in this sample, and photoionization (PID) headspace readings were in the 2000 ppm range. A soil sample from this interval displayed a small amount of free product when it was mixed with water and shaken. MW-103 was constructed with a screened interval from 4.7 to 14.7 feet.

Soil samples retrieved from beneath the sand pack of the former wells MW-2 and MW-5 included gray silty sands. Saturation was noted at an approximate depth of 17 feet. The boreholes were advanced to total depths of 23.6 feet for MW-102, and 20.5 feet for MW-105. Well screens were installed across the interval of 10.3 to 20.3 feet below grade for both wells. PID headspace screening results are presented below:

MW-102		MW-103		MW-105	
Depth (feet)	PID (ppm)	Depth (feet)	PID (ppm)	Depth (feet)	PID (ppm)
15.0-15.4	29.0	12.5-13.5	2400	12.8-17.8	126
		13.5-14.8	1900	15.0-20.0	120

Well logs are enclosed.

WATER LEVELS

Table 1 presents groundwater elevations measured on January 4, 1994. Water levels in MW-102 and MW-105 were nearly equal, while the water level in MW-103 was about five feet higher. Since MW-103 is less than 50 feet from the MW-102 and MW-105, the disparity in water levels suggests that MW-103 is screened into a separate unit (perched zone). Figure 3 presents a cross section which illustrates the two water levels. Based on this data, it is difficult to assess groundwater flow directions at the site.

GROUNDWATER SAMPLING

The three new monitoring wells were sampled on January 4, 1995, for BTEX and MTBE using EPA Method 8020. Table 1 presents the analytical results, which show relatively high levels of dissolved BTEX and MTBE in each of the three wells. The highest BTEX concentrations were observed in MW-103:

MW-103 (sampled on 1/4/95)

Constituent	Concentration (µg/L)
Benzene	4, 620
Toluene	6,940
Ethylbenzene	1,390
Xylenes	15,700

Without additional information of groundwater flow directions, it is difficult to interpret the distribution of contamination. For example, contamination present in MW-103 could have originated from the former pump dispensers and/or piping, or could have migrated to MW-103 from releases originating from the tanks.

EXTENT OF CONTAMINATION/POTENTIAL RECEPTORS

Dissolved-phase contamination is present in groundwater at the site, and soil-adsorbed free product was observed in soil samples collected during the installation of MW-103. Groundwater flow patterns/contaminant migration at the site is difficult to assess due to the apparent complexity of the hydrogeologic setting. In general, site soils appear to be low-permeability in nature, which may limit contaminant migration rates. Subsurface utilities may influence contaminant distribution at the site.

The vicinity is served by municipal water (South Hero Fire District). The Water Supply Division's water-well inventory for South Hero was reviewed to identify private wells in the vicinity. The enclosed Figure 4 presents the locations of the nearest four wells, as identified in the water-well inventory (locations have not been verified). Well WR#18 is closest to the site, at a distance of over 1000 feet, and the well log shows a depth to bedrock of 20 feet.

The former South Hero Grocery building and adjacent addition (Island Video) do not have basements. During the UST closures, personnel at Island Video reported that they had not noticed petroleum odors. No positive readings were obtained with the PID in the former Grocery building, which was vacant at the time.

The nearest surface waters include wetlands to the west, and Keeler Bay to the north. The distance to these surface waters is greater than 2000 feet.

SMS FILE REVIEW - SOUTH HERO MOBIL

In order to gain insight into the site hydrogeologic setting, the SMS files on the South Hero Mobil (SMS Site #90-0414) were reviewed. The location of the South Hero Mobil relative to the former South Hero Grocery is shown on Figure 5, a tax map of the vicinity. The initial subsurface investigation at the South Hero Mobil (then known as the McDonough Service Center) was performed by Griffin International (GI) in 1990. GI installed three monitoring wells at the site. Soils observed during the installation of the monitoring wells included gravelly fill underlain by silts and clays. Water levels in the wells ranged from five to eight feet below grade and portrayed a northeastward groundwater flow direction.

Additional field efforts at the site have been performed by Wagner, Heindel, & Noyes (WH&N), including the installation of numerous wells. The additional wells were installed at different intervals, in an attempt to define vertical flow patterns and contaminant distribution. Native soils encountered by WH&N during drilling and test pit excavating have included a shallow silt and clay unit underlain by a permeable sandy till. Water level data collected by WH&N portrays a northwestward groundwater flow direction. Groundwater flow patterns and contaminant migration at the site are influenced by the presence of subsurface utilities along Route 2.

PROPOSED ADDITIONAL MONITORING WELL INSTALLATIONS

It is recommended that another set of monitoring wells be drilled on the former South Hero Grocery property to assist in the delineation of groundwater flow directions and contaminant distribution. Five monitoring wells are proposed (Figure 6), and are sited on the perimeter of the property.

SCOPE OF WORK

- Groundwater Monitoring Well Installation - We recommend using hollow-stem augers to collect soil samples and install 2-inch diameter monitoring wells at the site. Boreholes will be advanced using hollow stem augers to the first zone of saturation, estimated to be at a maximum of 17 feet. Split spoon samples will be collected as necessary to define the stratigraphy and depth to water. A total of five split-spoon samples have been budgeted per well. Soil samples will be classified using the SCS classification scheme, and soil-sample headspaces will be evaluated with a PID.

  Wells will be constructed with 10 foot sections of 2-inch diameter factory-slotted (10 or 20-slot), flush-thread, PVC well screen. The well screens will be positioned so that the top of the screen remains above the seasonal high water table, as judged by observations during well drilling. Flush-thread PVC riser will be extended from the top of the screen to the ground surface. An appropriately-sized, commercially-sorted sandpack will be installed around the well screens. Geologic and monitoring well construction logs will be prepared to document the stratigraphy and well construction details. After well installation, the wells will be developed by either bailing or pumping. All development waters will be collected and placed into a 55-gallon drum at the site.

During the well drilling and installation activities, a PID will be utilized to monitor for the presence of organic vapors. The vapor monitoring will be used to detect zones of contamination, and also to monitor worker air-space for health and safety concerns. Drilling equipment will be steam-cleaned between each borehole.

Prior to drilling, DIG-SAFE will be contacted to alert subsurface utility owners of the well drilling activities. In addition, arrangements will be made with the local water utility company to locate water lines.

Five tentative monitoring well locations are shown on Figure 6. Since groundwater flow directions are uncertain, well locations are sited on the perimeter of the property. Final well placement may be altered due to the presence of utilities or access.

A price quote for the installation of five monitoring wells at the site was obtained from Tri-State Drilling and Boring, West Burke, Vermont, and is enclosed.

- Groundwater Sampling - One set of groundwater samples will be collected from all site monitoring wells (five proposed wells, and MW-102, MW-103, and MW-105). Prior to sampling, depth to water, PID well headspace, and free product thickness (if present) determinations will be made. The monitoring wells will be purged of three well volumes or until dry prior to sampling. Samples will be collected from the new 2-inch monitoring wells using dedicated polyethylene bailers. Samples will be collected from the 1.5-inch wells (MW-102, MW-103, and MW-105) using dedicated PVC bailers. Quality assurance/quality control samples will include a trip blank, a field blank, and a blind duplicate.

The samples will be properly labeled and placed into a cooler with water ice. The samples will be transported to the laboratory and analyzed for MTBE and BTEX using EPA Method 8020. A laboratory chain-of-custody and a field sampling data sheet will be utilized to document the sampling event.

For the purposes of this scope of work, we have used unit prices from Scitest Laboratory Services, Randolph, Vermont, for the analytical work.

- Water well inventory - Due to the uncertainty with regard to locations of private wells, the immediate vicinity (500 foot radius) of the site will be canvassed to look for the presence of private wells. In addition, the South Hero town clerk will be interviewed concerning the presence of private water supplies in the vicinity.

- Groundwater elevation surveys - Depth to water measurements will be taken in the site monitoring wells on at least two occasions. Depth to water measurements will be converted to groundwater elevations to allow preparation of groundwater elevation contour maps depicting groundwater flow directions.

- Site survey/basemap preparation - A basemap at an approximate scale of 1 inch to 50 feet will be prepared for the site. The basemap will include relevant site features and monitoring well elevations (ground surface and top of casing). If possible, site elevations will be measured relative to a USGS benchmark in feet above mean sea level. If not, an on-site benchmark will be assigned an arbitrary reference elevation. In our cost estimate, we have included an estimated cost of $200 for the surveying work.

- **Report preparation** - All information collected during the investigation will be incorporated into a bound report. The report will describe the environmental setting, the nature and extent of contamination found at the site, identify potential receptors, and discuss the qualitative risks posed by site contamination to potential receptors. The report will include well logs, tabulated groundwater elevation and analytical results, contour maps, isoconcentration maps, cross-sections, and all raw data collected during the investigation. The report will provide recommendations concerning the need for further characterization, remedial approaches if deemed appropriate, and/or monitoring frequencies.

The costs to perform this site investigation are estimated as follows:

Contractor	Cost
Jefferson P. Hoffer, Consulting Hydrogeologists	$1883.40
Tri-State Drilling & Boring	$2540.00
Scitest Laboratory Services	$ 605.00
Surveyor	$ 200.00
TOTAL	$5228.40

If you would like to discuss this proposal, please give us a call.5

Sincerely,

HOFFER & ASSOCIATES

Jefferson P. Hoffer
Principal Hydrogeologist

enc.

Letter to Carl Ruprecht
March 1, 1995
Re: Former South Hero Grocery UST Site Investigation

LIST OF ATTACHMENTS

ITEM

Table 1 - Groundwater elevations and analytical results
Figure 1 - Site location map
Figure 2 - Site map
Figure 3 - Cross section
Figure 4 - Locations of nearest private wells
Figure 5 - South Hero tax map
Figure 6 - Proposed monitoring well locations
Adams Engineering Well Logs
MW-102 Well Log
MW-103 Well Log
MW-104 Well Log
Scitest Laboratory Report
Chain-of-custody
Field Data Sampling Sheet
Hoffer & Associates Cost Estimate
Tri-State Drilling and Boring Cost Estimate

TABLE 1

Groundwater elevations and analytical results for BTEX constituents and MTBE, Former So. Hero Grocery, So. Hero, Vermont, Facility ID #3724266

GROUNDWATER ELEVATIONS

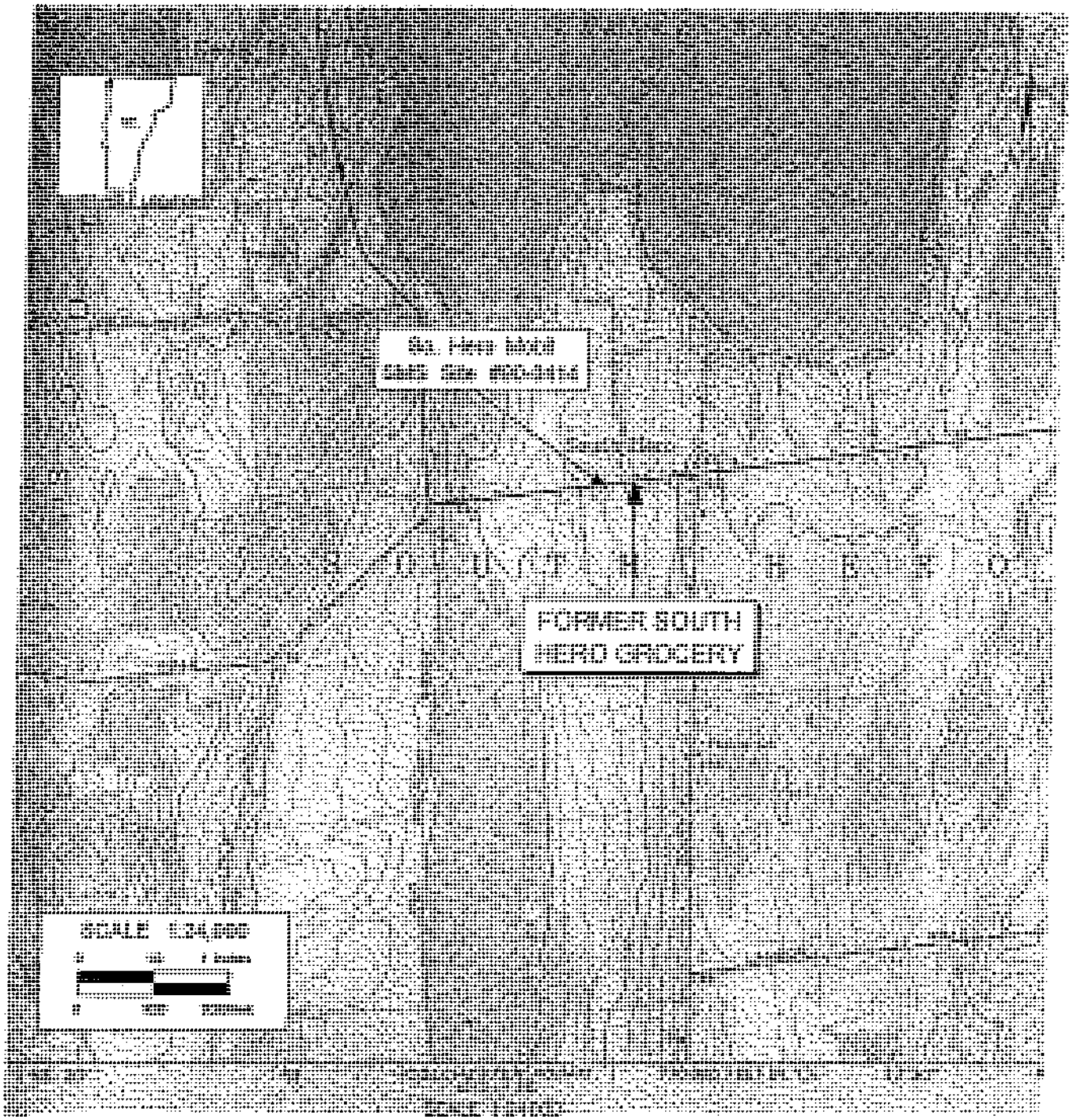
Well ID	Elevation of Top of Casing (feet*)	1/4/1995	
		Depth to Water from TOC (feet)	Groundwater Elevation (feet*)
MW-102	99.88	17.09	82.79
MW-103	99.23	12.11	87.12
MW-105	99.88	17.03	82.85

*Relative to arbitrary on-site benchmark of 100.00 feet

Sampling Date: 1/4/1995
ANALYTICAL RESULTS (µg/L)

Well ID	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
MW-102	258 / 247	89 / 81	<1 / <1	12400	69 / 65
MW-103	4620	6940	1390	15700	255
MW-105	1250	1290	363	3490	1640
Trip Blank	<1	<1	<1	<1	<1
Field Blank	<1	<1	<1	<1	<1

<1 = less than a detection limit of 1
258 / 247 = sample/ field duplicate results



Base from U.S. Geological Survey, 1:24,000;
South Hero, VT-NY, VT, 1966

FIGURE 1
Site location map, former South Hero Grocery,
328 Route 2, South Hero, Vermont (Facility ID #3724266).

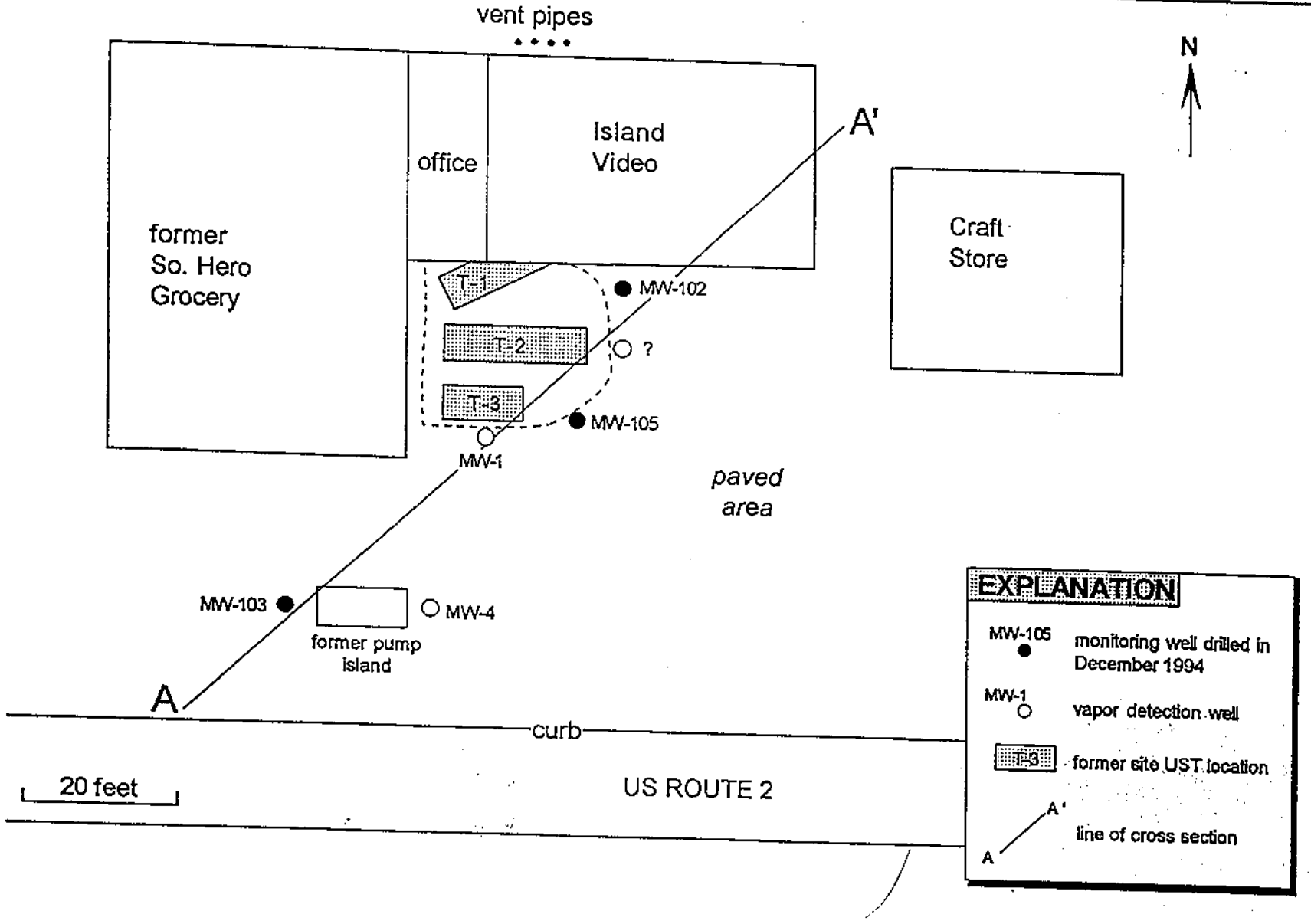


FIGURE 2
Site map of the former South Hero Grocery UST site,
328 Route 2, South Hero, Vermont (Facility ID #3724266).

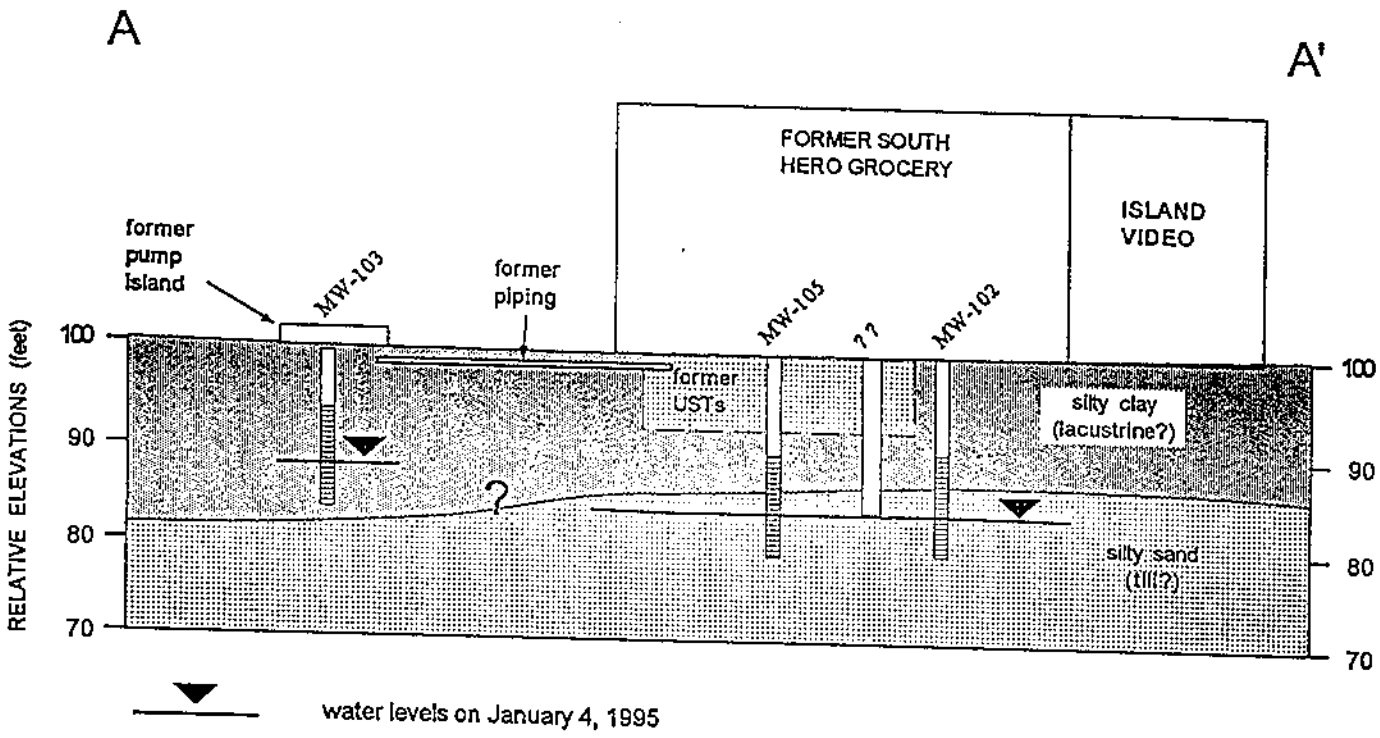
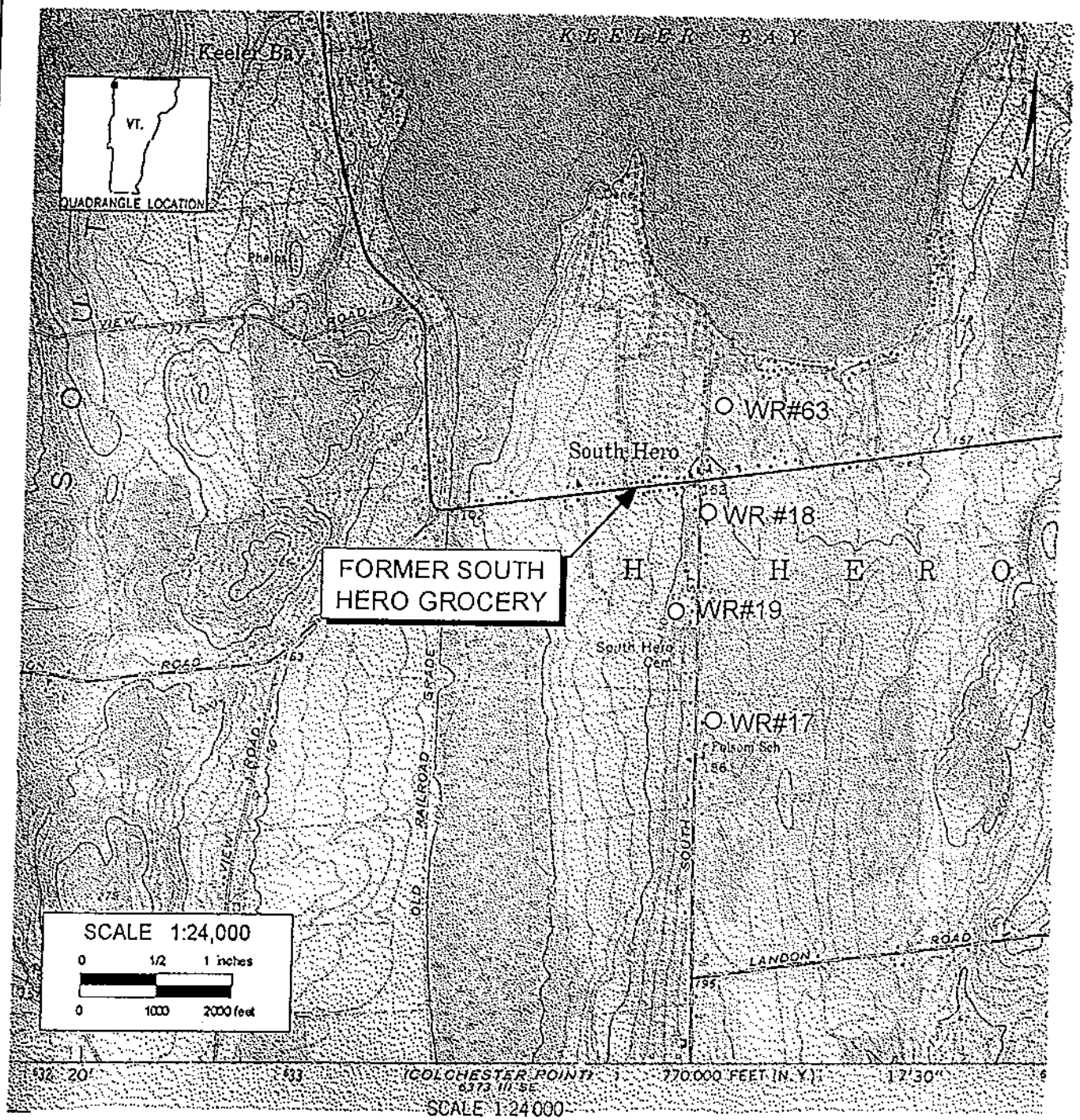


FIGURE 3

Cross section (line of section A-A' shown on Figure 2),
Former South Hero Grocery UST site investigation,
328 Route 2, South Hero, Vermont (Facility ID #3724266).



Base from U.S. Geological Survey, 1:24,000; South Hero, VT-NY, VT, 1966

Well Locations from Vermont Water Supply Division's Well Inventory for South Hero, Vermont

O WR#17 - well location/log #

FIGURE 4
Locations of nearest private wells,
former South Hero Grocery UST site investigation,
South Hero, Vermont (Facility ID #3724266).

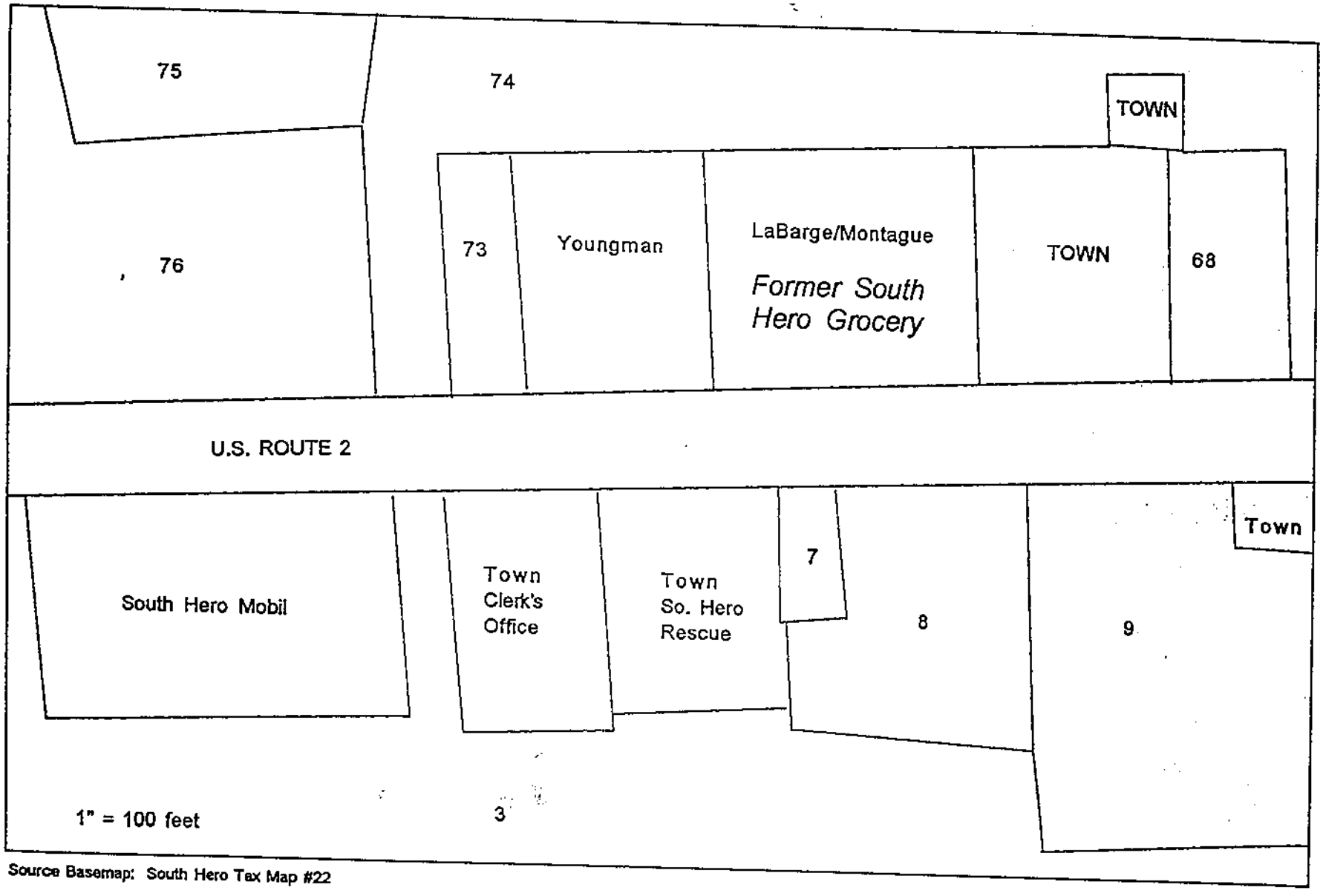


FIGURE 5
South Hero tax map showing location of former South Hero Grocery, South Hero Mobil, and surrounding property owners.

Hoffer & Associates · Consulting Hydrogeologists

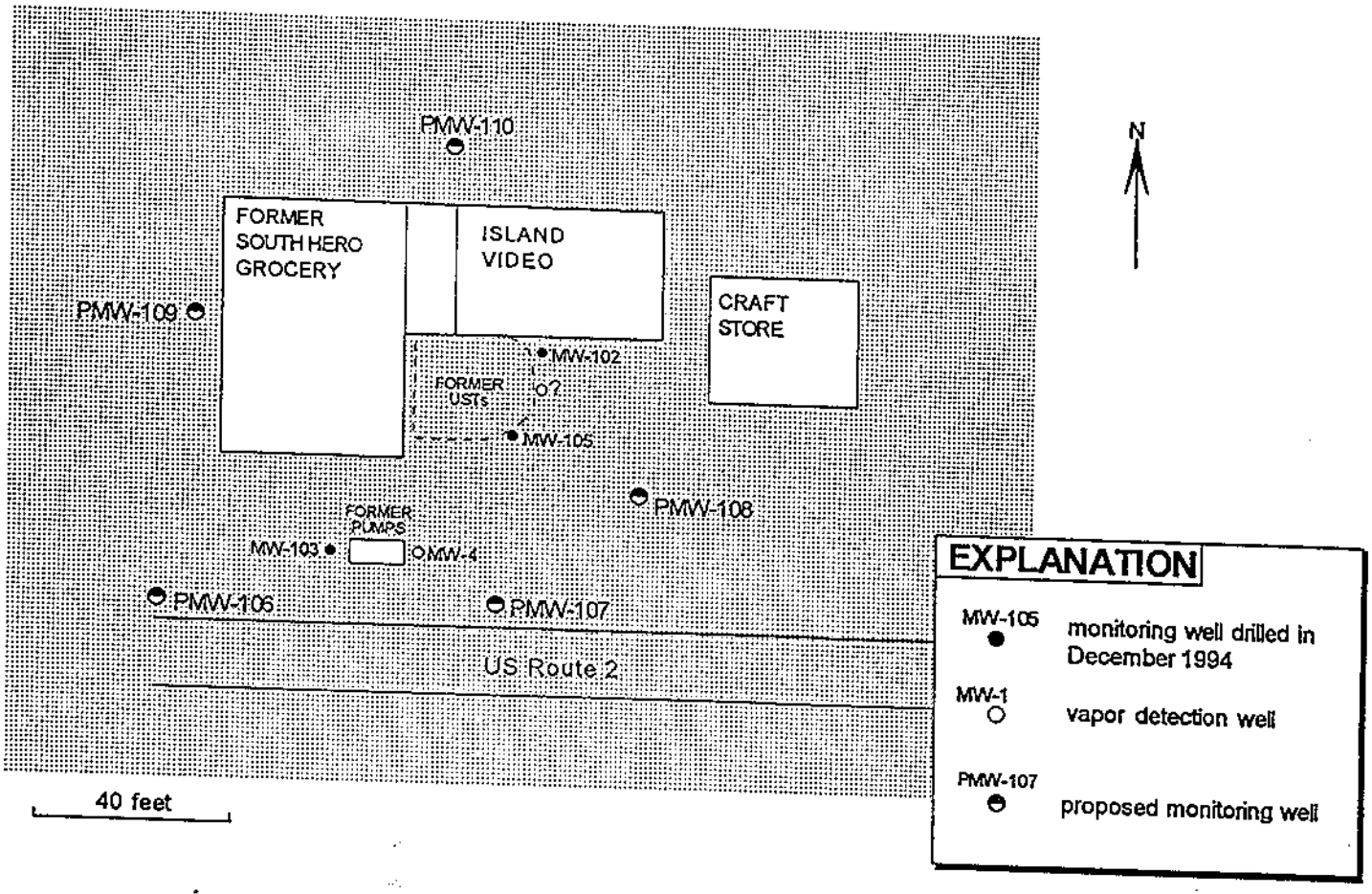


FIGURE 6
Proposed monitoring well locations,
former South Hero Grocery UST site investigation,
South Hero, Vermont, Facility ID #3724266.

ADAMS ENGINEERING
Gerard Adams
RD #1, Box #3700, Underhill, VT 05489

December 18, 1994
Revised February 27, 1995

Mr. Tim Schmalz
Jefferson P. Hoffer Hydrgeologist.

Well Logs: South Hero Grocery.
Pulled existing 2" X 12.8' wells, used existing manways, sampled with polyethylene (PE) lined 5' X 2.375" ID NQ vibrated to depth, pulled & sample vibrated from casing in PE liner for examination; well with slip cap to create annulus & sandpack vibrated to depth in open 2.75" borehole left by sampler; bentonite slurry placed in open hole. Not developed.

12/15/94 MW #102.
SOILS WELL

-.3' Top of well 10' X 1.5" solid riser, typ.
-1.5' Top bentonite slurry.
-4' Bottom of bentonite top native backfill.
-7' Bottom of native backfill top of sandpack #1 NJ, typ.
-10.3' Top of well screen 2-5' X 1.5" X .010" slot Hi. Flo. screen, typ.
-12>15.2' Two tries NQ sampler & 1 try EW (1.5" ID) very dense light brown very silty sand
-15>20.5' 4" solid augers, silty sand saturated.
-20.3' Bottom of screen & well with slip & threaded caps.
-20.5>23.6' NQ sampler, fine sand spoil // (over) saturated silty medium sand// very silty medium sand.

MW #105, Original 2" well frozen into manway.

-.3' Top of well 10' solid riser.
-2.0' Top bentonite slurry.
-5.8' Bottom of bentonite top of sandpack #1 NJ.
-10.3' Top of well screen 2-5' X 1.5" X .010" slot Hi. Flo. screen.
-12>14' Refusal rock in tip, light brown silty sand.
-15>20.5' 4" solid augers, rubble.
-20.3' Bottom of screen & well with slip & threaded caps.
-20.5>23.6' NQ sampler, fine sand spoil // (over) saturated silty medium sand// very silty medium sand.

MW #103

-.3' Top of well 5' solid riser.
-1.0' Top bentonite slurry.
-3' Bottom of bentonite top of sandpack #1 NJ.
-4.7' Top of well screen 10'.
-12>14.8' Saturated coarse sand//saturated silty fine sand//tough DRY dark brown fine sandy silt & stones, water with sheen @ 9.7', tried to sample deeper with no success.
-15>20.5' 4" solid augers, rubble.
-14.7' Bottom of screen & well with point.

G. Adams
GA

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

Well/Boring ID: MW-102

Project Name: S.B. Collins, South Hero, Vermont	WELL CONSTRUCTION
Site: South Hero Grocery	Total Depth Drilled: 23.6'
Project Number: 04-15	Screen Type/Interval: 10-slot, 1.5" PVC, 20.3' - 10.3'
Driller: Adams Engineering	Sandpack Type/Interval: #1 filter sand, 20.3' - 4.0'
Drilling Method: 2.375" Hollow Barrel Sampler	Riser Type/Interval: 2.0" PVC, 10.3' - 0.0'
Geologist: T. Schmalz	Seal Type/Interval: bentonite slurry, 4.0' - 1.5'
Sampling Method: 2.375" Hollow Barrel Sampler	Measuring Point/Stickup: top of PVC casing, flushmount
Date/Time Started: 12/16/94, 0940	Water Level/Date/Time: 16.97, 12/16/94, 1658
Date/Time Completed: 12/16/94, 1120	Elevation of Top of PVC: 99.88'
Weather: 20°, overcast	
Surface Conditions: Level asphalt south of video store	

Sample Interval (feet)	Recovery (feet)	Sample Description	Comments	PID Reading (ppm)*
0.0-12.7'	NR (not sampled)	Pushed spoon to base of former well, through brown, m to c sand and silt	Prev. well s.pack to 12.7' approx.	
12.7-17.7'	2.3	2.0' -Brown SILTY SAND, moist, loose f to m sand	Prev. well s.pack?	0.2
		0.3' - fine sand, firm	Native material?	
15.0-15.4'	0.4	0.4' Grey SILTY SAND, moist, f sand	Sampled with 1.5" spoon, ref. @ 15.4	29.0
15.4-20.5'	not sampled	cuttings from augers - same as above, saturation at 17'	4" SS Augers to 20.5, no samples	(0.0-5.8) (off augers)
20.5-23.6'	no return	cuttings from augers - same as above	2.375" spoon to 23.6', no return	

GENERALIZED GEOLOGIC LOG and OTHER OBSERVATIONS

0.0 - 12.7' Removed existing well (TD=12.7'), spooned through collapsed sandpack (brown SILTY SAND) to native material

12.7 - 15.0' Brown silty sand, loose (previous sandpack?) becoming more firm and finer (native?) with depth

15.0 - 23.6' Gray lacustrine silt and fine sand, firm to very firm, moist to wet

NOTES:

* Peak Headspace Reading, Photovac MicroTIP HL-2000, calibrated to isobutylene

BGS - Below Ground Surface, BTOC - Below Top of Casing, f - fine, m - medium, c - coarse

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

Well/Boring ID: MW-103

Project Name: S.B. Collins, South Hero, Vermont	WELL CONSTRUCTION
Site: South Hero Grocery	Total Depth Drilled:14.8' BGS
Project Number: 04-15	Screen Type/Interval: 10-slot, 1.5" PVC, 14.7' - 4.7'
Driller: Adams Engineering	Sandpack Type/Interval: #1 filter sand, 14.8' - 3.0'
Drilling Method: 2.375" Hollow Barrel Sampler	Riser Type/Interval: 2.0" PVC, 4.7' - 0.0' BGS
Geologist: T. Schmalz	Seal Type/Interval: bentonite slurry, 3.0' - 1.0'
Sampling Method: 2.375" Hollow Barrel Sampler	Measuring Point/Stickup: top of PVC casing, flushmount
Date/Time Started: 12/16/94, 1505	Water Level/Date/Time: 16.97, 12/16/94, 1710
Date/Time Completed: 12/16/94, 1540	Elevation of Top of PVC: 99.23'
Weather: 20°, overcast	
Surface Conditions: Level asphalt south of grocery	

Sample Run Depth (feet)	Recovery (feet)	Sample Description	Comments	PID Reading (ppm)*
0.0-12.5	not sampled	12.8' Pushed spoon to base of former well, through brown, m to c sand and silt	Prev. well s.pack	
12.5-14.8	2.3'	1.0' Brown SILTY SAND, c to m sand and silt, wet, rounded to subrounded sand, poorly graded, loose	Prev. well s.pack strong gas odor	2400.0
		1.3' Brown silt and clay, stiff, slightly moist to moist,	Sheen on samples, fp in bag/H2O test	1900.0

GENERALIZED GEOLOGIC LOG and OTHER OBSERVATIONS

0.0 - 12.5' Removed existing well (TD=12.5'), sampled through collapsed sandpack (brown SILTY SAND) to native material

12.5 - 13.5' Sandpack from pre-existing well, soft, m to c sand and silt, saturated

13.5 - 14.8' Brown, stiff, slightly moist silts and clays, lacustrine, sand above is saturated

NOTES:

* Peak Headspace Reading, Photovac MicroTIP HL-2000, calibrated to isobutylene

BGS - Below Ground Surface, BTOC - Below Top of Casing, f - fine, m - medium, c - coarse

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

Well/Boring ID: MW-105

Project Name: S.B. Collins, South Hero, Vermont	WELL CONSTRUCTION DETAILS
Site: former South Hero Grocery	Total Depth Drilled: 20.5'
Project Number: 04-15	Screen Type/Interval: 10-slot, 1.5" PVC, 20.3' - 10.3'
Driller: Adams Engineering	Sandpack Type/Interval: #1 filter sand, 20.5' - 5.8'
Drilling Method: 2.375" Hollow Barrel Sampler	Riser Type/Interval: 2.0" PVC, 10.3' - 0.0'
Geologist: T. Schmalz	Seal Type/Interval: bentonite slurry, 5.8' - 2.0'
Sampling Method: 2.375" Hollow Barrel Sampler	Measuring Point/Stickup: top of PVC casing, flushmount
Date/Time Started: 12/16/94, 1230	Water Level/Date/Time: 16.92, 12/16/94, 1652
Date/Time Completed: 12/16/94, 1310	Elevation of Top of PVC: 99.88'
Weather: 20°, overcast	
Surface Conditions: Level asphalt south of video store	

Sample Interval (feet)	Recovery (feet)	Sample Description	Comments	PID Reading (ppm)*
0 - 12.8'	not sampled	Pushed sampler to base of former well, through brown, m to c sand and silt	Prev. well s.pack to 12.8' approx.	
12.8-17.8'	2.2	Dark gray SILTY SAND, moist, dense, f to m sand	Gasoline odor in sample	126.0
15.0-15.8	0.8	Same as above	Sampler refusal at 15.8' BGS	120.0
15.8-20.5'	not sampled	cuttings from augers - same as above, saturation @ approx 17"	4" solid augers to 20.5'	(0.0-125.0) (off augers)

GENERALIZED GEOLOGIC LOG and OTHER OBSERVATIONS

0.0 - 12.8' Removed existing well (TD=12.8'), sampled through collapsed sandpack (brown SILTY SAND) to native material

12.8 - 20.5' Dark gray alternating lacustrine silts and sands, f to m sand, dense, saturated below 17'

NOTES:

* Peak Headspace Reading, Photovac MicroTIP HL-2000, calibrated to isobutylene

BGS - Below Ground Surface, BTOC - Below Top of Casing, f - fine, m - medium, c - coarse

SCITEST
LABORATORY SERVICES

P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-6313

LABORATORY REPORT

CLIENT: SB Collins, Inc.
ADDRESS: 54 Lower Welden St.
St. Albans, VT 05478

SITE: South Hero Grocery
ATTENTION: Carl Ruprecht

LABORATORY NO: 5-0025
PROJECT NO: 70249
DATE OF SAMPLE: 1/04/95
DATE OF RECEIPT: 1/05/95
DATE OF ANALYSIS: 1/13/95
DATE OF REPORT: 1/23/95

RESULTS
(Results expressed in micrograms per liter (ug/L))

PARAMETER	MW-102	MW-105	QC REP MW-105	MW-103	MW-C (MW-102 duplicate)	Field Blank	Trip Blank
Methyl Tertiary Butyl Ether	69	1640	1510	255	65	BPQL	BPQL
Benzene	258	1250	1150	4620	247	BPQL	BPQL
Toluene	89	1290	1230	6940	81	BPQL	BPQL
Ethylbenzene	BPQL	363	414	1390	BPQL	BPQL	BPQL
Total Xylenes	25	3490	2950	15700	22	BPQL	BPQL
Chlorobenzene	BPQL	< 20	< 40	< 100	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	< 20	< 40	< 100	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	< 20	< 40	< 100	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	< 20	< 40	< 100	BPQL	BPQL	BPQL

EPA Method 8020
BPQL = Below Practical Quantitation Limit, 1 ppb

c: Jeff Hoffer

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

ADD COLLINS, INC
64 LOWER WELDEN ST, ST. ALBANS VT 05478

HOFFER + ASSOCS, (BELOW)

Scitest, Inc.
P.O. Box 339
Route 66 Professional Center, Randolph, VT 05060
Phone: (802)728-6313 Fax: (802)728-6044

Client: Jeff Hoffer
Contact: Jeff Hoffer
Address: P.O. Box 428, Waterbury, VT 05676
Project Name: South Hero Grocery
Date requested: 12/28/94
Date shipped: Pick Up
Date scheduled:
Project # 70249
Phone No:
Requested by: JH/KED

Additional Comments or Directions: [redacted]

CHAIN OF CUSTODY RECORD				DATE	TIME
Sampled By:*	DATE	TIME	Relinquished By:	1/4/94	
Accepted By:			Relinquished By:*	*	*
Accepted By:			Received by Scitest:	1/05/95	9:10a

Item Nos	Client ID or Description	Sampling Date	Sampling Time	Matrix	Preservative or Label	Bottle Type Plastic/Glass	Container Volume	Bottles per Sample	Parameters and Expiration Time 7days
(1)	MW-102	1/4/94	1015	GW	HCl	G	40 mL	2	EPA 8020
(2)	MW-105	"	1030	GW	HCl	G	40 mL	2	EPA 8020
(3)	MW-103	"	1040	GW	HCl	G	40 mL	2	EPA 8020
(4)	MW-C	"	1145	GW	HCl	G	40 mL	2	EPA 8020
(5)	Field Blank	"	1050	GW	HCl	G	40 mL	2	EPA 8020
(6)	Trip Blank	"	0830	GW	HCl	G	40 mL	2	EPA 8020

*Parameters correct as listed Client Initial: _____
Please fill in ALL areas marked with an asterisk (*). Thank you.

w:\requests\jeffhoffer

Report Reviewed By: Date:	Preserve Check:	Project Nos 70249	LABORATORY NUMBER: 5-0025 LOGIN: KDugo

GROUNDWATER SAMPLING DATA SHEET

LOCATION: South Hero Grocery
DATE: JAN. 4, 1995

SAMPLE METHOD: 1.5" Bailers
SAMPLING TEAM: TFS

WELL ID	PID Head Space (ppm)	Depth to Water (ft)	Total Well Depth (ft)	Water Column (ft)	3 Well Volumes* (gals)	Total Purged (gals)	Sample Time	Sample Type	Chain-of-Custody Number	Chain-of-Custody Time	Remarks
TB-01	NA	—	—	—	—	—	0830	TB	TB-01	0830	TRIP BLANK
MW-102	76.0	17.09	19.70	2.61	0.72	0.25	1015	S	MW-102	1015	SILTY, BROWN. DRY @ 1 VOL
MW-102	↓	↓	↓	↓	↓	↓	1015	DP	MW-C	1145	DUPLICATE OF MW-102
MW-105	7212	17.03	19.80	2.77	0.76	0.25	1030	S	MW-105	1030	SILTY, BROWN. DRY @ 1 VOL.
MW-103	2500+	12.11	14:00	1.89	0.52	1 QT.	1040	S	MW-103	1040	① DARK BROWN, VERY SILTY
EB-01	NA	—	—	—	—	—	1050	FB	EB-01	1050	FIELD BLANK

* (1.5" = 0.092 gals/ft, 2" = 0.16 gals/ft, 4" = 0.65 gals/ft, 6"=1.5 gals/ft)

REMARKS ① MW-103 TOTAL DEPTH OF 14.00' IS BEST ESTIMATE - APPROX. 1' OF SILT AND MUD IN BOTTOM OF WELL.

December 9, 1994

Carl Ruprecht, UST Manager
S.B. Collins, Inc.
54 Lower Welden Street
St. Albans, Vermont 05478

Re: UST Closure Sampling Results, South Hero Grocery, South Hero, VT
Facility ID #3724266

Dear Carl:

Enclosed is a copy of the laboratory results for a groundwater sample collected from monitoring well MW-3 at the former South Hero Grocery. The sample was collected during the site UST closures on November 22, 1994. Groundwater was not found in any of the other site monitoring wells. The laboratory results indicate high levels of dissolved BTEX and slightly lower levels of MTBE.

A site investigation is being implemented at this site under the "Expressway" program. I've tentatively scheduled monitoring well installations with Adams Engineering for the week of December 12 - 16. The plan is to pull the existing monitoring wells (MW-1, MW-2, and MW-5) and re-drill three new wells at these same locations. We will obtain water levels and reference elevations from these wells in order to map the groundwater flow direction and determine if additional wells will be needed.

I am sending a copy of this letter and lab results to Ted Unkles as a follow up to my November 23, 1994, site assessment report. Please call me if you have any questions.

Sincerely,

Jefferson P. Hoffer
Principal Hydrogeologist

enc.

cc: Ted Unkles, VTDEC

Jefferson P. Hoffer
Consulting Hydrogeologists

(802) 244 - 5573
P.O. Box 428, Waterbury, Vermont 05676

SCITEST
LABORATORY SERVICES

P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-6313

LABORATORY REPORT

CLIENT:	Carl Ruprecht	LABORATORY NO:	4-3119
ADDRESS:	SB Collins, Inc.	PROJECT NO:	70249
	54 Lower Welden St.	DATE OF SAMPLE:	11/22/94
	St. Albans, VT. 05478	DATE OF RECEIPT:	11/23/94
		DATE OF ANALYSIS:	12/06/94
SITE:	SB Collins South Hero, Vermont	DATE OF REPORT:	12/07/94
ATTENTION:	Carl Ruprecht		

Results
(Results expressed in micrograms per liter (ug/L))

PARAMETER	MW-3
Methyl Tertiary Butyl Ether	392
Benzene	5960
Toluene	8750
Ethylbenzene	1610
Total Xylenes	15380
Chlorobenzene	< 200
1,2-Dichlorobenzene	< 200
1,3-Dichlorobenzene	< 200
1,4-Dichlorobenzene	< 200
Surrogate % Recovery	88%

EPA Method 8020

c: Jefferson P. Hoffer

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

Bill to: [illegible] 57 LOWER WELDEN ST. ST ALBANS, VT. 05478 OF RESULTS TO: CONSULTING HYDROGEOLOGISTS

Scitest, Inc.

P.O. Box 339
Route 66 Professional Center, Randolph, VT 05060
Phone: (802)728-6313 Fax: (802)728-6044

LABORATORY NUMBER:

LOGIN: KLG

Client: Jeff Hoffer - ~~Highgate Manor~~'s SBC-S.HERO
Contact:
Date requested: 9/6/94
Date shipped: 9/6/94
Date scheduled:

Project # 004-015 70249
Phone No:
Requested by: KLG
Cooler #(s)

Address: P.O. Box 428
Waterbury, VT 05676

Cals Checked by:
Date:

Report Prepared by:
Date:

Data Tran Checked by:
Date:

CHAIN OF CUSTODY	DATE	TIME
SAMPLED BY:		
RELINQUISHED BY:	11/23	1455
RECVD BY SCITEST INC: Kim J. Fuenmayor	11/23/94	1455

Additional Comments:

Item Nos	Client ID or Description	Sampling Date/Time	Type Comp/Grab	Matrix	Preserve/ Label	Preserve Check	Bottle Type	Reqd. Volume	Bottles/ Sample	Parameters and Holding Times ASAP	24 hrs	48 hrs	7days	>7days
1	MW-3	11/22 1236	Grab	GW	HCl		Glass	40 mL	2				EPA 8020	
2			Grab		HCl		Glass	40 mL	2				EPA 8020	
3			Grab		HCl		Glass	40 mL	2				EPA 8020	
4			Grab		HCl		Glass	40 mL	2				EPA 8020	
5			Grab		HCl		Glass	40 mL	2				EPA 8020	
6			Grab		HCl		Glass	40 mL	2				EPA 8020	
7			Grab		HCl		Glass	40 mL	2				EPA 8020	
8			Grab		HCl		Glass	40 mL	2				EPA 8020	
9			Grab		HCl		Glass	40 mL	2				EPA 8020	
10			Grab		HCl		Glass	40 mL	2				EPA 8020	
~~11~~	~~Trip Blank~~		Grab		HCl		Glass	40 mL	2				EPA 8020	

GROUNDWATER SAMPLING DATA SHEET

LOCATION: SBC/So. Hero Grocery
DATE: 11/22/94

SAMPLE METHOD: Poly Bailer
SAMPLING TEAM: Jeff Hoffer

Page ___ of ___

WELL ID	PID Head Space (ppm)	Depth to Water (ft)	Total Well Depth (ft)	Water Column (ft)	3 Well Volumes* (gals)	Total Purged (gals)	Sample Time	Sample Type	Chain-of-Custody Number	Chain-of-Custody Time	Remarks
MW-3	100	10	13	———	———	———	12:36	Sample	MW-3	12:36	Silty

* *(1.5" = 0.092 gals/ft, 2" = 0.16 gals/ft, 4" = 0.65 gals/ft, 6"=1.5 gals/ft)*

Please Analyze for BTEX/MTBE
EPA Method 8020

REMARKS _____

Bill to:
Carl Ryprecht
SB Collins

Results to:
Jeff Hoffer

November 23, 1994

Carl Ruprecht, UST Manager
S.B. Collins, Inc.
54 Lower Welden Street
St. Albans, Vermont 05478

Re: UST Closure Site Assessment Report, South Hero Grocery, South Hero, VT
Facility ID #3724266

Dear Carl:

This letter presents a site assessment report for the closure of three underground storage tanks (USTs) at the former South Hero Grocery, 328 Route 2, South Hero, Vermont. UST Program tank pull forms are enclosed for your signature and submittal to the State. Two sets of photographs are also enclosed.

I arrived at the site at noon on Tuesday, November 22, 1994. S.B. Collins (SBC) personnel had excavated down to the tops of the tanks, and Environmental Products & Services (EPS) personnel were in the process of inerting and cleaning the tanks in place. I took photoionization detector (PID) readings of the excavated soil, and checked water levels and PID headspaces of the four accessible monitoring wells while EPS was cleaning the tanks. I collected a sample from monitoring well MW-4, the only well which had water. After two of the USTs were removed from the excavation, I screened the excavation floor and sidewalls, and inspected the integrity of the USTs. The third UST extends underneath the building foundation and plans were apparently being made to close this tank in place. At the time of the preparation of this letter, the plan was to fill the tank with a slurry mixture on Wednesday, November 23, 1994, pending approval from the State.

Jefferson P. Hoffer
Consulting Hydrogeologists

(802) 244 - 5573
P.O. Box 428, Waterbury, Vermont 05676

ENVIRONMENTAL SETTING AND GENERAL SITE OBSERVATIONS

The site is the former South Hero Grocery, 328 Route 2, South Hero, Vermont. Figure 1 presents a site location map. According to SBC personnel at the site, the South Hero Grocery has not operated for about two years. SBC had maintained the tanks during their use by the Grocery, and the USTs were being removed from service. A site sketch is provided as Figure 2. The building at the site includes the former Grocery, which is a two-story concrete-block structure. The Island Video store and office are located in an apparent addition to the former Grocery building. Neither structure has a basement. Personnel in the video store have not noticed any petroleum odors.

As shown on Figure 1, the site is located in a residential and commercial neighborhood along Route 2 in the Champlain Islands. Keeler Bay of Lake Champlain is located about 2000 feet north of the site. Elevation at the site is approximately 140 feet above mean sea level, about 40 feet higher than the mean elevation of Lake Champlain. Topography in the vicinity grades gently westward and northward. Stewart's (1974) surficial geologic map shows till and lacustrine and marine silts and clay in the area. According to the South Hero Town Clerk, the residences and businesses along Route 2 are served by municipal water, the South Hero Fire District #1.

Five leak-detection monitoring wells were in place at the site at the time of the UST closure. Each of these monitoring points was approximately 13 feet deep, and equipped with a vapor sensor device. MW-5 was apparently covered with excavated soil when I arrived at the site, and the top of MW-1 was broken during the soil excavating. Water was detected only in MW-3, at a depth of 11.85 feet below the top of the casing. A grab water sample was collected from this well using a polyethylene bailer. The sample was later submitted to Scitest Laboratory Services (Randolph, Vermont) for analysis of BTEX and MTBE. PID (MicroTIP HL-2000, 10.6 eV lamp, calibrated to respond to isobutylene) readings were taken in the well headspaces and are given below:

WELL ID	PID HEADSPACE (ppm)
MW-1	300
MW-2	3.5
MW-3	34.2
MW-4	149

Approximately 15 to 20 cubic yards of soil were excavated from the top of the tanks to allow access for inerting and cleaning. This soil (reddish-brown gravelly silty sand) was temporarily placed on the asphalt immediately adjacent to the tank excavation. At six locations in the stockpile, a shovel was used to remove about six inches of soil. The PID tip was placed near the freshly-exposed soil to obtain a reading. Readings were in the 1 to

2 ppm range, with a maximum of 10 ppm. SBC personnel were planning to place this soil back in the excavation after the closure of Tank T-1 was completed.

TANK EXCAVATIONS

The three tanks included two used for gasoline and one for diesel. Tanks locations are shown on Figure 2. Tanks sizes are given below:

Tank T-1, 4000 gallons, formerly used for gasoline storage
Tank T-2, 3000 gallons, formerly used for gasoline storage
Tank T-3, 2000 gallons, formerly used for diesel fuel storage

As shown on Figure 2, Tank T-1 extends underneath the building occupied by Island Video. As a result, this tank could not be removed and was cleaned in place by EPS personnel. EPS personnel reported that the interior surface of the tank appeared to be in relatively good shape. The visible portion of the exterior surface of the tank appeared to be in relatively good shape.

The 3000-gallon Tank T-2 was lined with fiberglass. A fiberglass patch was visible on the top of the tank, suggesting that the fiberglass surface was applied while the tank was in place. Upon removal from the ground, the tank was visually inspected. Although the overall condition of the tank was relatively good, a number of corrosion holes were found on the western end (bottom 1/6) of the tank. The interior layer of fiberglass was visible through the holes in the steel. Based on these observations, it appears that historical leaks from this tank prompted the fiberglass lining.

After removal of Tank T-2, the excavation underneath and alongside the former tank location was screened with a PID. Soil directly underlying the tank was silty clay. PID readings in the silty clay directly below the spine of the tank and on the western end registered over the maximum capacity (2500 ppm) of the instrument. Soils in contact with the tank showed two color zones. Above the middle of the tank, soils were orangish-red indicative of oxidizing conditions. Below the middle of the tank, soils were darker-colored, due to either reducing conditions and/or product staining.

Holes were also observed in the former diesel tank, T-3. The holes were visible on the lower 1/3 of the tank distributed uniformly along the tank's length. There was no fiberglass lining in this tank. Soil underlying and surrounding the tank was silty clay with PID readings exceeding 2500 ppm. PID readings in the backfill gravelly silty sands on the southern sidewall of the T-3 excavation were in the 10 to 15 ppm range.

The enclosed Figure 3 presents plan view and cross-section sketches of the tank excavation pit. Two main soil types were encountered; a fairly dense reddish-brown gravelly sand (backfill), and a dry, dense, silty clay (apparently native). No groundwater was encountered in the excavation.

EXTENT OF CONTAMINATION

Evidence of releases of petroleum hydrocarbons at the site include holes in the tanks, and elevated PID readings in soil underneath and surrounding the tanks. PID readings of soil exposed in the tank excavation ranged from 10 to 15 ppm in the overlying gravelly silty sand fill to >2500 ppm in the silty clay directly underneath the tanks. Elevated PID readings were detected in the headspace of a dry monitoring well located adjacent to the USTs (MW-1). Elevated PID readings were obtained in the two monitoring wells which are located on the ends of the former pump island, suggesting contamination from the USTs has reached this location, or that other leakage occurred from the pumps or piping. Water was present in one of these wells, MW-3, and a grab sample was collected and submitted for laboratory analysis.

POTENTIAL RECEPTORS

As stated above, the businesses and residences along Route 2 in the vicinity of the site are serviced by municipal water. As a result, there are no known water supplies which appear to be threatened by contamination at the site. However, the State's water well inventory should be checked to see if any domestic water wells are located near the site.

There are no basements in the structures immediately adjacent to the former UST locations. Personnel of the Island Video store have not reported any petroleum vapors in their building, which is directly above Tank T-1.

The nearest surface waters include wetlands to the west, and Keeler Bay to the north. Distances to these surface waters is greater than 2000 feet. Based on the low permeability soils observed during the UST excavations, site contamination, although presently undefined, does not appear to pose a risk to these surface waters.

SUMMARY AND RECOMMENDATIONS

Closure of three out-of-service USTs at the South Hero Grocery began on November 22, 1994. One of the tanks extends under the building, and in-place closure of this tank was planned. The remaining two tanks were excavated and removed, and holes were observed in both tanks. Elevated PID readings in soil and monitoring well headspaces indicate that releases of petroleum hydrocarbons have occurred at the site.

Although this preliminary evaluation has not determined that potential receptors are threatened by site contamination, additional investigation is needed to define the nature and extent of contamination at the site.

It is recommended that this site be investigated under the Sites Management Section's "Expressway" program. Groundwater monitoring wells should be installed at the site to define the stratigraphy and groundwater flow directions, and to perform groundwater sampling to define the impact of site releases to groundwater.

Since the direction of groundwater flow at the site is unknown, a phased approach to monitoring well installation is recommended. One option would be to use the existing monitoring well locations (i.e., pull existing wells and re-drill). By deepening and installing new wells at three locations, the groundwater flow direction can be defined. At that point in time, groundwater sampling results and flow direction can be utilized to determine if and where additional monitoring wells are needed.

Please call me if you any questions.

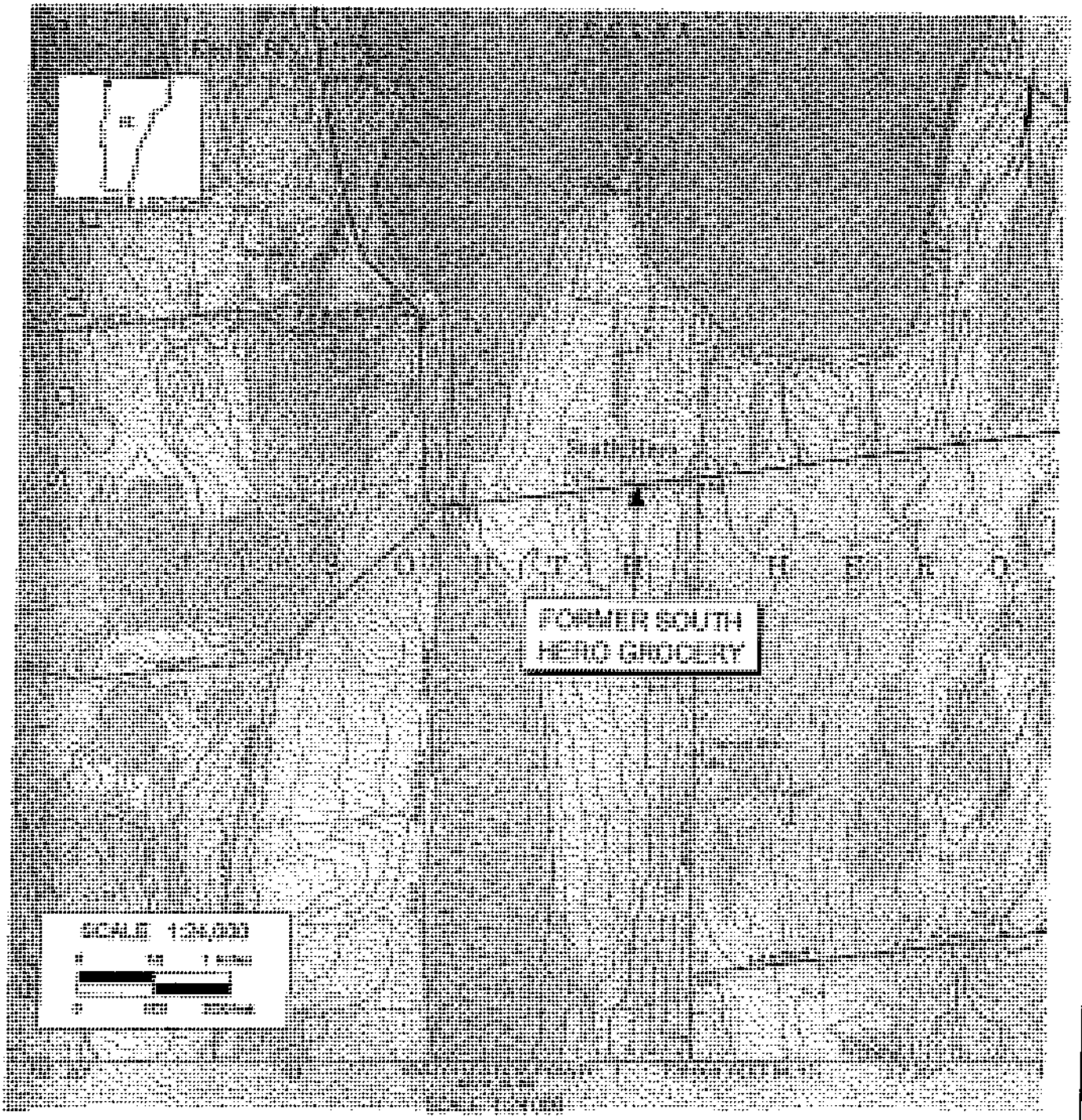
Sincerely,

Jefferson P. Hoffer
Principal Hydrogeologist

enc.

REFERENCES

Stewart, D.P., 1974, Geology for Environmental Planning in the Milton-St. Albans Region, Vermont, Vermont Geological Survey, Environmental Geology No. 5.



Base from U.S. Geological Survey, 1:24,000;
South Hero, VT-NY, VT, 1966

FIGURE 1
Site location map, former South Hero Grocery,
328 Route 2, South Hero, Vermont (Facility ID #3724266).

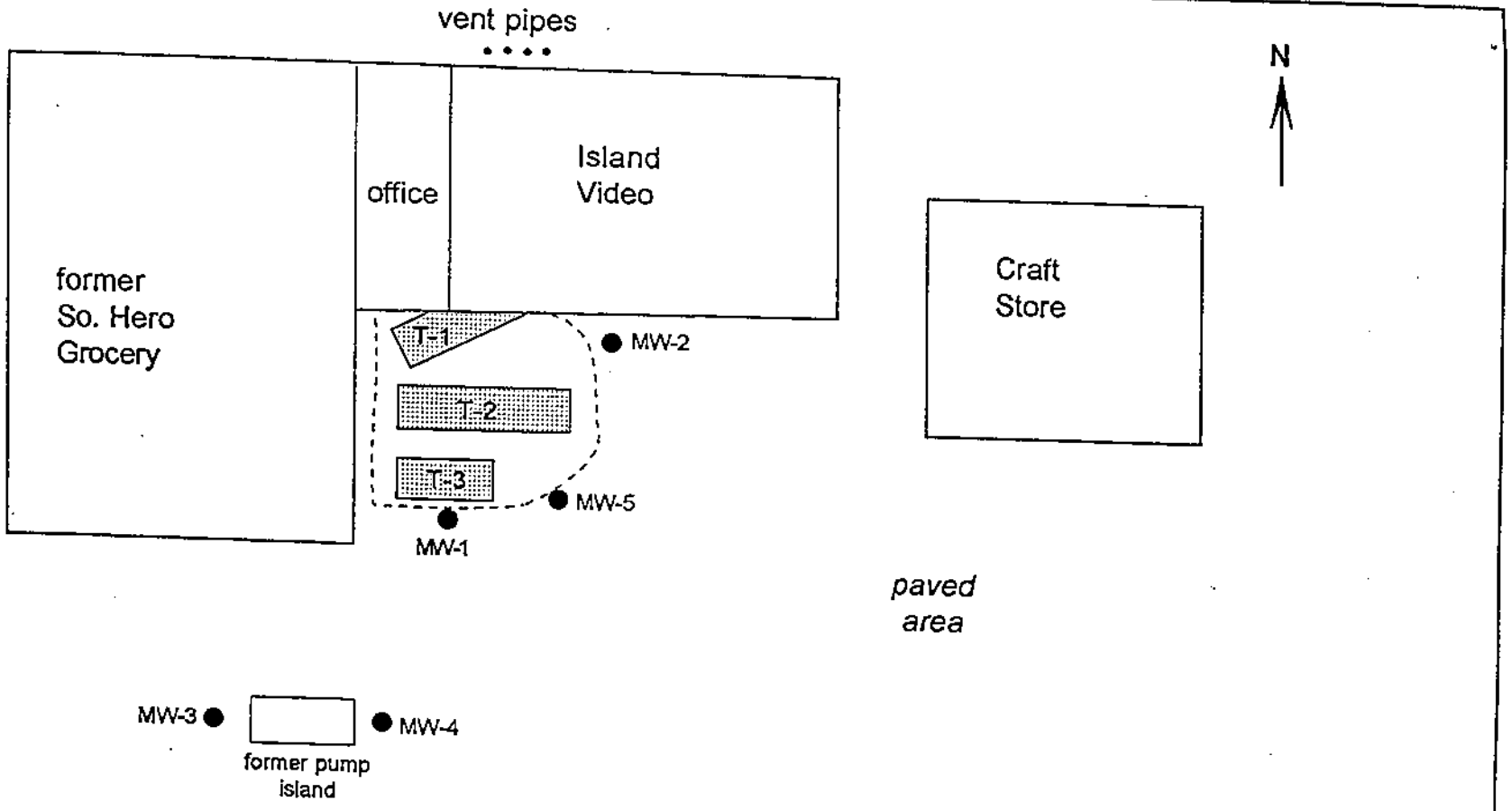
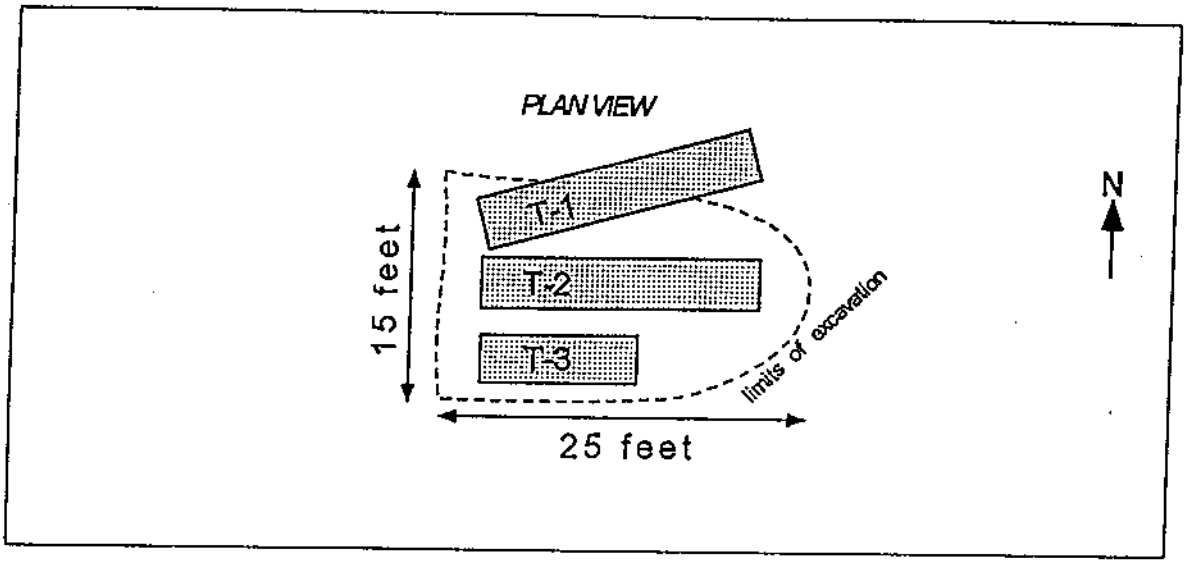
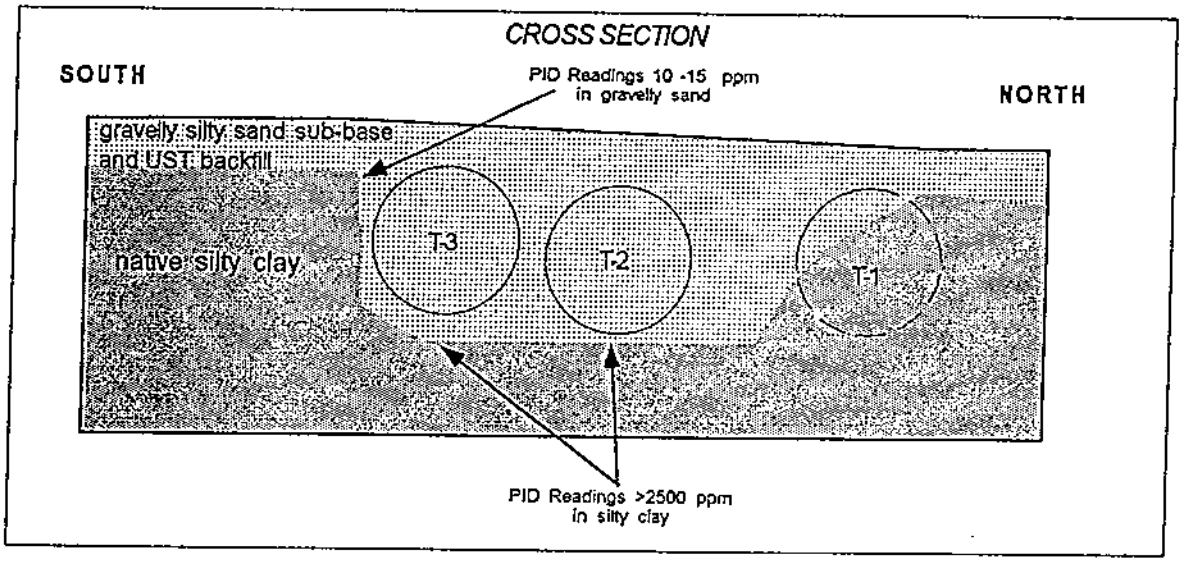


FIGURE 2
Site sketch of the former South Hero Grocery USTs,
328 Route 2, South Hero, Vermont (Facility ID #3724266)





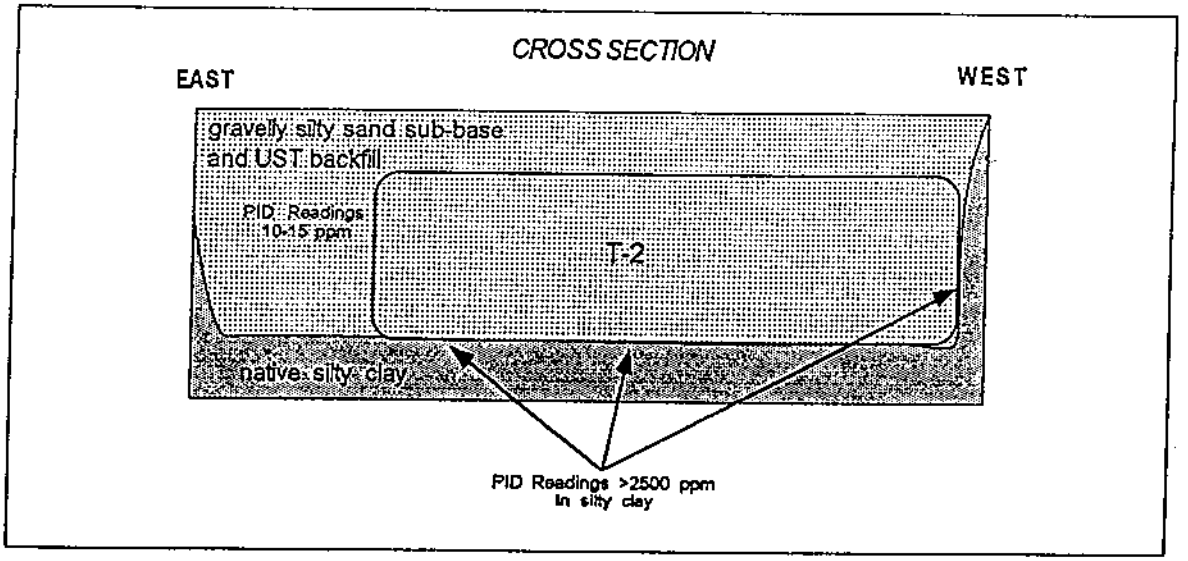


FIGURE 3

Plan view and cross-section sketches of UST excavation,
former South Hero Grocery, South Hero, Vermont (Facility ID #3724266)

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-102

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Adams Engineering
Drilling Method:	2.375" hollow barrel sampler
Geologist:	T. Schmalz
Sampling Method:	2.375" hollow barrel sampler
Date/Time Started:	12/16/94, 0940
Date/Time Completed:	12/16/94, 1120
Weather:	Overcast, 20°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	23.6' BGS
Screen Type/Interval:	1.5" PVC #10 slot, 20.3' to 10.3' BGS
Sandpack Type/Interval:	#1 filter sand, 20.3' to 4.0' BGS
Riser Type/Interval:	2" PVC , 10.3' to 0.0' BGS
Seal Type/Interval:	Bentonite slurry, 4.0' to 1.5' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	16.97', 12/16/94, 1658
Elevation of Top of PVC:	99.88'
Well Development:	none

Sample Run Depth (feet)	Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
0.0 - 12.7	NR (not sampled)	12.7 Brown, moist, soft silty sand (70% medium to coarse well-sorted brown subangular sand, 30% brown silt and clay).	sandy loam	
12.7 - 15.0	2.3	2.0 Same (as above).	sandy loam	0.2
		0.3 Same (as above), fine to medium sand, becoming firm.	sandy loam	
15.0 - 15.4	0.4	0.4 Gray, moist, silty sand (65% fine sand, 35% silt and clay).	sandy loam	29
15.4 - 23.6	NR (not sampled)	8.2 Same (as above), saturation at 17.0' BGS.	sandy loam	(0.0 - 5.8) (off augers)

Generalized Geologic Log and Other Observations

0.0 - 12.7 Removed existing well (TD=12.7'), spooned through collapsed sandpack (brown silty sand) to native material.
12.7 - 15.0 Brown, lacustrine silty sand, loose, becoming more firm.
15.0 - 23.6 Solid stem auger through lacustrine silty sands interlayered with firm wet silts, saturation at 17.0' BGS.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene
BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-103

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Adams Engineering
Drilling Method:	2.375" hollow barrel sampler
Geologist:	T. Schmalz
Sampling Method:	2.375" hollow barrel sampler
Date/Time Started:	12/16/94, 1505
Date/Time Completed:	12/16/94, 1540
Weather:	Overcast, 20°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	14.8' BGS
Screen Type/Interval:	1.5" PVC #10 slot, 14.7' to 4.7' BGS
Sandpack Type/Interval:	#1 filter sand, 14.8' to 3.0' BGS
Riser Type/Interval:	2" PVC , 4.7' to 0.0' BGS
Seal Type/Interval:	Bentonite slurry, 3.0' to 1.0' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	16.97', 12/16/94, 1710
Elevation of Top of PVC:	99.23'
Well Development:	none

Sample Run Depth (feet)	Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
0.0 - 12.5	NR (not sampled)	12.5 Brown, moist, soft silty sand (70% medium to coarse well-sorted brown subangular sand, 30% brown silt and clay).	sandy loam	
12.5 - 14.8	2.3	1.0 Brown, wet, loose silty sand (85% well-sorted, medium to fine sand, 15% silt and clay).	loamy sand	2400
		1.3 Brown, slightly moist, dense sandy silt (80% stiff, brown silt and clay, 20% fine sand).	silty clay loam	1900

Generalized Geologic Log and Other Observations

0.0 - 12.5 Removed existing well (TD=12.7'), spooned through collapsed sandpack (brown silty sand) to native material.
12.5 - 13.5 Brown, loose silty sand - old sandpack. Saturation at 13.0' approximately, strong gasoline odor.
13.5 - 14.8 Brown, stiff, lacustrine silts, slightly moist.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene
BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-105

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Adams Engineering
Drilling Method:	2.375" hollow barrel sampler
Geologist:	T. Schmalz
Sampling Method:	2.375" hollow barrel sampler
Date/Time Started:	12/16/94, 1230
Date/Time Completed:	12/16/94, 1310
Weather:	Overcast, 20°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	20.3' BGS
Screen Type/Interval:	1.5" PVC #10 slot, 20.3' to 10.3' BGS
Sandpack Type/Interval:	#1 filter sand, 20.3' to 5.8' BGS
Riser Type/Interval:	2" PVC , 10.3' to 0.0' BGS
Seal Type/Interval:	Bentonite slurry, 5.8' to 2.0' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	16.92', 12/16/94, 1652
Elevation of Top of PVC:	99.88'
Well Development:	none

Sample Run Depth (feet)	Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
0.0 - 12.8	NR (not sampled)	12.8 Brown, moist, soft silty sand (70% medium to coarse well-sorted brown subangular sand, 30% brown silt and clay).	sandy loam	
12.8 - 14.0	2.2	2.2 Dark gray, moist, firm silty sand (65% fine to medium sand, 35% dense silt and clay).	sandy loam	126
14.0 - 14.8	0.8	0.8 Same (as above).	sandy loam	120
14.8 - 20.5	NR (not sampled)	5.7 Same (as above).	sandy loam	(0.0 - 125.0) (off augers)

Generalized Geologic Log and Other Observations

0.0 - 12.8 Removed existing well (TD=12.7'), spooned through collapsed sandpack (brown silty sand) to native material.

12.8 - 20.5 Dark gray, lacustrine sands with interbedded silts and clays. Solid stem augered from 15.8' to 20.5', saturation at 17.0' BGS.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene

BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-106

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Tri-State Drilling & Boring
Drilling Method:	4.25" hollow stem auger
Geologist:	T. Schmalz
Sampling Method:	2" split spoon
Date/Time Started:	4/11/95, 1440
Date/Time Completed:	4/11/95, 1530
Weather:	Clear, calm, 60°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	20.0' BGS
Screen Type/Interval:	2" PVC #10 slot, 20.0' to 10.0' BGS
Sandpack Type/Interval:	#1 filter sand, 20.0' to 9.0' BGS
Riser Type/Interval:	2" PVC , 10.0' to 0.0' BGS
Seal Type/Interval:	Granular bentonite, 9.0' to 8.0' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	14.43', 4/19/95, 1238
Elevation of Top of PVC:	
Well Development:	2" polyethylene bailer

Sample Run Depth (feet)	Blow Count, Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
5.0 - 7.0	7-9-11-13 (2.0)	2.0 Dark brown, slightly moist, firm silty clay, little sand, some gray mottling (85% brown silt and clay, 15% sand and fine angular gravel).	silty clay	1.3
10.0 - 12.0	7-8-8-10 (1.8)	1.8 Same (as above), increasing sand and gravel content,becoming sandy clay loam (70% silt and clay, 30% coarse sand).	sandy clay loam	9.9
15.0 - 17.0	5-6-9-15 (1.7)	1.2 Same (as above).	sandy clay loam	0.6
		0.5 Dark gray, firm, moist, gravelly clay loam (55% tough gray silt and clay, 25% fine sand, 20% fine, angular gravel).	gravelly clay loam	2.3

Generalized Geologic Log and Other Observations

0.0 - 13.8 Lacustrine/marine brown sandy silts and clay loam.

13.8 - 20.0 Lacustrine/marine gray gravelly clay loams, some sand (30% sand). Saturation at 15.0' BGS.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene

BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-107

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Tri-State Drilling & Boring
Drilling Method:	4.25" hollow stem auger
Geologist:	T. Schmalz
Sampling Method:	2" split spoon
Date/Time Started:	4/11/95, 1140
Date/Time Completed:	4/11/95, 1300
Weather:	Clear, calm, 60°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	22.0' BGS
Screen Type/Interval:	2" PVC #10 slot, 20.0' to 10.0' BGS
Sandpack Type/Interval:	#1 filter sand, 20.0' to 9.0' BGS
Riser Type/Interval:	2" PVC , 10.0' to 0.0' BGS
Seal Type/Interval:	Granular bentonite, 9.0' to 8.0' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	16.85', 4/19/95, 1227
Elevation of Top of PVC:	
Well Development:	2" polyethylene bailer

Sample Run Depth (feet)	Blow Count, Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
5.0 - 7.0	6-10-12-14 (1.2)	1.2 Dark red brown, slightly moist, silt and clay, trace gravel (95% red-brown, firm, tough silt and clay, 5% fine subangular gravel).	silty clay	2.9
10.0 - 12.0	7-12-13-18 (1.8)	1.8 Brown and gray, slightly moist, gravelly silt and clay with sand (70% brown, firm silt and clay, 20% fine gravel, 10% fine to coarse sand).	gravelly clay loam	1.9
15.0 - 17.0	18-19-20-25 (1.3)	1.3 Light brown and dark gray, wet silty sand (80% fine, well-sorted sand, 20% silt and clay).	loamy sand	6.9
20.0 - 22.0	18-30-25-12 (1.0)	1.0 Same (as above), slightly more gray.	loamy sand	2.1

Generalized Geologic Log and Other Observations

0.0 - 13.0 Brown and gray, lacustrine/marine gravelly sandy silts.

13.0 - 22.0 Brown and gray, moist to wet lacustrine sands with silt. Saturation at 16.0' BGS.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene

BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-108

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Tri-State Drilling & Boring
Drilling Method:	4.25" hollow stem auger
Geologist:	T. Schmalz
Sampling Method:	2" split spoon
Date/Time Started:	4/11/95, 1300
Date/Time Completed:	4/11/95, 1430
Weather:	Clear, calm, 60°
Surface Conditions:	Level asphalt

Well Construction	
Total Depth Drilled:	22.0' BGS
Screen Type/Interval:	2" PVC #10 slot, 20.0' to 10.0' BGS
Sandpack Type/Interval:	#1 filter sand, 20.0' to 8.5' BGS
Riser Type/Interval:	2" PVC , 10.0' to 0.0' BGS
Seal Type/Interval:	Granular bentonite, 8.5' to 7.5' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	17.00', 4/19/95, 1225
Elevation of Top of PVC:	
Well Development:	2" polyethylene bailer

Sample Run Depth (feet)	Blow Count, Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
5.0 - 7.0	2-12-13-20 (1.8)	1.8 Dark brown and gray, slightly moist, firm sandy silt (80% dark brown and gray firm silt and clay, 20% fine, well sorted sand).	silty clay loam	1.0
10.0 - 12.0	10-12-16-30 (1.8)	1.8 Dark gray and brown, slightly moist, stiff gravelly silt with sand (65% dark gray firm silt and clay, 20% fine subangular gravel, 15% sand).	gravelly silty clay loam	2.2
15.0 - 17.0	8-20-30-50/.3 (1.4)	1.4 Light brown and dark gray, wet silty sand (85% fine, well-sorted sand, 15% silt and clay).	loamy sand	1.0
20.0 - 22.0	9-12-16-26 (1.6)	1.6 Same (as above), gray, wet.	loamy sand	1.0

Generalized Geologic Log and Other Observations

0.0 - 13.0 Brown, lacustrine/marine sandy silts.

13.0 - 22.0 Gray, lacustrine sands with silt. Saturation at 16.0 - 17.0' BGS.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene

BGS = Below Ground Surface

SOIL BORING / MONITORING WELL CONSTRUCTION LOG

Well Boring ID: MW-109

Project Name:	S.B. Collins/So. Hero Grocery
Site:	Former South Hero Grocery
Project Number:	04-15
Driller:	Tri-State Drilling & Boring
Drilling Method:	4.25" hollow stem auger
Geologist:	T. Schmalz
Sampling Method:	2" split spoon
Date/Time Started:	4/10/95, 1635
Date/Time Completed:	4/11/95, 0910
Weather:	Clear, calm, 60°
Surface Conditions:	Level lawn

Well Construction	
Total Depth Drilled:	22.0' BGS
Screen Type/Interval:	2" PVC #10 slot, 20.0' to 10.0' BGS
Sandpack Type/Interval:	#1 filter sand, 20.0' to 9.0' BGS
Riser Type/Interval:	2" PVC , 10.0' to 0.0' BGS
Seal Type/Interval:	Granular bentonite, 9.0' to 8.0' BGS
Measuring Point/Stickup:	Top of PVC casing, flush mount
Water Level/Date/Time:	15.46', 4/19/95, 1240
Elevation of Top of PVC:	
Well Development:	2" polyethylene bailer

Sample Run Depth (feet)	Blow Count, Recovery (feet)	Sample Description	SCS Classification	PID Reading* (ppm)
0.0 - 2.0	2-4-9-8 (0.6)	0.6 Dark brown, slightly moist, soft gravelly sandy silt (75% dark brown, soft silt and clay, 15% fine to coarse angular sand, 10% fine gravel).	silty clay loam	0.1
5.0 - 7.0	4-7-12-16 (1.6)	1.6 Dark brown, slightly moist, stiff gravelly sandy silt (70% dark brown, slightly moist, stiff, slightly plastic silt and clay, 15% sand, 15% angular to subrounded gravel).	silty clay	0.5
10.0 - 12.0	6-10-12-17 (1.9)	1.9 Same (as above).	silty clay	2.6
15.0 - 17.0	12-18-20-30 (2.0)	1.0 Same (as above).	silty clay	1.0
		1.0 Dark brown, moist, sandy silt with gravel (60% dark brown, soft silt and clay, 30% fine to medium sand, 10% angular fine gravel).	clay loam	0.9
20.0 - 22.0	8-8-17-36 (1.6)	1.6 Dark brown and gray, wet, soft silty sand (80% fine brown sand, 20% silt and clay).	loamy sand	0.8

Generalized Geologic Log and Other Observations

0.0 - 3.0 Dark brown, sandy silts and clays, some gravel, large humic component (20%), (topsoil).
3.0 - 17.0 Brown, lacustrine/marine silts and clays with gravel and sand. Saturation at 17.0' BGS.
17.0 - 22.0 Dark brown, lacustrine silty fine sands.

Notes:

* = Peak Headspace Reading, Photovac MircoTIP HL-2000, calibrated to isobutylene
BGS = Below Ground Surface

SCITEST
LABORATORY SERVICES

LABORATORY REPORT

CLIENT: SB Collins, Inc.
ADDRESS: 54 Lower Welden St.
St. Albans, VT 05478

ATTENTION: Carl Ruprecht
SITE: South Hero Grocery
MATRIX: Ground Water

LABORATORY NO: 5-0968
PROJECT NO: 70249
DATE OF SAMPLE: 04/19/95
DATE OF RECEIPT: 04/20/95
DATE OF ANALYSIS: 04/25/95
DATE OF REPORT: 04/28/95

Results

(Results expressed in micrograms per liter (ug/L))

PARAMETER	1 MW-109	2 MW-108	3 MW-107	4 MW-106	5 MW-103	6 MW-102	7 MW-105	8 MW-01	9 FB-01	10 TB
Methyl Tertiary Butyl Ether	2	BPQL	BPQL	BPQL	< 100	< 10	< 50	BPQL	BPQL	BPQL
Benzene	BPQL	BPQL	1	BPQL	2450	241	688	BPQL	BPQL	BPQL
Toluene	BPQL	BPQL	1	BPQL	3890	39	383	BPQL	BPQL	BPQL
Ethylbenzene	BPQL	BPQL	BPQL	BPQL	1230	< 10	< 50	BPQL	BPQL	BPQL
Total Xylenes	1	BPQL	BPQL	BPQL	16100	17	2000	BPQL	BPQL	BPQL
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	< 100	< 10	< 50	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	< 100	< 10	< 50	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	< 100	< 10	< 50	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	< 100	< 10	< 50	BPQL	BPQL	BPQL

Note: Samples # 3, 5, 6, & 7 contained several non-target compounds. GC/MS analysis on samples # 3 & 6 confirmed target compound values.

EPA Method 8020
BPQL = Below Practical Quantitation Limit, 1 ppb

c: Hoffer & Associates

Respectfully submitted,

SCITEST, INC.

Roderick J. Lamothe
Laboratory Director

GROUNDWATER SAMPLING DATA SHEET

LOCATION: South Hero Grocery
DATE: April 19, 1995

SAMPLE METHOD: 1.5" and 2.0" Dedicated Bailers
SAMPLING TEAM: T. Schmalz

WELL ID	PID Head Space (ppm)	Depth to Water (ft)	Total Well Depth (ft)	Water Column (ft)	3 Well Volumes* (gals)	Total Purged (gals)	Sample Time	Sample Type	Chain-of-Custody Number	Chain-of-Custody Time	Remarks
TB-01	NA						0800	TB	TB-01	0800	TRIP BLANK
MW-109	4.6	15.46	18.89	3.43	1.65	1.50	1310	S	MW-109	1310	BROWN, TURBID
MW-108	0.0	17.00	18.65	1.65	0.79	0.25	1320	S	MW-108	1320	BROWN, VERY TURBID - SANDY
MW-107	22.8	16.85	17.65	0.80	0.38	1.50	1330	S	MW-107	1330	DARK BROWN, VERY TURBID
MW-106	2.5	14.43	19.32	4.89	2.35	2.50	1355	S	MW-106	1355	DARK GRAY, VERY TURBID
MW-106	↓	↓	↓	↓	↓	↓	↓	DP	MW-01	1450	DUPLICATE OF MW-106
MW-103	330	11.72	~14'	2.28	0.63	0.33	1405	S	MW-103	1405	DARK GRAY, VERY TURBID
MW-102	1910	16.48	19.82	3.34	0.92	0.75	1425	S	MW-102	1425	" BROWN, " "
MW-105	2500+	16.40	1916	2.70	0.75	0.33	1440	S	MW-105	1440	DARK GRAY-BROWN, V. TURBID
FB-01	NA						1600	FB	FB-01	1600	FIELD BLANK

* *(1.5" = 0.092 gals/ft, 2" = 0.16 gals/ft, 4" = 0.65 gals/ft, 6"=1.5 gals/ft)*

REMARKS _____

BILL TO CARL RUPRECHT
SB COLLINS, INC
54 LOWER WELDEN ST.
ST. ALBANS VT 05478

COPY RESULTS TO:
H+ ASSOCS

Report: **Invoice:**

Scitest, Inc.
P.O. Box 339
Route 66 Professional Center, Randolph, VT 05060
Phone: (802)728-6313 Fax: (802)728-6044

Client: Jeff Hoffer & Associates
Contact Tim Schmalz
Address: P.O. Box 428, Waterbury, VT 05676
Project # 70249
Phone No: *
Requested by: KLG

Project Name: South Hero Grocery
Date requested: 04/17/95
Date shipped: 04/17/95 WITH ROD
Date scheduled: Week of 04/17/95

Additional Comments or Directions: AS ABOVE

CHAIN OF CUSTODY RECORD				DATE	TIME
Sampled By:*		DATE	TIME	Relinquished By:	4/19/95
Accepted By:				Relinquished By:*	*
Accepted By:				Received by Scitest:	

Item Nos	Client ID or Description	Sampling Date	Sampling Time	Matrix	Preservative or Label	Bottle Type Plastic/Glass	Container Volume	Bottles per Sample	ASAP	Parameters and Expiration Time 24 hrs	48 hrs	7days	>7days
1	MW-109	4/19/95	1310	GW	HCL	G	40 mL	2					EPA 8020
2	MW-108	*	1320	GW	HCL	G	40 mL	2					EPA 8020
3	MW-107	*	1330	GW	HCL	G	40 mL	2					EPA 8020
4	MW-106	*	1355	GW	HCL	G	40 mL	2					EPA 8020
5	MW-103	*	1405	GW	HCL	G	40 mL	* 1 vial only					EPA 8020
6	MW-102	*	1425	GW	HCL	G	40 mL	2					EPA 8020
7	MW-105	*	1440	GW	HCL	G	40 mL	2					EPA 8020
8	MW-01	*	1450	GW	HCL	G	40 mL	2					EPA 8020
9	FB-01	*	1600	GW	HCL	G	40 mL	2					EPA 8020
10	*	*	*	GW	HCL	G	40 mL	2					EPA 8020
11	Trip Blank	*	0800	GW	HCL	G	40 mL	2					EPA 8020

w:\requests\jeffhoffer\soherogr.wb1

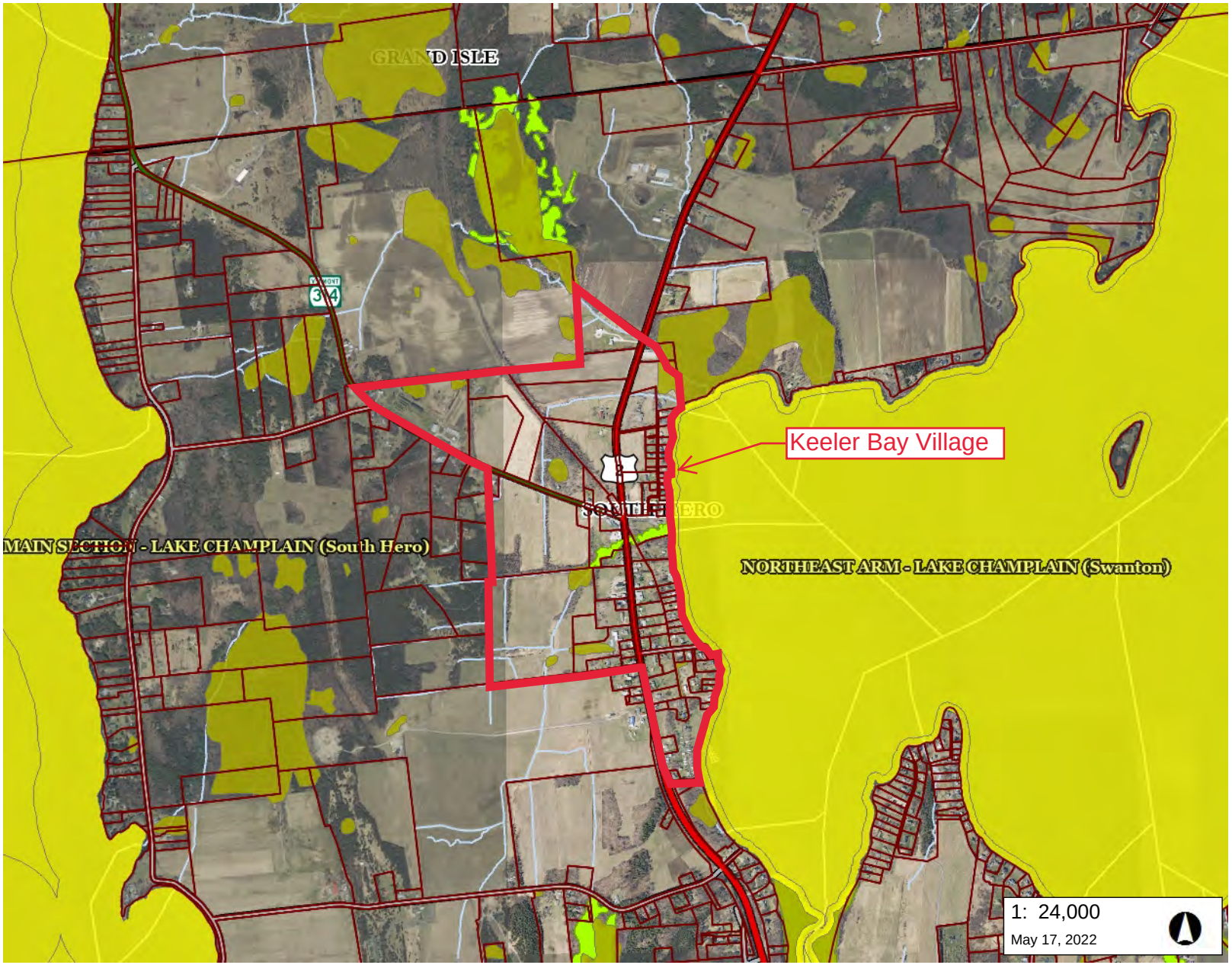
Report Reviewed By: Date:	Preserve Check:	Project Nos	LABORATORY NUMBER: LOGIN:

APPENDIX D – VT ANR ATLAS MAPS – KEELER BAY

Vermont Agency of Natural Resources

Vermont Agency of Natural Resources

vermont.gov





LEGEND

- Vernal Pools Confirmed – AE/V
- Vernal Pools Unconfirmed – AE
- 303(d) List of Impaired Lakes a
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Wetlands Advisory Layer
- Parcels (standardized)
- 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
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

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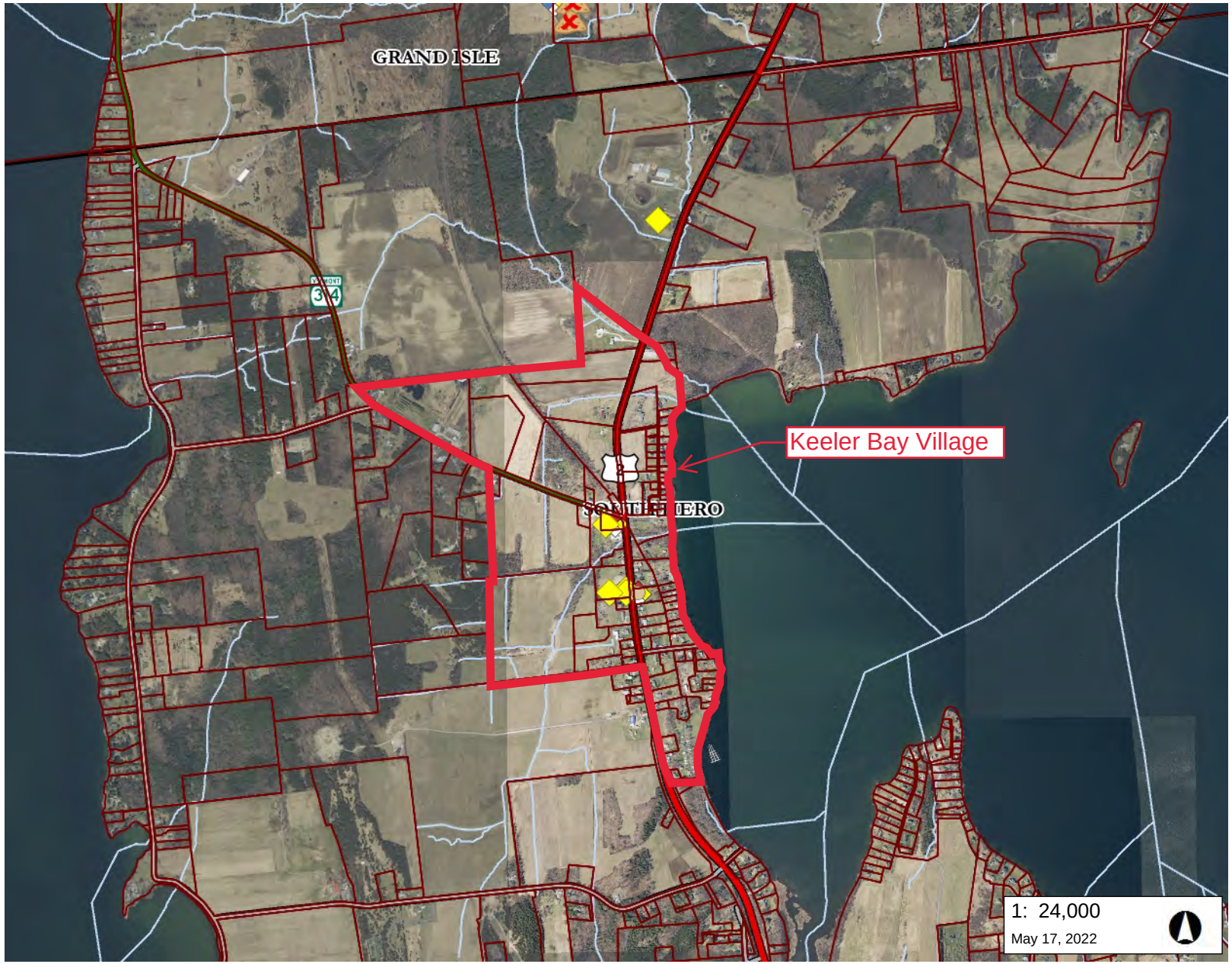
THIS MAP IS NOT TO BE USED FOR NAVIGATION

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Vermont Agency of Natural Resources

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LEGEND

Landfills
- OPERATING
- CLOSED

Land Use Restrictions
- Class IV GW Reclass
- Class VI GW Reclass
- Deed Restriction
- Easement
- Land Record Notice
- Other

Hazardous Site

Hazardous Waste Generators

Parcels (standardized)

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

Stream/River
- Stream

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

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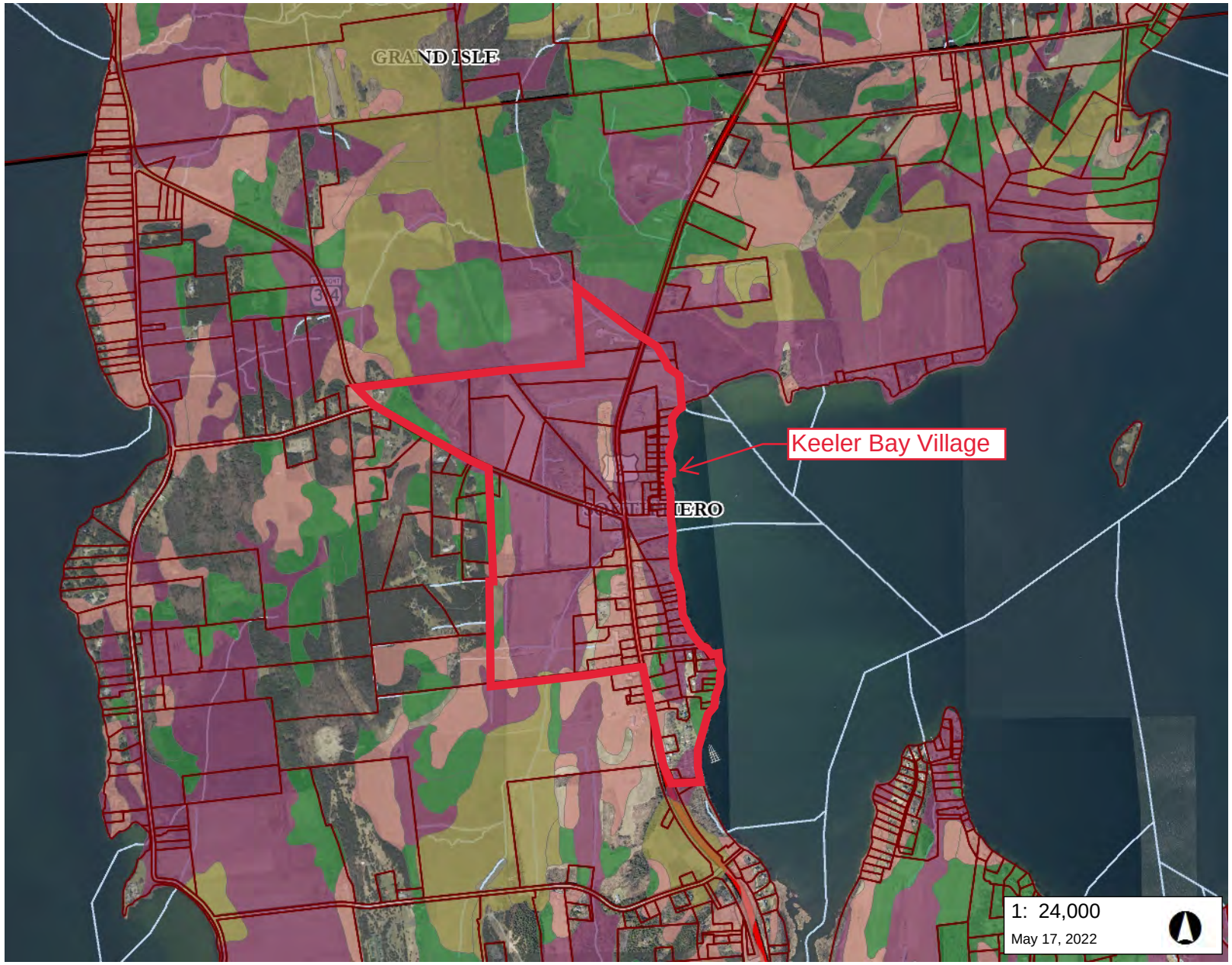
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LEGEND

Soils - Prime Agricultural

- Local
- Local (b)
- Not rated
- Prime
- Prime (b)
- Prime (f)
- Statewide
- Statewide (a)
- Statewide (b)
- Statewide (c)

Parcels (standardized)

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

Stream/River

- Stream
- Intermittent Stream

NOTES

Map created using ANR's Natural Resources Atlas

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

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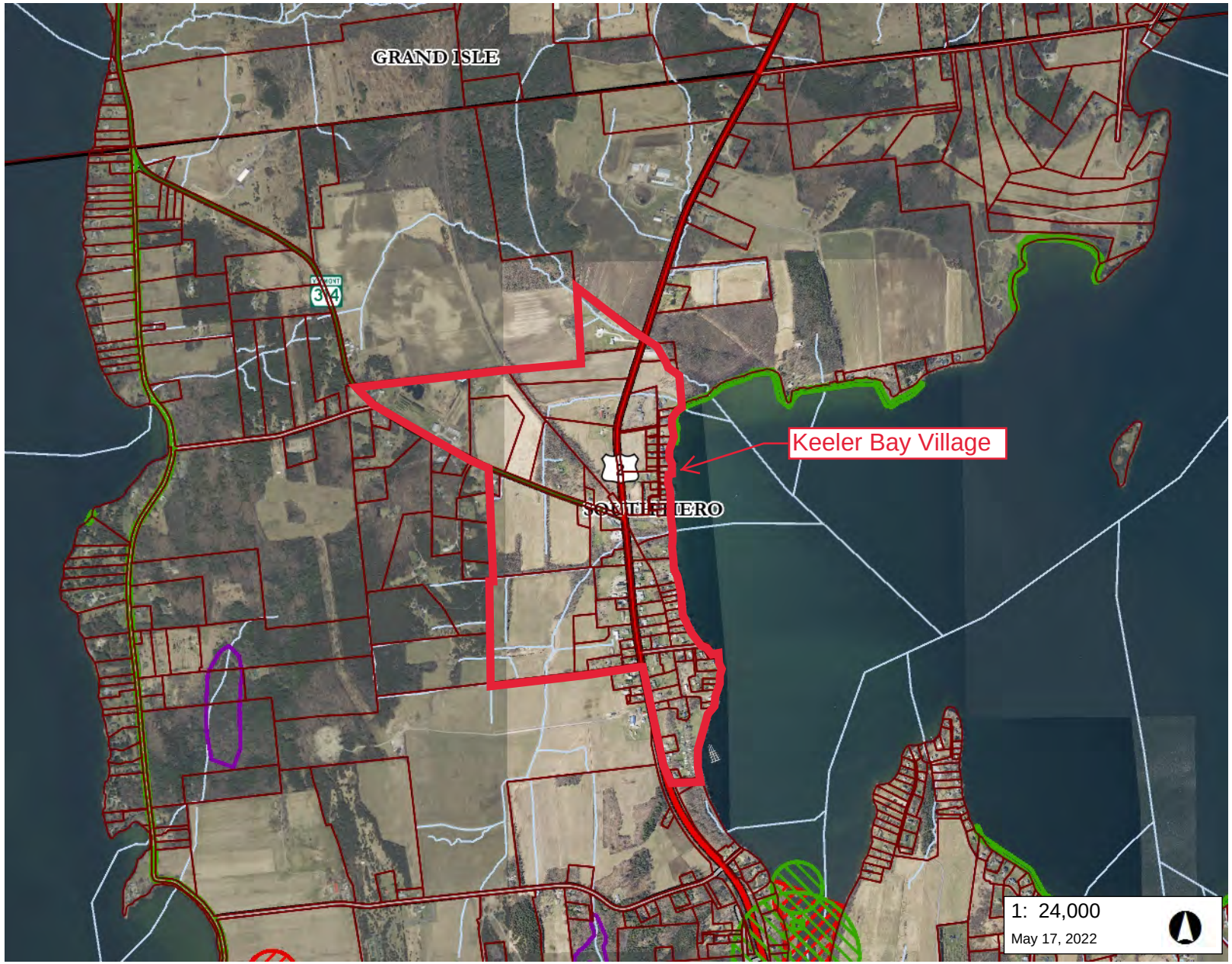
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LEGEND

- Rare Threatened Endangered
  - Threatened or Endangered
  - Rare
- Significant Natural Community
- Parcels (standardized)
- 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
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

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4,000.0 0 2,000.00 4,000.0 Feet

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APPENDIX E – HAZARDOUS SITE SI REPORTS - KEELER BAY

NOV 2 3 1994

TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477
Tel.: (802) 434-3350 • Fax (802) 434-4478

November 22, 1994

Mr. Chuck Schwer
Agency of Natural Resources
Sites Management Section
103 South Main Street/West Office
Waterbury, Vermont 05671-0404

RE: Site Investigation Report
Cornerstone Market
South Hero, Vermont
SMS # 94-1599
TSEC # 94-126

Dear Mr. Schwer:

1.0 INTRODUCTION

The following presents Twin State Environmental Corporation's (TSEC's) site investigation report for the Cornerstone Market site. This investigation was requested by the Vermont Agency of Natural Resources, Sites Management Section (SMS), to address petroleum contamination at this site. The activities conducted were performed in accordance with TSEC's Site Investigation Work Plan dated June 21, 1994, and approved by the SMS in their letter dated July 12, 1994.

As indicated on Figures 1 and 2, the site is located at the intersection of Routes 2 and 314 in South Hero, Vermont. The site currently contains two (2) gasoline underground storage tanks (UST's) which are located north of the building. These existing tanks were installed in 1993. The two former gasoline UST's, which were removed from the site in 1986, were located on the south side of the existing building. The pump dispensers associated with these tanks were located southeast of the building (Figure 3). According to the site owners, no contamination was identified by the Petroleum Sites Management Section (now the SMS) during the removal of these tanks.

On May 12, 1994, during a recent effort to grade the eastern portion of the site in preparation for paving, petroleum contamination of surficial soils was visually identified in this area by the contractor. The SMS was subsequently notified of the soil contamination, and TSEC recommended that the soils which required removal for the upcoming paving, be stockpiled and polyencapsulated on site. This excavation was conducted, and the soils were polyencapsulated on the western portion of the site (Figure 3).

In response to the SMS's request, the objectives of this site investigation are to determine the extent and degree of contamination present on the site.

2.0 SCOPE OF WORK

The following activities were conducted as part of TSEC's site investigation.

2.1 Soil Boring Survey

In order to determine the degree and extent of contamination, a soil boring survey was conducted in the vicinity of the former tank system (UST's, product lines and pump dispensers). A soil boring was also advanced cross to downgradient of this system along Route 2, between the former tank system and the drainage swale. The location of these borings was proposed by TSEC in the work plan to the SMS dated July 21, 1994, and subsequently approved by the SMS in their letter dated July 21, 1994. A site map showing the location of these borings is presented as Figure 3.

Soil borings were conducted by Tri State Drilling & Boring of West Burke, Vermont, with oversight provided by TSEC. A total of four (4) soil borings were advanced using a truck mounted drilling rig equipped with 4.25 inch hollow stem augers. Borings were advanced to depths ranging from six to seventeen feet (6-17') below ground surface.

Split spoon soil samples were collected from each of the borings. Soils were screened both visually and with the use of a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp to detect the presence of volatile organic compounds (VOC). The PID was calibrated with an isobutylene standard to quantify VOC concentrations. The soils were screened using both ambient and head space techniques, and were logged using conventional soil classification techniques.

2.2 Monitoring Well Installations

In order to evaluate the overburden aquifer for the presence of contamination, a groundwater monitoring well was installed in each of the soil borings. The location of the borings/monitoring wells were positioned to allow for the determination of the groundwater flow direction as well as the horizontal hydraulic gradient.

MW-1, MW-3, and MW-4 were each constructed of two (2) inch diameter schedule 40 PVC pipe. The well screen in each well consisted of a ten (10) foot section of 0.010 inch machine slotted PVC, set a depth of 5-15 feet below ground surface. The annulus surrounding each of these wells was backfilled with clean filter sand to a depth approximately 1.5 feet above the top of the well screen. A two (2) foot bentonite seal was placed above the sand pack. Each of the wells was completed at the ground surface, with a well plug and with a flush-with-the-ground protective casing.

During the drilling of MW-2, perched water was encountered at a depth of approximately one (1) foot below ground surface. Water was observed pouring into the boring at an estimated rate of 5 gallons per minute (gpm) from the northwest. The water appeared to be perched on top of a silt/clay layer, and a strong petroleum odor was observed. It was decided that although this was not likely the true water table, that the well should screen this unit, given the presence of contamination. Therefore, MW-2 consisted of a five (5) foot section of well screen similar to that described above, set at a depth of 1-6 feet below ground surface. Because of the shallow depth of the screen, the sand pack only extended 0.5 feet above the top of the screen and a 0.5 foot bentonite seal was placed above the sand pack. The well was completed at grade with a well plug and a flush-with-the-ground protective casing.

Since the paving of the parking area had not been finished, the protective casings were only loosely cemented in place, so that they could be raised once the final layer of paving was completed.

Each monitoring well was developed using a peristaltic pump equipped with dedicated polyethylene tubing in order to remove stagnant water and any drill cuttings introduced to the well. The wells were developed for approximately 30 minutes. All purge water was discharged directly to the ground surface.

2.3 Water Quality Sampling

Water quality samples were collected from each of the monitoring wells in accordance with TSEC's Standard Operating Procedure (Appendix 4). Analytical samples were also collected from the drainage swale located approximately 250 feet south of the site. The approximate location of this sample is shown on Figure 2. Water quality samples were collected on September 1, 1994 for analysis of purgeable aromatics and MTBE by USEPA Method 8020, and for total petroleum hydrocarbons in accordance with modified EPA Method 8015. For QA/QC purposes, the sampling event included a duplicate sample for MW-2 and an equipment blank. All water quality samples were analyzed by Chemserve Environmental Analysts (Chemserve) of Milford, New Hampshire.

2.4 Potential Receptor Survey

TSEC inspected the drainage swale which runs from west to east, just south of the site for the presence of petroleum staining, stressed vegetation, and odors. As mentioned above in Section 2.3, this drainage swale was also sampled and analyzed for water quality. A drainage ditch, located east of the site was also inspected for petroleum contamination. In addition, the basements of adjacent camps were surveyed to determine if there has been any impact. A review of the well records, available at the State of Vermont Water Supply Division, was conducted to determine if there are any private wells in the site vicinity.

2.5 Site Survey

An elevation and location survey was conducted by TSEC on August 22, 1994. Features which were surveyed include the monitoring wells, Cornerstone Market, existing pump islands, and Zachary's Pizza House. These features were added to an existing base map of the site which was originally prepared by Cross Consulting Engineers, of St. Albans, VT.

2.6 Soil Stockpile Monitoring

The stockpiled soils were assayed by TSEC on August 15, 1994, using a PID equipped with a 10.6 eV lamp. This monitoring was conducted in order to determine the relative degree of contamination of the soils. The volume of soils was also estimated.

3.0 RESULTS

3.1 Soil Boring/Monitoring Well Results

The location of the soil borings/groundwater monitoring wells is presented in Figure 3. Based on the results of the soil boring survey, soils in the site vicinity were generally found to consist of stratified gray brown silt, and clay, with an occasional sand layer, overlying cohesive dark gray silt/clay (Appendices 1 and 2). This is consistent with the soil classification presented in the "Soil Survey, Grand Isle County, Vermont", written by the United States Department of Agriculture, Soil Conservation Service, and dated December 1959. In this document, the soils in the site vicinity are classified as being Covington silty clay loam (Figure 2). These are described as consisting of dark-colored clay soils, which formed from clays and silts that were deposited in inland seas.

The depth to groundwater across the site at the time of our investigation ranged from approximately 1-3.5 feet below ground surface, with the exception of MW-2 (Table 1). This well is thought to be screened across a perched layer, with a depth to water on the order of only 0.5 feet below ground surface.

PID concentrations of the soils collected from MW-1 were reported to be at background concentrations (1 ppm or less) throughout the entire depth of the boring. Maximum PID concentrations of the soils from the three (3) wells located on the Cornerstone Mobil property were reported to be:

- 114 ppm from a depth of 3-5 feet in MW-2,
- 12 ppm from a depth of 4-6 feet in MW-3, and
- 233 ppm from a depth of 3-5 feet in MW-4.

Although elevated PID concentrations were noted in each of the borings located in the vicinity of the former UST system, in general soil PID concentrations tended to decrease significantly beyond a depth of approximately 8 feet or so.

MW-3 + MW-4 only

3.2 Groundwater Flow Direction

Groundwater flow across the site was determined to be approximately from northwest to southeast. The horizontal hydraulic gradient was determined to be on the order of 0.07. A groundwater elevation summary table for data collected on September 1, 1994 is presented as Table 1, and a groundwater contour map for this date is presented on Figure 4.

3.4 Groundwater Quality

A water quality summary table for samples collected on September 1, 1994 is presented on Table 2. The laboratory analytical reports are presented in Appendix 3. Samples were analyzed in accordance with EPA Method 8020, and Modified EPA Method 8015. Those concentrations which exceed the associated Vermont Enforcement Standard (VES) have been shaded.

These data indicate that samples collected from MW-2 exceeded the associated VES for both benzene and xylene. The concentrations of these compounds in MW-2 was reported to be 880 ug/l, and 3000 ug/l respectively. MW-3 was reported to exceed the associated VES for benzene only. The concentration of benzene in this well was reported to be 110 ug/l. All other samples were reported to be below the associated VES for each compound tested. In addition, samples collected from MW-1, the drainage swale, and the equipment blank, were all found to be free from detectable concentrations of all EPA Method 8020 compounds.

Detectable concentrations of TPH's were reported in all four wells. This ranged from a high of 8.5 mg/l in MW-2, to a low of 0.7 mg/l in MW-4. Upon receipt of the TPH results, Chemserve Analytical was contacted to determine the nature of the TPH contamination in MW-1. According to the laboratory, contamination appears to be old and weathered gasoline. The sample collected from the drainage swale was reported to be free of detectable concentrations of TPH's.

An isocontour map for total benzene, toluene, ethylbenzene and xylene (BTEX) compounds is presented as Figure 5. This is based on limited data, and on data from both the perched (MW-2) as well as the true water table. Therefore, this should be considered as a visual tool for a preliminary understanding the spatial distribution of the petroleum contamination. This figure suggests that the greatest concentration of contamination is located in the vicinity of MW-2, just down gradient of the former pump dispensers. It should be noted that the location of the dispenser island as depicted on this figure is only approximate.

3.5 Potential Receptors

No signs of stressed vegetation, petroleum staining, or odors were noted during the reconnaissance survey of the drainage swale located just south of the site. The location of

this swale is presented on Figure 2. As discussed in the above section, the water quality sample collected from this swale also was found to be free of detectable levels of the compounds tested. It should be noted that during our site walkover, it was noted that a drain pipe emerged from below the pavement just north of a brick wall located in front of Zachary's Pizza. Discharge from this pipe runs south along the west side of Route 2, into the drainage swale.

A drainage ditch was noted which runs to the southeast under Route 2, from the northwest corner of the intersection of Route 2 and Route 314. This drainage ditch contained cattails and a few areas of ponded water, but no flowing water. The drainage ditch eventually intersects the larger drainage swale discussed above. A slight sheen was noted on the standing water in the ditch, however no petroleum odors were noted, and it was not clear if the sheen was due to petroleum or natural sources. No water quality samples were collected from this ditch.

Two seasonal houses and a trailer were observed east, or down gradient of the site. These buildings are located on the east side of Route 2 near the shore of Keeler Bay. The first house was a white cape with green trim. Although no one was home at the time of the survey, the basement bulk head was open. The basement smelled damp, but no standing water, or petroleum odors were observed from the doorway. The second structure, a trailer, was located just north of the house. No one was home here either, and it did not appear to have a basement. The final building which was considered to be a potential receptor, was a small tan camp. This building did not have a basement, and no one was home at the time of the survey. It is assumed that these camps and trailer use lake water for their water systems, however this could not be readily confirmed.

A review of the files available from the VT DEC Water Supply Division indicated that there are seventeen (17) wells located within 0.5 mile of the site. All of these wells are reported to be bedrock sources. Of these wells, only three (3) are reported to be located east of Route 2 in the vicinity of the site. These three wells are reported to be north of the area of concern; however, these locations are not confirmed by the DEC, and they were not field verified as part of this investigation.

According to the site owners, the site itself is serviced by a shared bedrock well which is located approximately 0.25 mile upgradient of the site. Therefore, this is not considered a potential receptor.

The ultimate potential receptor is thought to be the Keeler Bay, which is located approximately 750 feet east of the site.

3.6 Soil Stockpile Monitoring

It is estimated that approximately 120 cubic yards of soil is stockpiled and polyencapsulated on the site. These soils were generated as a result of preparation of the site for paving. These soils were assayed with a PID on September 1, 1994. Results of

this survey are presented on Figure 6. As indicated on this figure, PID concentrations raged from 0 to 141 parts per million (ppm), with an average concentration of 18 ppm. PCS Stock pile

4.0 SUMMARY AND CONCLUSIONS

- The soils in the site vicinity are classified as being Covington silty clay loam. These consist of stratified silts and clays with an occasional sand layer. The soil description is consistent with the soils encountered during TSEC's subsurface investigation. The depth to water at the time of our investigation was on the order of 1-3 feet below ground surface. Groundwater flow across the site was determined to be from northwest to southeast.

- Based on the PID screening of the split spoon soil samples, the VOC soil contamination which was encountered in the vicinity of the former tank system, appears to be primarily limited to soils at depths of less than approximately 8 feet or so.

- Based on the water quality results from the groundwater monitoring wells, the groundwater in the vicinity of the former tank system was reported to contain elevated concentrations of BTEX compounds. The VES for benzene was exceeded in MW-2 and MW-3, and the VES for xylene was exceeded in MW-2. MW-1, which is located cross to down gradient of the tank system was reported to be free from detectable concentrations of EPA Method 8020 compounds. However, this well was reported to contain TPH at a concentration of 1.3 mg/l. According to the laboratory, the TPH contamination resembles old and weathered gasoline.

- Based on the water quality results reported above, the source of the petroleum contamination is thought to be from the former UST system.

- The downgradient extent of the petroleum contamination is currently not known.

- The closest potential receptor of petroleum contamination originating from the site, may be a drainage ditch located across Route 2, east of the site. Although petroleum contamination was not confirmed, a sheen was noticed on the standing water located in this drainage ditch. It is uncertain if the sheen is petroleum related, or naturally occurring. Based on visual observations as well as analytical results, no petroleum contamination was noted in the larger drainage swale located south of the site. The ultimate potential receptor is thought to be Keeler Bay, which is located approximately 750 feet east of the site.

- Approximately 120 yards of petroleum contaminated soils are estimated to be stockpiled and polyencapsulated on site. PID concentrations of these soils ranged from 0-141 ppm.

5.0 RECOMMENDATIONS

Based on the results of this investigation, it is recommended that additional studies be conducted to further define the extent and degree of groundwater contamination at this site. Specific recommendations are presented below:

1. Four (4) additional groundwater monitoring wells should be installed in the site vicinity. This includes: one (1) up gradient well; two (2) down gradient wells, located on the east side of Route 2; and one (1) additional well in the vicinity of MW-2. The well in the vicinity of MW-2 should be screened similar to the previously installed wells in order to monitor the true water table rather than the "perched" layer. All new wells should be surveyed for location and elevation.

2. Given the relatively high levels of BTEX compounds detected in the first round of water quality samples, a second round of water quality samples should be collected and analyzed in accordance with EPA Method 8240. Samples should include the monitoring wells, as well as water from the drainage ditch located east of the site. In addition, given the elevated concentrations of xylenes reported in MW-2, it is recommended that this well be analyzed for TPH in accordance with EPA Method 8100. This TPH method, along with the results from TPH Method 8015 which was previously conducted on this well, will allow for determination of the type of contamination present.

3. The site owner should be interviewed, and the building records reviewed to determine if footing drains or if other subsurface drainage systems are present which may influence groundwater flow.

4. A survey of the neighboring property owners and/or a review of property records available from the Town, should be conducted to verify the types of water systems utilized by the downgradient buildings.

ooOoo

If you have any questions or comments regarding this report, please feel free to give me a call at (802) 434-3350.

Sincerely,

TWIN STATE ENVIRONMENTAL CORPORATION

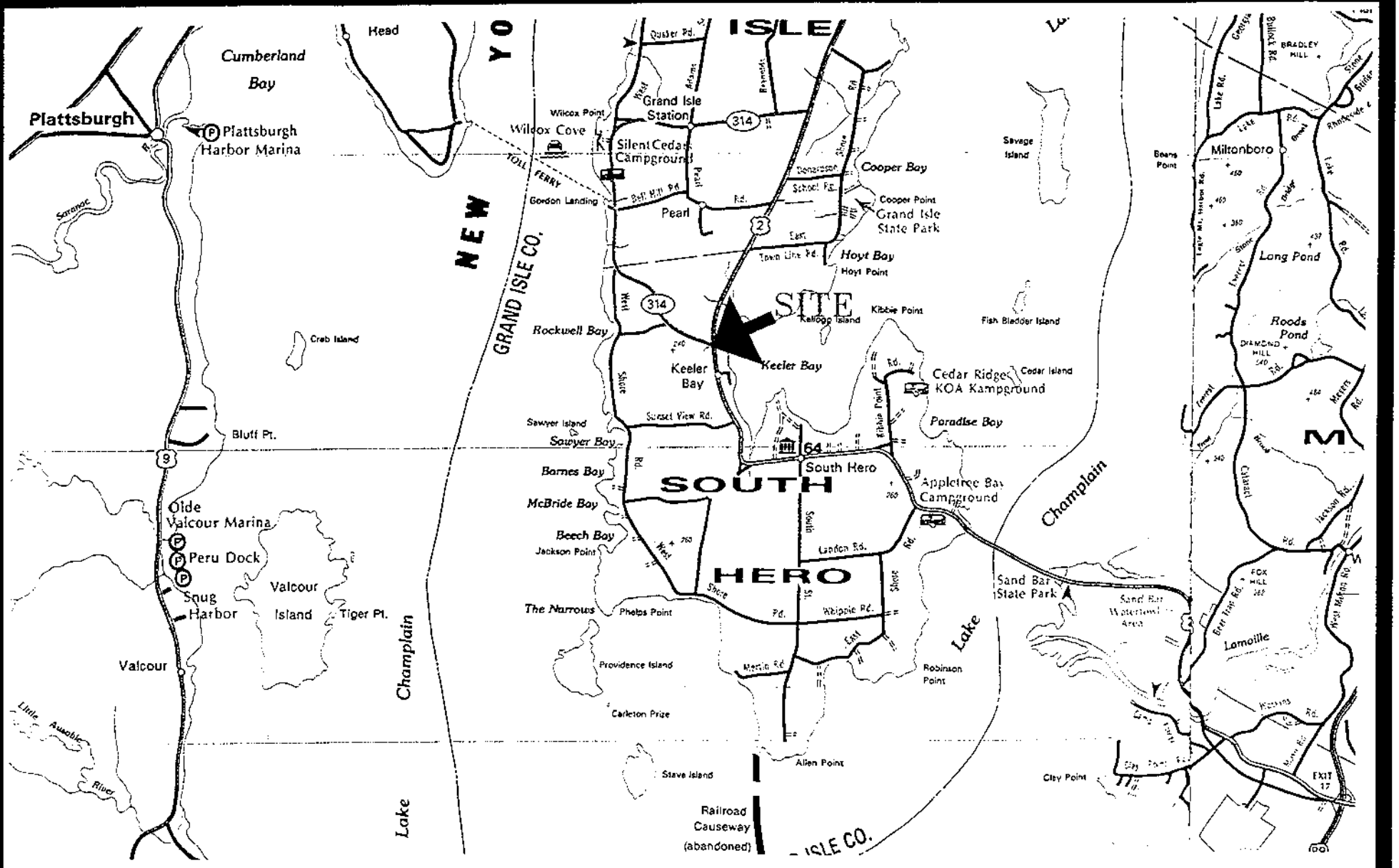
Cynthia Sprague
Hydrogeologist

Reviewed by Kenneth C. Bisceglio

enclosure
cc: Mr. Dan Griffiths, Cornerstone Market

b5:comersi.rpt

FIGURES



SPECIFICATIONS:

SOURCE: THE VERMONT ROAD ATLAS AND GUIDE – MAP 9 GRAND ISLE/MILTON.

1 0 1 2 3 4 MILES

N

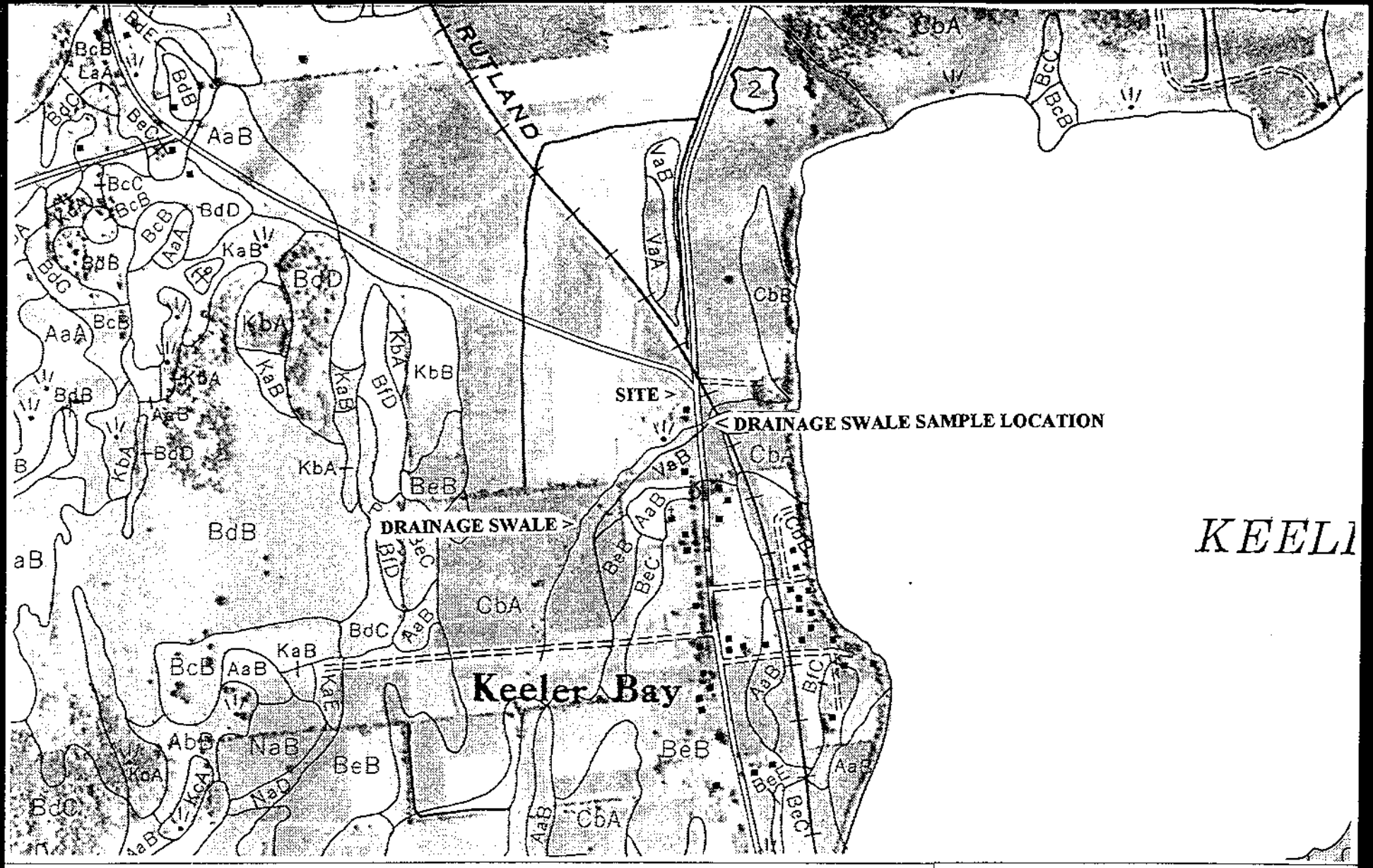
CORNERSTONE MOBIL

GENERAL LOCATION MAP

FIGURE 1

SCALE	DATE	
AS SHOWN	09/27/94	TSEC

11/cornerf1



SPECIFICATIONS:

SOURCE: SOIL SURVEY OF GRAND ISLE COUNTY, VERMONT, USDA SCS.

SOILS LEGEND

CbA	Covington silty clay loam, 0-3 percent slopes
CbB	Covington silty clay loam, 3-8 percent slopes

N

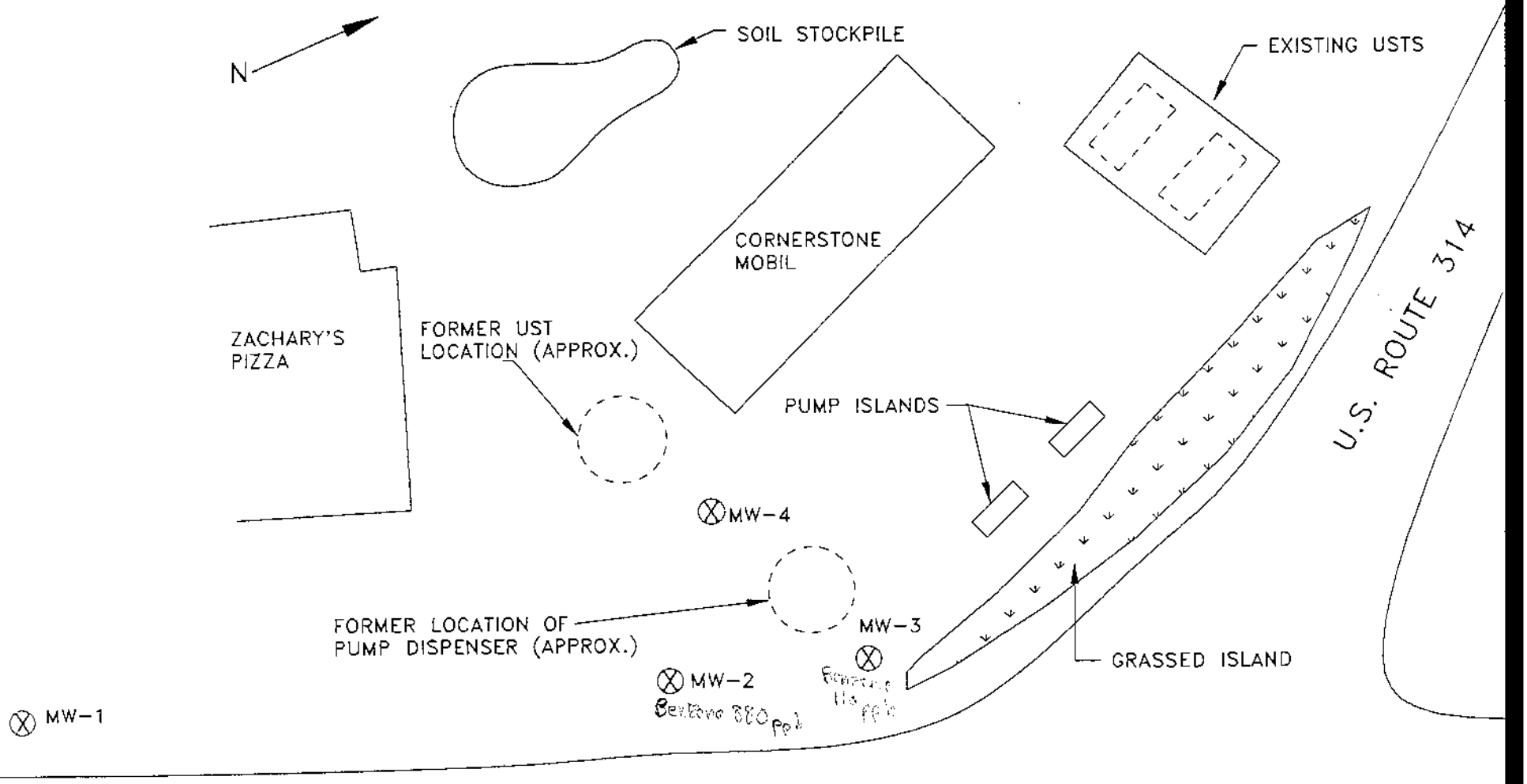
CORNERSTONE MOBIL

SOILS MAP

FIGURE 2

SCALE	DATE	
1:10,000	09/27/94	TSEC

11/cornerf2



SPECIFICATIONS:

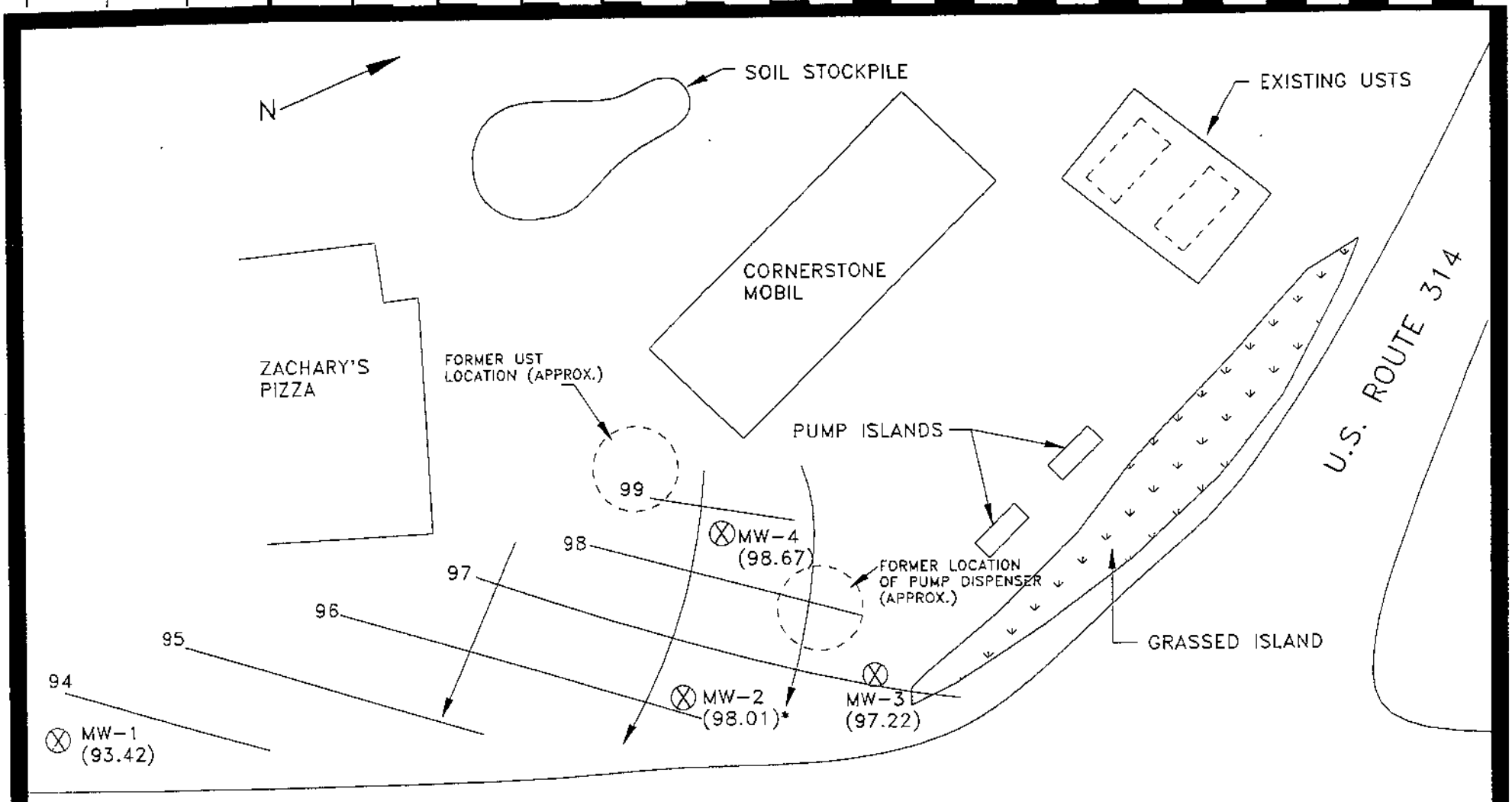
SOURCE OF BASE MAP: CROSS CONSULTING ENGINEERS, ST. ALBANS, VT.
MONITORING WELLS SURVEYED BY TSEC ON 8/22/94.
LOCATION OF SOIL STOCKPILE IS APPROXIMATE (NOT SURVEYED).

CORNERSTONE MOBIL

SITE PLAN

FIGURE 3

SCALE (APPROX.)	DATE	
1"-30'	09/01/94	TSEC



SPECIFICATIONS:
SOURCE OF BASE MAP: CROSS CONSULTING ENGINEERS, ST. ALBANS, VT.
MONITORING WELLS SURVEYED BY TSEC ON 8/22/94.
LOCATION OF SOIL STOCKPILE IS APPROXIMATE (NOT SURVEYED).
ALL ELEVATIONS ARE RELATIVE TO AN ON-SITE BENCH MARK WHICH HAS AN ASSIGNED ELEVATION OF 100 FEET.
ELEVATIONS ARE FOR 9/1/94.
(93.42) GROUNDWATER ELEVATION (FT).
*MW-2 ELEVATION NOT USED IN GROUNDWATER CONTOUR MAP.
THIS WELL APPEARS TO BE SCREENED IN A "PERCHED" WATER TABLE.

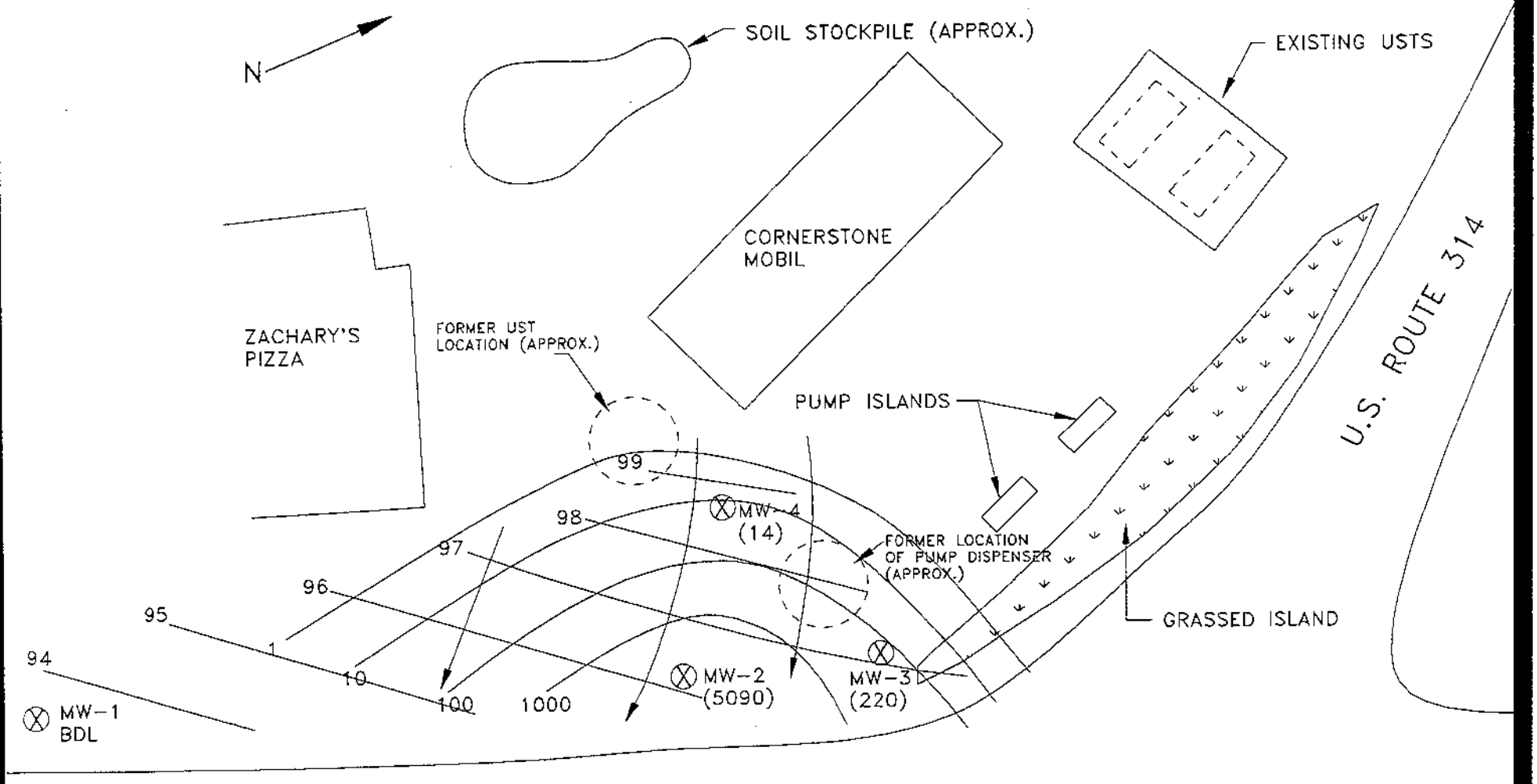
← GROUNDWATER FLOW DIRECTION

CORNERSTONE MOBIL

GROUNDWATER CONTOUR

FIGURE 4

SCALE (APPROX.)	DATE	
1"=30'	09/01/94	TSEC



SPECIFICATIONS:

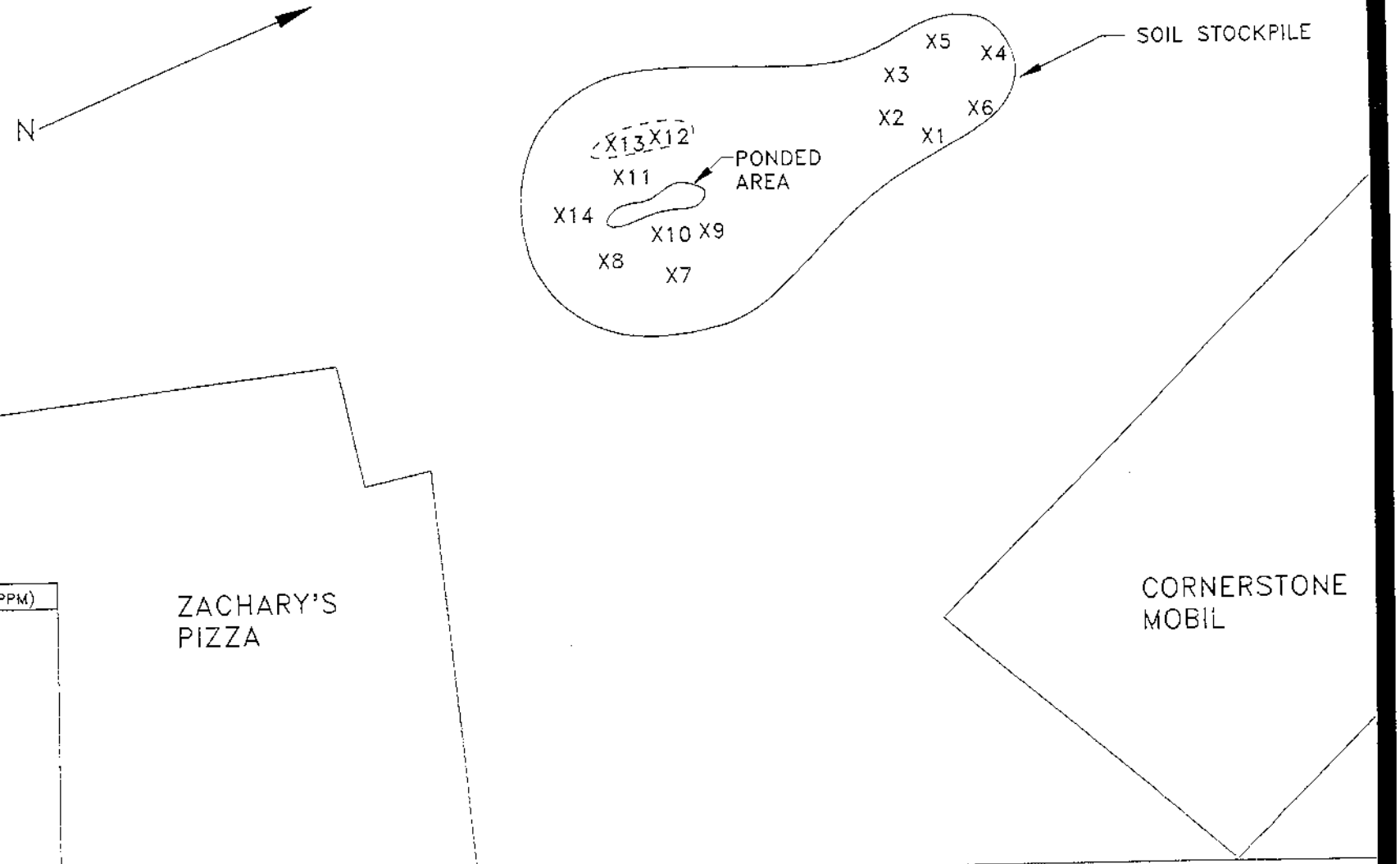
SOURCE OF BASE MAP: CROSS CONSULTING ENGINEERS, ST. ALBANS, VT.
MONITORING WELLS SURVEYED BY TSEC ON 8/22/94.
ALL ELEVATIONS AR RELATIVE TO AN ON-SITE BENCHMARK WHICH HAS AN ASSIGNED ELEVATION OF 100 FT.
(5090) TOTAL BTEX CONCENTRATION IN PPB ON 9/1/94.
* MW-2 ELEVATION NOT USED IN GROUNDWATER CONTOUR MAP.
THIS WELL APPEARS TO BE SCREENED IN A "PERCHED" WATER TABLE.
——— GROUNDWATER CONTOUR (FT) ON 9/1/94.
- - - - BTEX ISOCONTOUR (PPB) FOR 9/1/94.
BDL = BELOW DETECTION LIMIT.
←——— GROUNDWATER FLOW DIRECTION

CORNERSTONE MOBIL

TOTAL BTEX ISOCONTOUR MAP

FIGURE 5

SCALE (APPROX.)	DATE	
1"=30'	09/01/94	TSEC



LOCATION	PID (PPM)
1	36
2	1
3	2
4	10
5	1
6	5
7	0
8	9
9	3
10	4
11	141
12	4
13	1
14	33

LEGEND:

X 1 SOIL PID MONITORING LOCATION.

NOTE: SOILS SCREENED BY TSEC ON 8/15/94 USING AN OVM MODEL 580B EQUIPPED WITH A 10.2 EV LAMP.

⊂⊃ TEAR IN PLASTIC.

CORNERSTONE MOBIL

STOCKPILED SOIL
PID MONITORING LOCATIONS

FIGURE 6

SCALE (APPROX.)	DATE	
NONE	09/01/94	TSEC

TABLES

TABLE 1

CORNERSTONE MOBIL
Groundwater Elevation for 9/1/94

Well #	TOC Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-1	96.91	3.49	93.42
MW-2	98.68	0.67	98.01
MW-3	98.86	1.64	97.22
MW-4	100.67	2.0	98.67

NOTES:

- All elevations are relative to an on-site benchmark which has an assigned elevation of 100 feet.
- MW-2 is screened from a depth of 1-6' bgs. All other wells screened from a depth of 5-15' bgs.
- Elevation survey by TSEC on August 22, 1994.

TABLE 2

CORNERSTONE MARKET
Water Quality Summary Table

Location	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	Total BTEX	TPH mg/l
MW-1	BDL	BDL	BDL	BDL	BDL	BDL	1.3
MW-2	880 (850)	700 (690)	510 (520)	3000(2900)	BDL (BDL)	5090(4960)	8.5
MW-3	110	BDL	86	24	BDL	220	1.0
MW-4	2	BDL	9	3	BDL	14	0.7
Drainage Swale	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Equipment Bank	BDL	BDL	BDL	BDL	BDL	BDL	-
VES	5	2420	680	400	40 -	-	-
V6ES	5	1,000	700	10,000			

NOTES:

- Concentrations are in ug/l unless otherwise noted.
- Samples collected by TSEC on 9/1/94.
- Sample analyzed by ChemServe in accordance with EPA Method 8020 and Mod. EPA Method 8015.
- BDL = Below Detection Limit.
- VES = Vermont Enforcement Standard.
- ( ) = Duplicate sample results.
- Shaded values exceed associated VES.

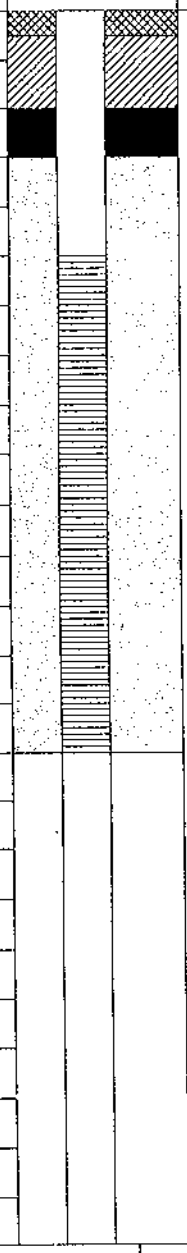
APPENDIX 1

TSEC SOIL BORING LOGS
&
MONITORING WELL CONSTRUCTION DIAGRAMS

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO. MW-1
PROJECT NAME/NO. CORNERSTONE MARKET/94-126
INSTALL DATE AUGUST 15, 1994
TSEC REP CINDY SPRAGUE
DRILLING CO. TRI-STATE DRILLING & BORING
DRILLING METHOD 4-1/4" HOLLOW STEM AUGER

TOTAL DEPTH OF HOLE 15'
DEPTH TO WATER 2.94' (8/22/94)
SCREEN DIA. 2" DEPTH 5-15'
SCREEN TYPE & SIZE 0.010 SLOT, 2" PVC
RISER TYPE 2" PVC
RISER DIA. 2" DEPTH 0-5'
GUARD TYPE ROAD BOX



DEPTH IN FEET	PID (PPM)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES
1-2	0.0	R=0.7	0-2' BLACK GRANULAR ASPHALT LIKE MATERIAL WITH SOME BROWN & BLACK SILT & GRAVEL LOAM, DAMP FILL.
2-4	1.0	R=0.5	2-4' BROWN SILT/CLAY, VERY COHESIVE, DAMP.
4-6	1.0	R=1.7	4-6' BROWN SILT/CLAY, VERY COHESIVE, MOTTLED, WET. LOWER PORTION CONTAINS 1/2" THICK LAYERS OF TAN SAND.
6-8	1.0	R=2.0	6-8' BROWN SILT/CLAY, VERY STIFF COHESIVE WITH LITTLE F. GRAVEL, MOIST TO WET. LOWER 0.3' GRAY SILT, SATURATED.
8-10	1.0	R=1.8	8-10' BROWN SILT, LITTLE F. SAND, TRACE CLAY, SATURATED.
13-15	1.0	R=2'	13-15' DARK GRAY SILT/CLAY, CONTAINS SMALL BLACK (1/8") CLAY PLATES OR BLOCKS THROUGHOUT, COHESIVE.
			NOTE: SEE DRILLERS LOGS FOR BLOW COUNTS.

LEGEND

- CEMENT GROUT
- NATIVE BACKFILL
- BENTONITE SEAL
- SAND PACK
- WELL SCREEN
- RISER PIPE
- HS HEAD SPACE
- WATER LEVEL (APPROX)

GRANULAR SOILS

BLOWS/FT	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	M.DENSE
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS

BLOWS/FT	DENSITY
<2	V.SOFT
2-4	SOFT
4-8	M.STIFF
8-15	STIFF
15-30	V.STIFF
>30	HARD

PROPORTIONS USED

TRACE	0-10%
LITTLE	10-20%
SOME	20-35%
AND	35-50%

WELL/BORING LOCATION: NEAR BRICK WALL IN FRONT OF ZACHARY'S PIZZA.

SEE FIGURE 1

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO. MW-2
PROJECT NAME/NO. CORNERSTONE MARKET/94-126
INSTALL DATE AUGUST 15, 1994
TSEC REP CINDY SPRAGUE
DRILLING CO. TRI-STATE DRILLING & BORING
DRILLING METHOD 4-1/4" HOLLOW STEM AUGER

TOTAL DEPTH OF HOLE 6'
DEPTH TO WATER 0.5 (8/22/94)
SCREEN DIA. 2" DEPTH 1-6'
SCREEN TYPE & SIZE 0.010 SLOT, 2" PVC
RISER TYPE 2" PVC
RISER DIA. 2" DEPTH 0-0.5' 1.0
GUARD TYPE ROAD BOX

DEPTH IN FEET	WELL PROFILE	WELL NOTES	PID (PPM)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES
1-2					AUGER TO 3' – AT +1' BGS WATER POURING INTO HOLE AT 5 GPM (EST.) ON TOP OF SILT/CLAY UNIT.
3-4			114	R=2.0	3-5' BROWN/GRAY SILT/CLAY, STIFF COHESIVE, MOIST, PETROL ODOR.
5-6			103	R=2.0	5-7' BROWN/GRAY SILT/CLAY, STIFF COHESIVE, MOIST, PETROL ODOR.
7-25					NOTE: SEE DRILLERS LOGS FOR BLOW COUNTS

LEGEND

- CEMENT GROUT
- NATIVE BACKFILL
- BENTONITE SEAL
- SAND PACK
- WELL SCREEN
- RISER PIPE
- HS HEAD SPACE
- WATER LEVEL (APPROX)

GRANULAR SOILS

BLOWS/FT	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	M.DENSE
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS

BLOWS/FT	DENSITY
<2	V.SOFT
2-4	SOFT
4-8	M.STIFF
8-15	STIFF
15-30	V.STIFF
>30	HARD

PROPORTIONS USED

TRACE	0-10%
LITTLE	10-20%
SOME	20-35%
AND	35-50%

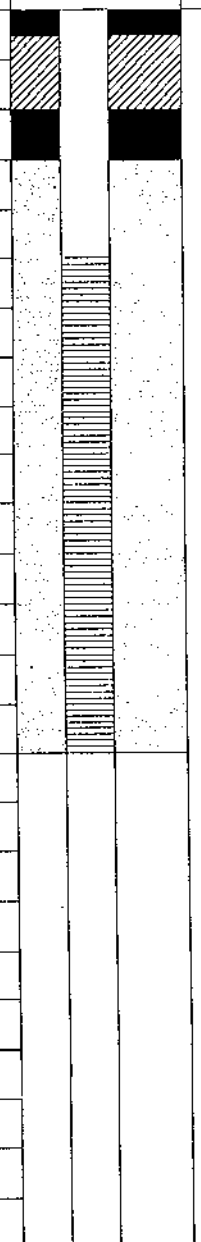
WELL/BORING LOCATION: MIDDLE OF LARGE ENTRY TO STORE (OFF ROUTE 2).

SEE FIGURE 1

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO. MW-3
PROJECT NAME/NO. CORNERSTONE MARKET/94-126
INSTALL DATE AUGUST 15, 1994
TSEC REP CINDY SPRAGUE
DRILLING CO. TRI-STATE DRILLING & BORING
DRILLING METHOD 4-1/4" HOLLOW STEM AUGER

TOTAL DEPTH OF HOLE 15'
DEPTH TO WATER 1.18' (8/22/94)
SCREEN DIA. 2" DEPTH 5-15'
SCREEN TYPE & SIZE 0.010 SLOT, 2" PVC
RISER TYPE 2" PVC
RISER DIA. 2" DEPTH 0-5'
GUARD TYPE ROAD BOX

DEPTH IN FEET	WELL PROFILE	WELL NOTES	PID (PPM)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES
1-25					AUGER TO 2': MINOR PERCHED WATER TABLE AT + 2' BGS.
			10	R=2.0	2-4' GRAY BROWN SILT/CLAY, STIFF, COHESIVE, MOIST.
			12	R=2.0	4-6' GRAY BROWN SILT/CLAY, STIFF, COHESIVE, MOIST.
			6.0	R=1.2	6-8' GRAY BROWN SILT/CLAY, COHESIVE, STIFF, DAMP. CONTAINS SOME AREAS OF F-M GRAVEL. ALSO GRAVEL IN TIP OF SPOON.
			2.0	R=2.0	8-10' BROWN SILT/CLAY, STIFF COHESIVE, DAMP. UPPER 0.2' CONTAINS GRAVEL, LOWER 0.3' IS GRAY SILT, LITTLE F. SAND, SATURATED, MOD. LOOSE.
			2.0	R=2.0	10-12' LIGHT RED-BROWN SILT/CLAY, SATURATED, VERY COHESIVE, STICKY.
					AUGER TO 15'
					NOTE: SEE DRILLERS LOGS FOR BLOW COUNTS

LEGEND

- CEMENT GROUT
- NATIVE BACKFILL
- BENTONITE SEAL
- SAND PACK
- WELL SCREEN
- RISER PIPE
- HS HEAD SPACE
- WATER LEVEL (APPROX)

GRANULAR SOILS

BLOWS/FT	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	M.DENSE
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS

BLOWS/FT	DENSITY
<2	V.SOFT
2-4	SOFT
4-8	M.STIFF
8-15	STIFF
15-30	V.STIFF
>30	HARD

PROPORTIONS USED

TRACE	0-10%
LITTLE	10-20%
SOME	20-35%
AND	35-50%

WELL/BORING LOCATION: JUST OFF SOUTH END OF GRASSY CURB.

SEE FIGURE 1

MONITORING WELL/SOIL BORING LOG

WELL/BORING NO. MW-4
PROJECT NAME/NO. CORNERSTONE MARKET/94-126
INSTALL DATE AUGUST 15, 1994
TSEC REP CINDY SPRAGUE
DRILLING CO. TRI-STATE DRILLING & BORING
DRILLING METHOD 4-1/4" HOLLOW STEM AUGER

TOTAL DEPTH OF HOLE 17'
DEPTH TO WATER 2.22' (8/22/94)
SCREEN DIA. 2" DEPTH 5-15'
SCREEN TYPE & SIZE 0.010 SLOT, 2" PVC
RISER TYPE 2" PVC
RISER DIA. 2" DEPTH 0-5'
GUARD TYPE ROAD BOX

DEPTH IN FEET	WELL PROFILE	WELL NOTES	PID (PPM)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES
1-3					AUGER TO 3': PETROL ODOR NOTICED FROM SOILS FROM 1.5-2'
4			233	R=2.0	3-5' GRAY BROWN SILT/CLAY, STIFF, COHESIVE.
5-7					
8-9			3	R=2.0	8-10' GRAY BROWN SILT/CLAY WITH GRAY SILT UNITS.
10-15					
16-17			1.0	R=1.8	15-17' DARK GRAY SILT SOME CLAY, CONTAINS SMALL (1/8") BLACK CLAY PLATES OR BLOCKS THROUGHOUT, COHESIVE, SATURATED.
18-25					NOTE: SEE DRILLERS LOGS FOR BLOW COUNTS

LEGEND

- CEMENT GROUT
- NATIVE BACKFILL
- BENTONITE SEAL
- SAND PACK
- WELL SCREEN
- RISER PIPE
- HS HEAD SPACE
- WATER LEVEL (APPROX)

GRANULAR SOILS

BLOWS/FT	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	M.DENSE
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS

BLOWS/FT	DENSITY
<2	V.SOFT
2-4	SOFT
4-8	M.STIFF
8-15	STIFF
15-30	V.STIFF
>30	HARD

PROPORTIONS USED

TRACE	0-10%
LITTLE	10-20%
SOME	20-35%
AND	35-50%

WELL/BORING LOCATION: APPROX. 20' OFF OF SE CORNER OF CORNERSTONE MARKET

SEE FIGURE 1

APPENDIX 2

DRILLERS LOGS

94-126

SOIL PROBE LOG

MW # 1
Cornerstone Mobil
South Hero, VT

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(802) 467-3123

DEC 2.5 RECD

	SAMPLER	
	Continuous	
TYPE	HSA	SS
SIZE	2"	
HAMMER	140#	
FALL	30"	

SOIL
Saturated
Wet
Moist
Damp
Slightly Damp

DATE STARTED: 08/15/94 DATE COMPLETED: 08/15/94

FOOTAGE DEPTH	BLOW COUNTS 6 12 18 24	REC	DRILLER'S NOTES & COMMENTS
0-2'	28 17 11 6	0.7'	0.2' Asphalt. 0.2-2' Black brown damp silty fine to coarse sand.
2-4'	2 3 6 9	0.5'	2-4' Brown damp silty clay.
4-6'	2 6 5 8	1.7'	4-7.7' Brown damp silty clay, fine sand lenses.
6-8'	3 4 5 7	1.9'	7.7-12' Brown wet silty clay layers, fine sand.
8-10'	3 3 3 4	1.8'	
13-15'	3 3 5 6	2.0'	12-15' Gray wet silty sandy clay. Bottom 15.0'.

Screen 15' to 5' below GS.
Riser 5' to surface.
Sand 15' to 3' below GS.
Hole plug 3' to 2' below GS.
Backfill 2' to 0.5' below GS.
Cement 0.5' to GS.

Client: Cornerstone Mobil
Job Location: South Hero, VT
Engineer: Twin State Environment Richmond, VT
Inspector: Cindy Sprague #94-126

Driller: Ray Gilfillan
Helper: Sean Hogan
Materials: 10' screen, 5' riser, 1 cap, 1 locking plug, 3.25 sand, 1/2 hole plug, 1 road box.

SOIL PROBE LOG

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(902) 467-3123

		SAMPLER Continuous
TYPE	HSA	SS
SIZE	2"	
HAMMER	140#	
FALL	30"	

SOIL
Saturated
Wet
Moist
Damp
Slightly Damp

DATE STARTED: 08/15/94 DATE COMPLETED: 08/15/94

FOOTAGE DEPTH	BLOW COUNTS	REC	DRILLER'S NOTES & COMMENTS
	6 12 19 24		
			0.3' Asphalt.
			0.3-1' Gravel fill.
3-5'	4 8 9 15	1.6'	1-7' Brown moist silty clay.
5-7'	3 5 6 12	2.0'	
			Bottom 7.0'.
			Screen 6' to 1' below GS.
			Riser 1' to GS.
			Sand 6' to 0.5' below GS.
			Hole plug 0.5' to GS.

Client: Cornerstone Mobil
Job Location: South Hero, VT
Engineer: Twin State Environment
Richmond, VT
Inspector: Cindy Sprague #94-126

Driller: Ray Gilfillan
Helper: Sean Hogan
Materials: 5' screen, 1' riser, 1 cap, 1 locking plug, 2 sand, 1/4 hole plug, 1 road box.

SOIL PROBE LOG

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(802) 467-3123

		SAMPLER Continuous
TYPE	HSA	SS
SIZE	2"	
HAMMER	140#	
FALL	30"	

SOIL
Saturated
Wet
Moist
Damp
Slightly Damp

DATE STARTED: 08/15/94 DATE COMPLETED: 08/15/94

FOOTAGE DEPTH	BLOW COUNTS 6 12 18 24	REC	DRILLER'S NOTES & COMMENTS
			0.2' Asphalt.
			0.2-2' Gravel fill.
2-4'	3 4 8 13	2.0'	2-7' Gray brown damp silty clay.
4-6'	4 7 11 12	2.0'	
6-8'	4 7 10 14	1.2'	7-9.6' Brown damp silty clay, fine gravel.
8-10'	5 5 6 8	1.9'	
10-12'	1 1 2 3	2.0'	9.6-15' Brown wet silty clay.
			Bottom 15.0'.

Screen 15' to 5' below GS.
Riser 5' to GS.
Sand 15' to 3' below GS.
Hole plug 3' to 2' below GS.
Backfill 2' to 0.5' below GS.
Cement 0.5' to GS.

Client: Cornerstone Mobil
Job Location: South Hero, VT
Engineer: Twin State Environment
Richmond, VT
Inspector: Cindy Sprague #94-126

Driller: Ray Gilfillan
Helper: Sean Hogan
Materials: 10' screen, 5' riser, 1 cap, 1 locking plug, 3.5 sand, 1/2 hole plug, 1 road box.

SOIL PROBE LOG

TRI STATE
DRILLING & BORING, INC.
RFD #2, Box 113 West Burke, VT 05871
(802) 467-3123

		SAMPLER
		Continuous
TYPE	HSA	SS
SIZE	2"	
HAMMER	140#	
FALL	30"	

SOIL
Saturated
Wet
Moist
Damp
Slightly Damp

DATE STARTED: 08/15/94 DATE COMPLETED: 08/15/94

FOOTAGE DEPTH	BLOW COUNTS 6 12 18 24	REC	DRILLER'S NOTES & COMMENTS
			0.3' Asphalt.
			0.3-2' Gravel fill.
3-5'	4 6 10 12	2.0'	2-9' Brown gray damp silty clay.
8-10'	3 5 6 8	2.0'	9-15' Brown wet silty clay.
15-17'	2 3 6 9	1.8'	15-17' Gray wet silty clay, sandy.
			Bottom 17.0'.

Screen 15' to 5' below GS.
Riser 5' to GS.
Sand 15' to 3' below GS.
Hole plug 3' to 2' below GS.
Backfill 2' to 0.5' below GS.
Cement 0.5' to GS.

Client: Cornerstone Mobil
Job Location: South Hero, VT
Engineer: Twin State Environment
Richmond, VT
Inspector: Cindy Sprague #94-126

Driller: Ray Gilfillan
Helper: Sean Hogan
Materials: 10' screen, 5' riser, 1 cap, 1 locking plug, 3.5 sand, 1/2 hole plug, 1 road box.

APPENDIX 3

LABORATORY REPORTS

ChemServe
ENVIRONMENTAL ANALYSTS

317 Elm Street
Milford, N.H. 03055
(603) 673-5440
FAX (603) 673-0366

SEP 26 RECD

September 20, 1994

Ms. Cindy Sprague
Twin State Environmental Corp.
P O Box 719
Richmond VT 05477

Job Name	**: Cornerstore Market**	**Laboratory #**	**: I07-94-14**
Job Number	**: 94-126**	**Purchase Order #**	**: N/A**
Location	**: S. Hero, VT**	**Control #**	**: 11198**

Dear Ms. Sprague,

Enclosed please find the laboratory results for the above referenced samples which were received, by the Chemserve sample custodian, under chain of custody control number 11198 on September 7, 1994. Samples were collected by Cindy Sprague on September 1, 1994. Any abnormalities to the samples would be noted on the enclosed chain of custody document or laboratory report form. Chemserve follows protocols for analysis corresponding to the methods referenced unless a modification is noted. Unless otherwise stated, all holding times, preservation techniques and container types are analogous with those outlined by the U.S. EPA.

A formal quality assurance/quality control QA/QC program is maintained and updated by Chemserve on a routine basis. This QA/QC manual is available upon request.

This report is not valid without a completed chain of custody with the corresponding control number attached.

If you have questions or concerns regarding this analysis, please feel free to contact me.

Sincerely,

Jay W. Chrystal
President/Laboratory Director

CHEMSERVE COMPANY
OFFICIAL SEAL
STATE CERTIFIED

Enclosures

ChemServe
ENVIRONMENTAL ANALYSTS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-1

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

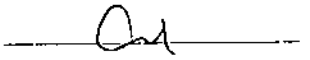
DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 1
BENZENE	BDL	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	BDL	1
ETHYLBENZENE	BDL	1
TOTAL XYLENES	BDL	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: 

ChemServe
ENVIRONMENTAL ANALYSIS

TOTAL PETROLEUM HYDROCARBONS
EPA MODIFIED METHOD 8015

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: 107-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-1

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

COMPOUND	CONCENTRATION (MG/L)	DETECTION LIMIT MULTIPLIER: (MG/L) X 1
TOTAL PETROLEUM HYDROCARBONS AS GASOLINE CONSTITUENTS	1.3	0.1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-2

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

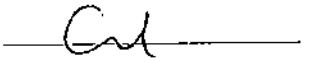
DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 10
BENZENE	880	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	700	1
ETHYLBENZENE	510	1
TOTAL XYLENES	3,000	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: 

ChemServe
ENVIRONMENTAL ANALYSIS

TOTAL PETROLEUM HYDROCARBONS
EPA MODIFIED METHOD 8015

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-2

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

COMPOUND	CONCENTRATION (MG/L)	DETECTION LIMIT MULTIPLIER: (MG/L) X 1
TOTAL PETROLEUM HYDROCARBONS AS GASOLINE CONSTITUENTS	8.5	0.1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-3

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 1
BENZENE	110	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	BDL	1
ETHYLBENZENE	86	1
TOTAL XYLENES	24	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

TOTAL PETROLEUM HYDROCARBONS
EPA MODIFIED METHOD 8015

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-3

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

COMPOUND	CONCENTRATION (MG/L)	DETECTION LIMIT MULTIPLIER: (MG/L) X 1
TOTAL PETROLEUM HYDROCARBONS AS GASOLINE CONSTITUENTS	1	0.1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-4

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 1
BENZENE	2	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	BDL	1
ETHYLBENZENE	9	1
TOTAL XYLENES	3	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

TOTAL PETROLEUM HYDROCARBONS
EPA MODIFIED METHOD 8015

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: 107-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-4

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

COMPOUND	CONCENTRATION (MG/L)	DETECTION LIMIT MULTIPLIER: (MG/L) X 1
TOTAL PETROLEUM HYDROCARBONS AS GASOLINE CONSTITUENTS	0.7	0.1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: DRAINAGE SWALE

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

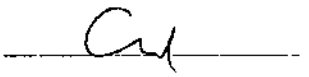
DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 1
BENZENE	BDL	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	BDL	1
ETHYLBENZENE	BDL	1
TOTAL XYLENES	BDL	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: 

ChemServe
ENVIRONMENTAL ANALYSIS

TOTAL PETROLEUM HYDROCARBONS
EPA MODIFIED METHOD 8015

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: DRAINAGE SWALE

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

COMPOUND	CONCENTRATION (MG/L)	DETECTION LIMIT MULTIPLIER: (MG/L) X 1
TOTAL PETROLEUM HYDROCARBONS AS GASOLINE CONSTITUENTS	BDL	0.1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: EQUIPMENT BLANK

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 1
BENZENE	BDL	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	BDL	1
ETHYLBENZENE	BDL	1
TOTAL XYLENES	BDL	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

VOLATILE ORGANIC ANALYSIS
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: 107-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

JOB#: 94-126

SAMPLE IDENTITY: MW-2 DUP

CONTROL#: 11198

DATE SAMPLED: 9/01/94

REC'D: 9/07/94

DATE ANALYZED: 9/15/94

MATRIX: LIQUID

PERCENT MOISTURE: N/A

COMPOUND	CONCENTRATION (UG/L)	DETECTION LIMIT MULTIPLIER: (UG/L) X 10
BENZENE	850	1
METHYL-TERTIARY-BUTYL ETHER	BDL	1
TOLUENE	690	1
ETHYLBENZENE	520	1
TOTAL XYLENES	2,900	1

BDL = BELOW DETECTION LIMIT

CERTIFIED BY: _____

ChemServe
ENVIRONMENTAL ANALYSIS

SPIKE RECOVERY FORM
EPA METHOD 8020

CUSTOMER: TWIN STATE ENVIRONMENTAL CORP.

LAB#: I07-94-14

SAMPLE LOCATION: CORNERSTORE MARKET S. HERO, VT

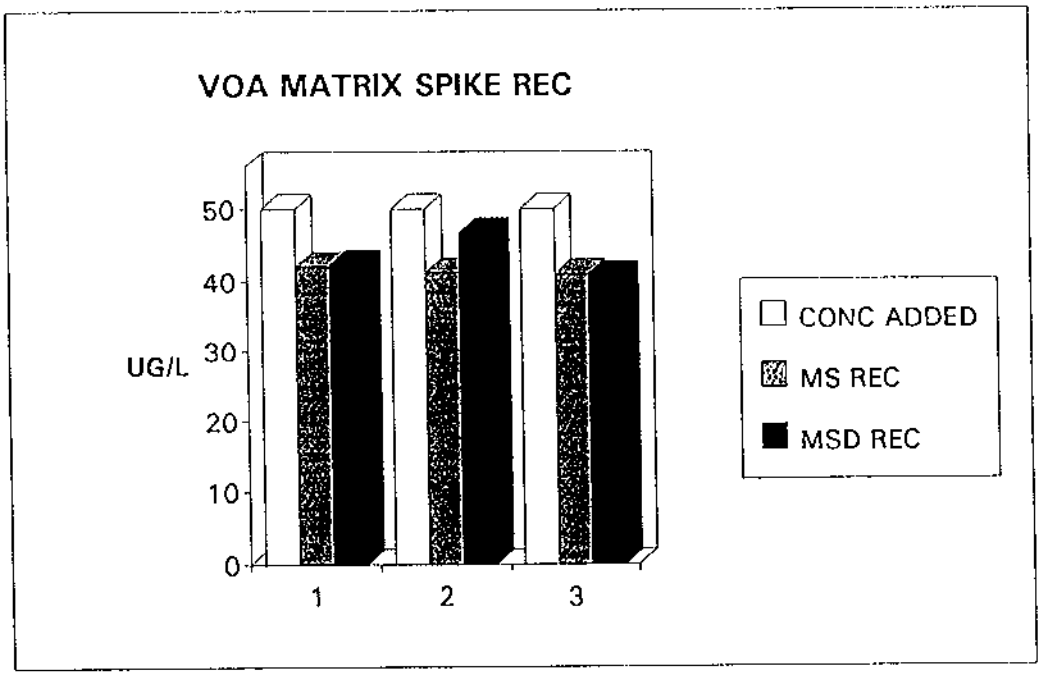
JOB#: 94-126

SAMPLE IDENTITY: OC SPIKES/11198 MW-1

CONTROL#: 11198

DATE ANALYZED: 9/15/94

COMPOUND	CONC ADDED (UG/L)	AMT REC (UG/L)	DUP AMT REC (UG/L)	%REC	DUP % REC	%DIFF
BENZENE	50	42.16	42.41	84%	85%	1%
TOLUENE	50	41.30	46.79	83%	94%	11%
CHLOROBENZENE	50	41.04	40.75	82%	82%	1%



CONTROL LIMITS +,- 25%

CONTROL NO. 11198

ChemServe ENVIRONMENTAL ANALYSIS

317 Elm Street
Milford, NH 03055
(603) 673-5440
FAX (603) 673-0366

CHAIN OF CUSTODY

(A) CUSTOMER INFORMATION

CUSTOMER: Twin State Environmental (w
ADDRESS: PO Box 719 Richmond VT
TELEPHONE: (802) 434-3350
CONTACT PERSON: Cindy Sprague
P.O. NUMBER:

(B) PROJECT INFORMATION

JOB NAME: Cornerstone Market
JOB NUMBER: 94-126
LOCATION: S. Hero VT
TELEPHONE:
CONTACT PERSON: (PRINT)
Dan Griffiths

(C) SAMPLE INFORMATION

TURNAROUND TIME: (CIRCLE ONE)

STANDARD (RUSH)

RUSH T.A.T. 7 day (Check with lab)

(D) STATION #	(E) SAMPLE IDENTIFICATION & LOCATION	(F) DATE COLLECTED	(G) TIME COLLECTED	(H) SAMPLE TYPE GRAB	(H) SAMPLE TYPE COMP	(I) MATRIX SOLID (S) LIQUID (L) COMBINED (C) HAZARD (H)	(J) # OF CONTAINERS	(K) CONTAINER & PRESERVATIVE 40 ml vials / HCL	(K) 1 liter glass	(L) ANALYSIS
	mw-1	9-1-94	13:00	X		L		3	1	8020 / 8015 TPH gas
	mw-2	"	13:30	X		L		3	1	"
	mw-3	"	12:30	X		L		3	1	"
	mw-4	"	12:00	X		L		3	1	"
	drainage swale	"	12:50	X		L		2		"
	Equipment blank	"	12:45	X		L		3		8020 only
	mw-2 Dup	"	13:35	X		L		3	1	8020 only

(M) CUSTODY

(PRINT NAME) SAMPLER: Cindy Sprague	SIGNATURE: Cindy Sprague	MILITARY DATE/TIME: 9-6-94/9:00
RELINQUISHED: Federal Express		MILITARY DATE/TIME:
RECEIVED:		MILITARY DATE/TIME:
RELINQUISHED:		MILITARY DATE/TIME:
RECEIVED FOR LABORATORY:		MILITARY DATE/TIME: 9/7/94 1315

LAB USE ONLY

A
B
C
D
E
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I
J
K
L
M

The State of New Hampshire
Department of Environmental Services

CERTIFICATE OF APPROVAL
Drinking Water Analysis

Issued to
Chemserve, Inc.

Located at
Elm Street, Milford, NH

Under the provisions of the Regulations in Env-C300 for the following analyses:

FULL CERTIFICATION: Total Coliform by Membrane Filtration, Fecal Coliform by Membrane Filtration, Colilert-MPN, Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrate-N, Nitrite-N, Turbidity, Total Filterable Residue, Calcium, Alkalinity, Sodium, Sulfate, Total Cyanide, Trihalomethanes, Volatile Organics, and Vinyl Chloride.

PROVISIONAL CERTIFICATION: EDB.

REPLACES CERTIFICATE #100893-A

CERTIFICATE NUMBER: 100893-D

DATE OF ISSUE: March 17, 1994

Certifying Officer

EXPIRATION DATE: December 2, 1994

The State of New Hampshire
Department of Environmental Services

CERTIFICATE OF APPROVAL
Wastewater Analysis

Issued to
Chemserve, Inc.

Located at
Elm Street, Milford, NH

Under the provisions of the Regulations in Env-C300 for the following analyses:

FULL CERTIFICATION: Total Coliform by Membrane Filtration, Fecal Coliform by Membrane Filtration, ICP Metals, Mercury, pH, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Total Cyanide, Non-Filterable Residue, Total Phenolics, PCBs in Water, PCBs in Oil, Pesticides, and Volatile Organics.

PROVISIONAL CERTIFICATION: Oil & Grease.

REPLACES CERTIFICATE #100893-C

CERTIFICATE NUMBER: 100893-E

DATE OF ISSUE: September 14, 1994

Certifying Officer

EXPIRATION DATE: December 2, 1994

APPENDIX 4

TSEC STANDARD OPERATING PROCEDURE

FOR

GROUNDWATER SAMPLING

TWIN STATE ENVIRONMENTAL CORPORATION

STANDARD OPERATING PROCEDURE FOR GROUNDWATER SAMPLING

Static water levels measurements from all of the wells requiring sampling will be collected prior to the collection of any samples. The depth to groundwater and the total depth to the bottom of the well screen will be measured with an electronic depth indicating probe. The probe will be lowered into the well until the meter indicates water is reached. The probe will be raised above the water level and slowly lowered again until the water level is detected. The cable will then be held against the side of the inner protective casing at the point designated for water level measurements and a depth reading taken. The measurement obtained will be recorded to the nearest 0.01 foot in the project log book. Using the probe in a similar fashion, the depth to the bottom of the well will be determined and recorded in the project log book.

Three well volumes will be purged from each well prior to sampling. Wells will be purged either by hand bailing, or with the use of a peristaltic pump equipped with dedicated polyethylene tubing.

The well will be allowed to recharge to seventy five (75) percent of the static water level before sampling, unless the well is bailed dry. In the latter case, the well may be sampled when sufficient recharge has occurred to enable sample containers to be filled. The bailer line will be prevented from contacting the ground surface to avoid the introduction of surface soils into the well during purging. All purge water removed from each well will either be containerized or discharged directly to the ground surface, depending on project requirements. Any water which is containerized will subsequently be sampled to determine the appropriate disposal method.

The time of sample collection, as well as the volume of water removed from the well will be recorded in the project log book.

Samples for analysis will be collected from the well using a newly decontaminated bailer. This will be conducted in a manner which minimizes sample agitation and contact with the atmosphere. Additionally, the following considerations will be incorporated in this sampling:

1. Bailer check valves will be inspected prior to sample collection.

2. Bailers will be carefully lowered into the well to minimize degassing of the water upon impact.

3. The bailer contents will be transferred to sample container(s) in a manner which minimizes agitation or aeration.

4. Decontaminated sampling equipment will not be placed directly on the ground or any other potentially contaminated surface prior to insertion into the well.

MEMORANDUM

TO: Keeler Bay Marina Site #191
THRU: Chuck
FROM: Bob H.
DATE: October 24, 1989
RE: Site Closure

On September 25, 1989 I attempted to locate the stockpiled soils resulting from a tank removal at Keelers Bay Deli and Variety. The soils had been moved to an old quarry adjacent to Appleton Campground in South Hero.

Several piles of soil were in this quarry. I checked all of them and there was no detectable contamination. These soils initially ranged between 2.0 and 8.0 ppm, and have been stockpiled since 4/88. Although I could not tell exactly which soils were from Keeler Bay, I feel we can safely close this site.

BH:bp32

OCT 03 2019

VERMONT

State of Vermont
Department of Environmental Conservation
Waste Management & Prevention Division
1 National Life Drive – Davis 1
Montpelier, VT 05620-3704
matt.moran@vermont.gov

AGENCY OF NATURAL RESOURCES

September 23, 2019

Mr. Richard Browne – *via e-mail*
Northern New England Environmental Operations Administrator
Global Partners LP
PO Box 133
Wells River, VT 05081

RE: Site Management Activities Complete
Keeler Bay Variety Store, South Hero, VT; SMS Site #98-2434

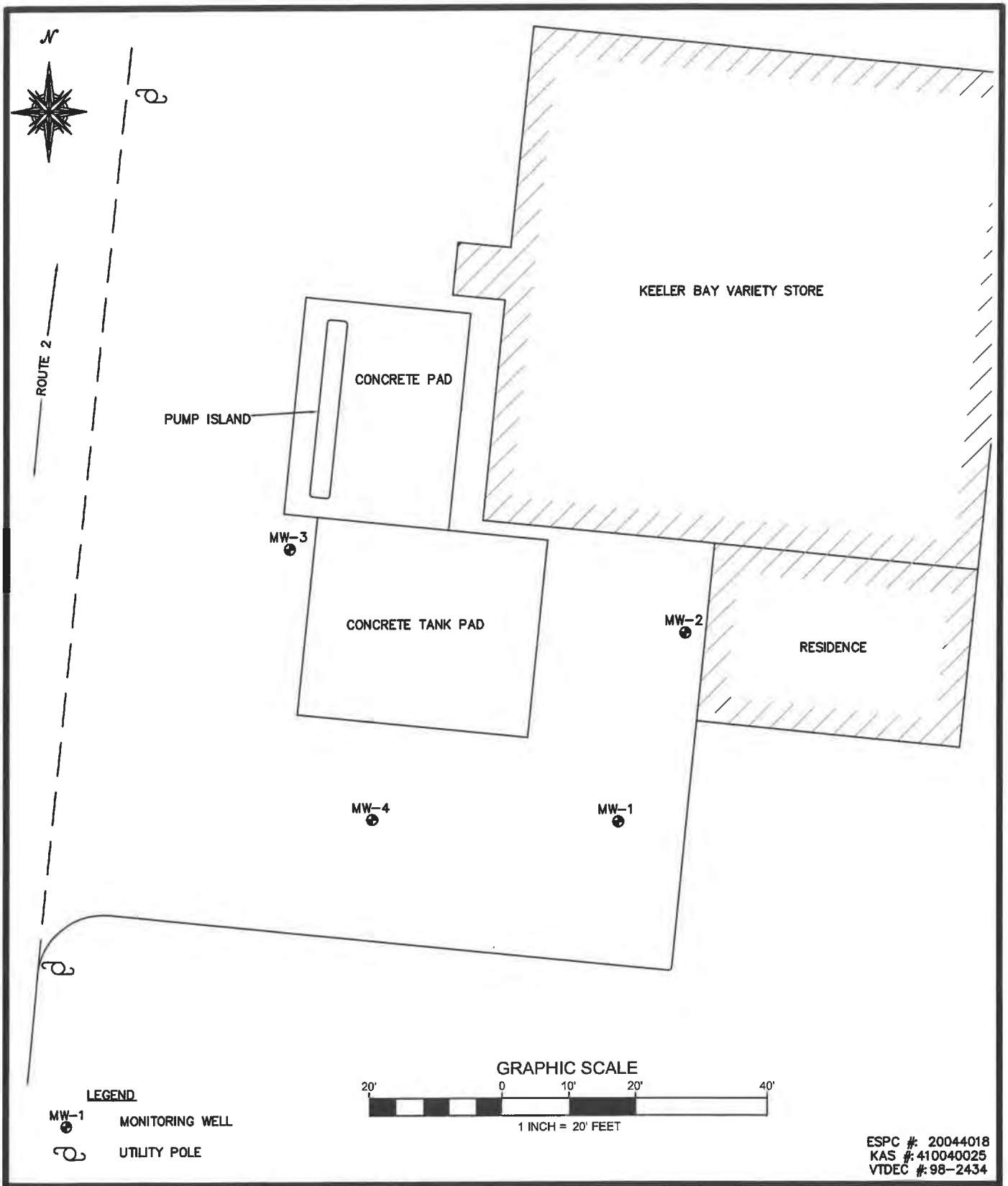
Dear Mr. Browne:

The Sites Management Section (SMS) has conducted a review of the above-referenced site file to determine if the site is eligible for a Site Management Activities Complete (SMAC) designation. Information contained within the site file includes the following:

- On April 27 and 28, 1998, Griffin International, Inc. (Griffin) inspected the removal and replacement of underground storage tanks (UST)piping and the excavation for the installation of two additional USTs at the Keeler Bay Variety Store in South Hero. Soils excavated during this work were screened for vapor phase contamination with a photoionization detector (PID). PID readings did not indicate the presence of contaminated soil in the new excavation for USTs #4 & #5, and soils were removed from the site to accommodate the new USTs. Fractured bedrock was encountered at approximately 7 feet below ground surface (bgs) and the excavation was extended to 9 feet bgs. Groundwater entered the excavation to approximately 7.5 feet bgs. Soils removed during the piping work exhibited a peak PID reading of 19 parts per million (ppm). Griffin estimated 22 cubic yards of contaminated soil with PID readings exceeding 1 ppm were returned to the ground.
- On November 4, 2004, KAS, Inc. (KAS) oversaw the completion of an initial site investigation which included the advancement of four soil borings by T&K Drilling that were completed as groundwater monitoring wells. The soil borings were drilled to the depth of the bedrock surface and soils were logged by KAS and screened with a PID. PID readings did not indicate vapor phase contamination in the fill encountered in soil borings MW-1, MW-3, and MW-4. MW-2 was installed in the presumed downgradient direction of the location of the USTs and adjacent to the onsite residence that is attached to the store. Soils consisted of clays from below the asphalt surface to 5 feet bgs. Underlying the clays was a 7-inch layer of gravel with sand followed by a 1-inch layer of silty sand with a petroleum odor, black staining, and a PID reading of 29 ppm. A soil sample was collected for laboratory analysis which reported ethylbenzene at 67.2 micrograms per kilogram (µg/kg), total xylenes at 44.2 µg/kg, 1,2,4-trimethylbenzene at 342 µg/kg, naphthalene at 231 µg/kg, and Total Petroleum

Hydrocarbons-Gasoline Range Organics (TPH-GRO) at 5.94 milligrams per kilogram (mg/kg).

- On November 24, 2004, KAS returned to the site to sample the groundwater monitoring wells for volatile organic compounds (VOCs) and TPH. The wells were gauged and depth to groundwater measurements ranged from approximately 6.65 to 7.8 feet bgs with groundwater flow directed generally to the southeast towards Lake Champlain. MW-4 was dry during this visit. The dissolved petroleum constituent methyl tert-butyl ether (MTBE) was present at concentrations exceeding the Vermont Groundwater Enforcement Standard (VGES) in samples collected from MW-1 and MW-2. The sample from MW-3 did not have any reported VOC detections. TPH-GRO was not reported above the detection limit in any of the three samples collected.
- On September 26, 2006, KAS oversaw the replacement of UST #1, UST #2, and UST #3, all 4,000-gallon capacity gasoline USTs. UST #1 was reportedly in fair to poor condition with minor corrosion on the outer wall and a hole in the inner wall of the tank. UST #2 and UST #3 were reported to be in fair condition with minor corrosion noted. The soils surrounding the USTs were primarily non-native fill. Weathered petroleum odors were noted by KAS and the soils were screened with a PID. The highest PID reading was 1,093 ppm from the bottom of UST #3 and the average PID reading of soils screened in the excavation was 51.5 ppm.
- An assessment of nearby sensitive receptors was completed. The area is served by a municipal water supply and there are no known water supply wells within a 500-foot radius of the site. Lake Champlain is located 500 feet east of the site, however due to the distance and low magnitude of the dissolved groundwater contamination, the Lake is considered unlikely to have been impacted. The indoor air of the Keeler Bay Variety Store, including its full basement, and the attached residence that also has a full basement, are potential sensitive receptors. The indoor air was screened with a PID on November 8, 2004 and no readings above background were reported by KAS.
- The monitoring well network was sampled by KAS quarterly from November 2004 through the June 2006 sampling event when the sampling frequency was reduced to annual. Following the June 2007 sampling event, the sampling frequency was reduced to biennial through August 2015 when sampling ceased. In total, there were eleven sampling events at the site. In general, MW-1 had detections of MTBE in all sampling events with concentrations decreasing to below VGES during the June 2009 sampling and remaining below VGES through 2015, with no other petroleum-related compounds detected. MW-2 had exceedances of VGES reported for numerous petroleum-related compounds including benzene, MTBE, trimethylbenzenes, and naphthalene from the first sampling round through the July 2013 sampling event. Concentrations of these compounds decreased due to natural attenuation over time and during the August 2015 sampling event, all petroleum-related analyte concentrations had decreased to below VGES with the only analyte detected being MTBE. Monitoring well MW-3 was sampled during the first five sampling events and did not have any analytes detected by the laboratory. The well was removed from the sampling program following the January 2006 sampling event. MW-4 was sampled during all but one of the sampling events (the well was dry during the initial sampling) with MTBE detected in all sampling events. MTBE concentrations in MW-4 were below the VGES during the final three sampling events.
- In addition to monitoring the groundwater at the site, KAS screened the indoor air of the onsite building on July 28, 2005, June 19, 2006, and September 26, 2006, with no PID readings reported above background. These results coupled with only low concentrations of dissolved phase petroleum constituents in groundwater indicate no significant risk to indoor air of the building.
- On September 20, 2017, KAS decommissioned the four monitoring wells at the site.



ESPC #: 20044018
KAS #: 410040025
VTDEC #: 98-2434

368 Avenue D, Suite 15
PO Box 787
Williston, VT 05495

www.kas-consulting.com

802 383.0486 p
802 383.0490 f

kas environmental science & engineering

KEELER BAY VARIETY STORE

500 ROUTE 2
SOUTH HERO, VERMONT

SITE MAP

DATE: 9/22/15	DWG #: 1	SCALE: 1"=20'	DRN.: TB	APP.: JD

Based on the information summarized above, the SMS has determined that the site has satisfied the requirements of §35-701 of the Investigation and Remediation of Contaminated Properties Rule (IRULE) and the SMS is not requesting any additional work in response to the petroleum contamination identified at this time. Therefore, the SMS is assigning the site a SMAC designation. The SMAC designation does not release any owner/operator of the property (past, current or future) from any past or future liability associated with the subsurface soil and groundwater contamination at this site. The Secretary may return the site to an active status if any of the criteria outlined in § 35-701(e) of the IRULE are met.

This SMAC letter and attached site map also serve as a Notice to the Land Records to document that residual contamination remains on this property in soils near the former UST location, as indicated on the attached site plan. Any residual contamination remaining at the site does not pose an unacceptable risk to human health and the environment providing it remains undisturbed. The SMS must be notified prior to conducting any subsurface work, excavation, or groundwater extraction near the above-described residual contamination. If a person fails to follow the use restrictions contained within this notice the person may be liable for further site investigation, remediation, and penalties pursuant to the Vermont Waste Management Act, 10 V.S.A. chapter 159.

This SMAC letter and attached map shall be recorded in the South Hero Town Land Records for this property within one week of receipt of this document. A copy of the recorded SMAC letter and map with the South Hero Town Clerk's stamp indicating the date and time of recording, book and page numbers, and the town clerk's signature must be provided to the Agency within 10 days of recording; upon which time the SMAC designation will take effect.

If you have any questions, please feel free to contact me or Michael Nahmias, SMS Project Manager, at (802) 828-1138.

Sincerely,

Matt Moran, Environmental Program Manager
Sites Management Section

Enclosure - Site Map

cc: Jeremy Roberts, KAS – *via e-mail*
DEC Regional Office – *via e-mail*
South Hero Selectboard – *via e-mail*
South Hero Town Health Officer – *via e-mail*

RECORDED 9/24/2019
AT 09:00 A M. IN
VOL 147 PAGE 039-042
OF SO. HERO LAND RECORDS.
ATTEST Serena Hilliker, Asst.
SOUTH HERO VERMONT TOWN CLERK

APPENDIX F – TOWN PLAN

of all modes of transportation. Not every street or road will be used by a wide variety of modes, but a complete streets approach considers all users, and seeks desirable, practical and affordable improvements that will be accepted by the community.

Roads & Vehicle Traffic

The Town maintains 22.09 miles of Town roads with the use of town owned equipment, a full- time road foreman and 2 other full-time employees. The Selectboard appoints a Road Commissioner who directs the work done by the road crew. The budget is set by the Selectboard, approved by voters, and supported by taxes and additional State aid. Approximately 14 Town roads are paved and 2 are gravel. The decision to pave a gravel road is currently balanced between maintaining a rural aesthetic, slower speeds, the convenience of blacktop and the availability of funds.

U.S. 2, a Federal Highway, traverses for about five and a half (5.783 miles) along the northern side of the Town. There is also State highway, VT 314, connecting US 2 to the ferry in New York State (1.592 miles in South Hero). Vermont Agency of Transportation completes actual and estimated traffic counts. The count shows an increase in traffic on Route 2 from 2019 to 2021 based on an actual count, from 8,837 to 9,156. It estimated a decrease in 2020, likely reflecting less travel during the pandemic. The northern mile of Route 2 and 314 are showing a decrease from 2019 to 2021, but it is based on estimated counts.

There are a large number of privately owned and maintained roads in the Town. The Town provides services on Town highways only. New private roads and upgrades to support new development are required to comply with the Town's Road Standards. The Town is not in the practice of accepting new town roads and is not obligated to, regardless of whether the private road is in compliance with Town road standards.

In response to the Municipal Roads General Permit implemented as a result of the Vermont Clean Water Act (Act 64, 2015) to reduce stormwater runoff and erosion on local roads, South Hero has accessed and will continue to seek funding through the Agency of Transportation Grants In Aid Program to complete stone lined ditches and other important road improvement projects that improve stormwater management and the resiliency of local roads.

Travel to Work and Commuting

The majority of workers living in South Hero (over 60%) travel to work in Chittenden County, with only 9% remaining in South Hero for employment. As a result, over 60% of commuters have over a 20-minute drive.

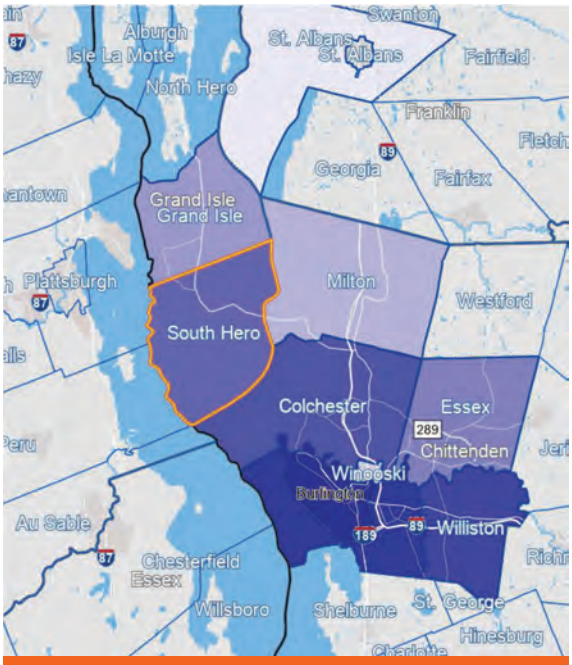


Figure 3.1 Work Destinations, 2019
https://onthemap.ces.census.gov

Table 3.1 Average Annual Daily Traffic Counts (VTRANS)

Route	*Start Location*	*End Location*	*2019*		*2020*		*2021*	
US2	Grand Isle Town Line	MM 1.158	6,111	Est.	5,176	Est.	5,172	Actual
US 2	MM 1.158	Milton Town Line 5.573	8,837	Actual	7,485	Est.	9,156	Actual
VT314	Route 2 intersection	Grand Isle Town Line 1.592	3,242	Est.	2,746	Est.	3,111	Est.

4 Municipal and Community Facilities and Services

Goals & Objectives

1. Maintain and upgrade, where reasonable and necessary, municipal facilities and grounds at reasonable costs.
2. Strive to meet the basic needs of residents and access to affordable goods and services within Town, including in times of emergency.
3. Ensure that new growth does not overburden Town services by planning, budgeting, and exploring new ways to cover costs of growth such as impact fees.
4. Increase civic infrastructure, community engagement, and communication through transparent government.
5. Support and create outdoor recreation opportunities that are available to the public, including a system of multiple use paths, trails and recreational areas on municipal and private lands.
6. Support through policies and regulations the preservation of historic buildings and sites in South Hero.

Implementation

1. Promote Town Plan objectives in the adoption of tax policies and planning for public facilities and services.
2. Explore innovative ways to finance and provide Town services to reduce property tax burdens.
3. Explore ways to save on supplies, equipment and Town services (such as plowing) through cooperative efforts with other towns.
4. Encourage the involvement of community members in community affairs and Town government in order to increase the number of individuals represented while addressing Town issues. This will provide a broader perspective of ideas to consider when making important decisions.
5. Develop and maintain a capital budget and program that will identify anticipated Town and school capital needs for a six-year period. Seek ways to minimize tax burdens on residents in any one year. The budget and program would contain a time frame for meeting anticipated needs and a method of financing the improvements.
6. Support efforts for education funding reform to address the property tax burdens imposed by Acts 60 and 68.
7. Investigate adopting impact fees, which would help finance the cost of specific Town services.
8. Explore ways to increase the tax base without adding significant burdens on Town services. Among the ways to do this are to encourage light business growth in central locations, the use of vacant private and Town buildings for new uses, and encourage home-based businesses.
9. Encourage public/private partnerships to improve Town services whenever possible.
10. Encourage volunteers to participate in Town government.
11. Support volunteers who are interested in creating and maintaining Town trails and coordinate with regional trail projects.
12. Redevelop the Meeting House as a location for municipal and community events.
13. Support community events and activities such as farmers markets and Weekend in the Islands (WiTI)
14. Ensure the Town continues to be represented in and participate in local and regional planning organizations such as the Northwest Regional Planning Commission, Lake Champlain Islands Economic Development Corporation (LCIEDC) Northwest Solid Waste District, etc.
15. Encourage the availability of safe and affordable child care.
16. Support the expansion of the Fire District #4 private water district and/or setting up other water districts in concentrated areas of the Town.

Some purchases of equipment for the Fire and Rescue Departments are funded by tax dollars. In 2018, both organizations moved into a shared building on Community Lane.

Law Enforcement

The Town has no local police department. Vermont State police as well as the Grand Isle County Sheriffs Department cover all areas of law enforcement from traffic violations to major crimes. The Town currently contracts with the County Sheriff's office for additional coverage and help with enforcement of local traffic ordinances. This coverage includes patrolling of the Town Beach during the summer months and various other extra coverage. If you have an emergency call 911.

Library

After a $1.5 million-dollar fundraising campaign, the Worthen Library was opened in 2019. Moving the library to its own dedicated building has allowed for an expansion in hours, additional programming, and for the library to be used for community meetings. Current programming includes lending books, movies, equipment as well as holding events for adults and children. The Library is primarily funded by Town tax dollars and by private fundraising through The South Hero Library Foundation (an IRS 501(c)(3)).The library is staffed by two salaried librarians and many volunteers from the community.

Water & Wastewater

There is no Town water & wastewater system. Fire District 4 is the current private water system which has a pumping and chlorination system to supply water to some of the residents of South Hero and Keeler Bay Villages The District maintains its own budget and funds its operations with assessments separate from Town property taxes. Existing and future water supply needs in the Town could be impacted by the emerging zebra mussel problem in Lake Champlain and the State's prohibition on the use of lake water for water supply in subdivisions. Investment and/or coordination with adjoining towns in providing water supply and distribution should continue to be considered.

In 2021, Fire District #4 installed 1,400 feet of upgraded and new water line to support the development of BayView Crossing, a 30-unit senior housing in the South Hero Village. The extended water line may also support additional growth in the Village.

All residences and businesses must comply with State regulations when installing their wastewater systems. Being a Lake community the Town of South Hero encourages old wastewater systems be upgraded before there is a failure issue. New technologies are available that can even pre-treat wastewater.

The lack of wastewater capacity in the villages creates some barriers to the goal of having vibrant villages with a mix of housing, businesses, and municipal services. Development potential and density (the amount of development per acre) are directly dependent on the capacity of the soil and land to accommodate soil-based wastewater treatment. The Town is currently conducting a feasibility study to understand the potential options for decentralized wastewater treatment in the villages.



Figure 4.2 Worthen Library, photo from grand opening.

The Town has zoning regulations that allow for increased density and mixed-use development in its village areas, while limiting the density and intensity of development allowed outside the village areas. South Hero does not have any areas designated for industrial development but does allow for light-industrial development in all areas of Town, including the village areas, as a conditional use with site plan review. It is important to allow for light-industrial development, but further work is needed to better define this use. It may be appropriate to designate certain areas where light-industry is not allowed.

It is important to ensure adequate telecommunications infrastructure for business development, including the increased demand for home occupations and remote work. While the majority of South Hero residents have access to service that meets the minimum standards for broadband, 2% still lack broadband service and none are served by high-speed fiber. The majority of residents have cellular access. To support enhanced broadband access, the Town has joined the Northwest Fiberworx (formerly Northwest Communications Union District).

Wastewater and water supply infrastructure are a significant hurdle for current and new development in the villages. There are several small private water districts, however there is no municipal wastewater system and local soils severely limit the capacity for on-site soil based wastewater management. In 2023 a feasibility study was in process to determine the potential for small, community waste-water systems to possibly serve the village areas.

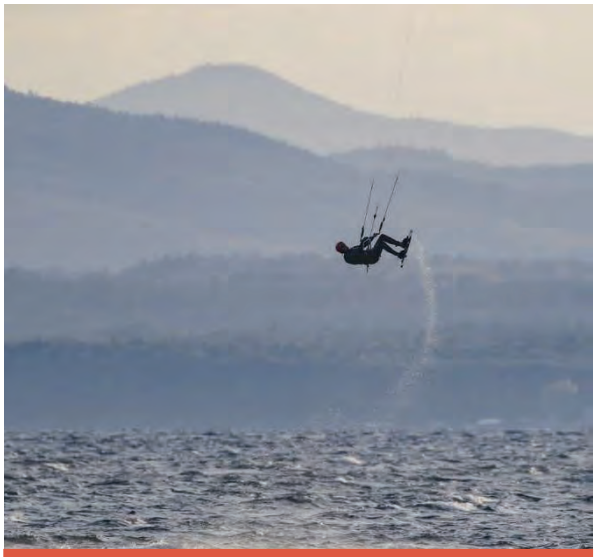


Figure 5.1 Parasailing in South Hero. Credit: Jared Katz



Figure 5.2 Volleyball in South Hero. Credit: South Hero Land Trust

11 Appendix III: South Hero Town Plan 2022 Survey

Northwest Regional Planning Commission

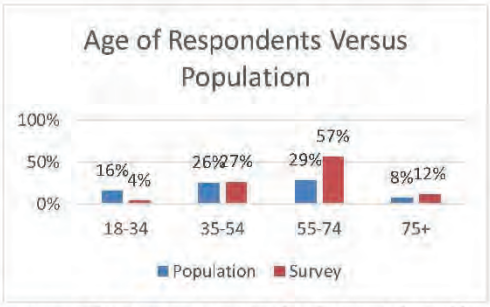
75 Fairfield Street • St. Albans, VT 05478-1850 • (802) 524-5958 • (800) 564-5958 • Fax (802) 527-2948

MEMORANDUM

To: South Hero Planning Commission
From: Emily Klofft- Regional Planner & Greta Brunswick-Senior Planner
Date: August 3, 2022
Subject: South Hero Town Plan Survey

Distribution and Response Rate

The survey was available online at the South Hero Town Plan website and via paper copy at the Town office. Residents were sent a postcard with a link to the survey and the survey was advertised on local social media platforms. Copies of and links to the survey where also provided at the June Community Cheers and Cheese event.



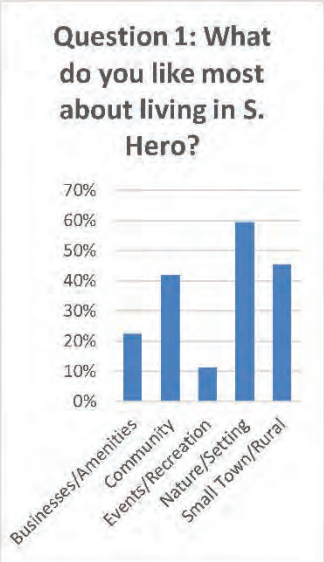
The survey received 207 responses. 162 responses were received from year-round residents, which represents 11.7% of the year-round adult population. 32 responses were received from seasonal residents. Adults ages 55-75 are significantly overrepresented by survey respondents, while adults ages 18-34 are underrepresented. No responses were received from residents under the age of 18. Renters are underrepresented, only 4% of survey respondents were renters despite rentals making up 15% of the housing stock. Results of the survey should be considered with this context, especially as it relates to issues that might most impact renters or younger residents.

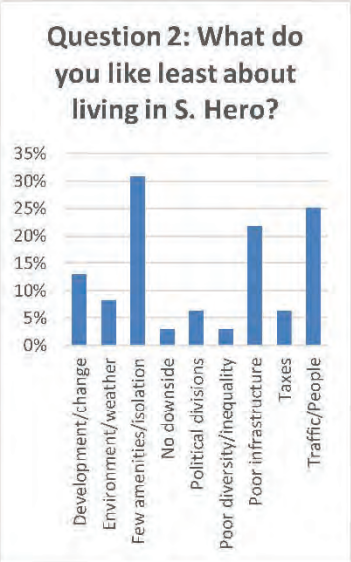
Respondents were distributed across South Hero, with 11% living in the Village Zoning District, 42% in the Rural Residential District and 34% in the Shoreland Zoning District. Roughly 40% of respondents were retired, 18% work in Chittenden County, 19% worked at home and 8% worked a hybrid schedule. 7% worked at businesses in South Hero and 2% were unemployed. Other respondents worked out-of-state, were homemakers or disabled.

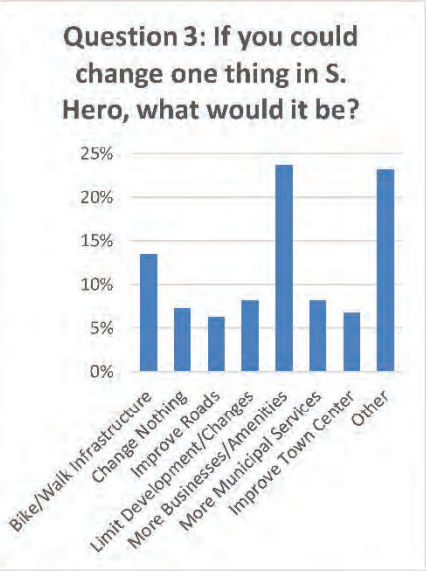
What Do You Think About South Hero?

When asked what they liked most about South Hero, common themes were the natural beauty of South Hero (59%), the small & rural nature of South Hero (45%) and the community of South Hero (42%). Common themes that respondents liked least include the lack of amenities/isolation (31%), traffic and crowds (25%), and poor infrastructure (22%). Respondents most wanted more businesses/amenities (24%) and to change pedestrian and bicycle infrastructure (14%).

Serving the municipalities of: Alburg T • Alburg V • Bakersfield • Berkshire • Enosburg Falls • Enosburg T • Fairfax • Fairfield • Fletcher • Franklin • Georgia • Grand Isle • Highgate • Isle La Motte • Montgomery • North Hero • Richford • St. Albans C • St. Albans T • Sheldon • South Hero • Swanton T • Swanton V





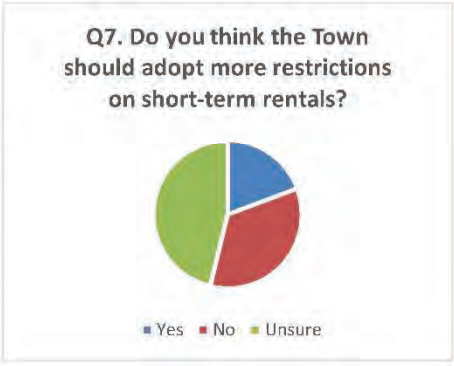


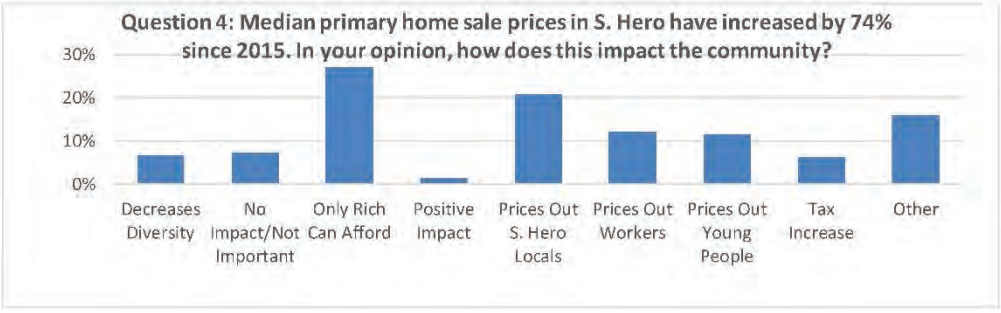
Housing & Transportation

Housing

When asked about the impact of home price increases, respondents were concerned about only wealthy people being able to afford homes (25%), as well as South Hero locals (21%), workers (12%) and young people (12%) being priced out. Only 7% of respondents did not feel it had an impact on the community. 34% of respondents were satisfied with housing options, while 30% were dissatisfied. 96% of respondents lived in single household homes, with 2% in ADUs and 1% in small apartment buildings.

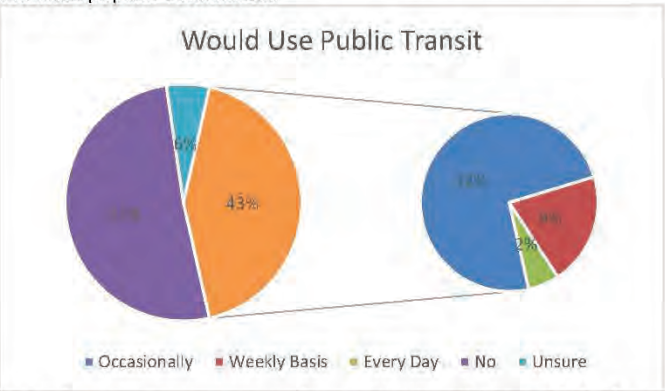
Respondents were divided on short-term rentals, with the plurality being unsure if they should be restricted (46%), while 19% believed they should be restricted and 35% believing they should not be restricted.





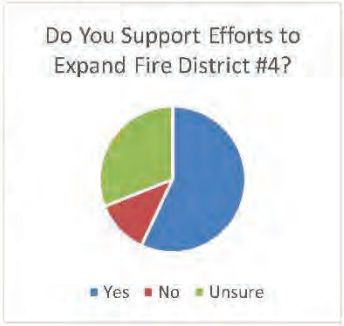
Public Transit

Roughly half of respondents would not use public transit, and a quarter were unsure. Of the half of respondents who stated they may would use public transit the most common reasons would be for appointments and transit connections. 68% would use public transit only occasionally, with just 5% stating they would use it every day. Mornings were the most popular departure time, and evenings were the most popular return time.



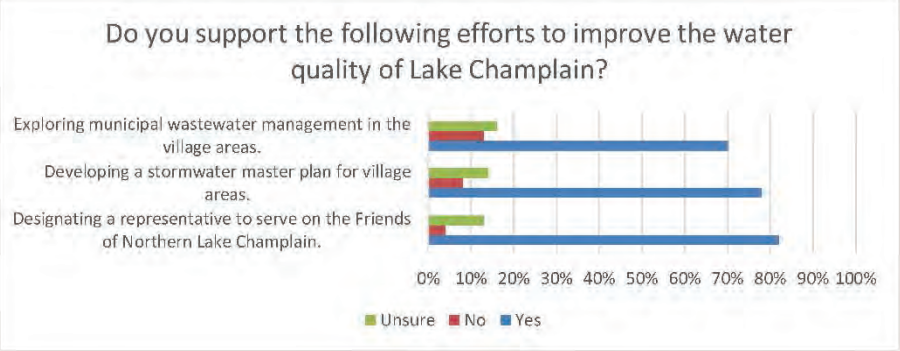
Note: Orange represents yes and unsure answers who provided a frequency of potential use answer in a later question.

Climate Change and Resilience



Just over half (57%) of respondents supported expanding Fire District #4, while 1/3 were unsure and 11% opposed such efforts.

Over 90% of respondents supported efforts to improve the water quality of Lake Champlain. Efforts to do so were supported by most, including designating a representative to serve on the Friends of Northern Lake Champlain (82%), developing a stormwater master plan for village areas (78%), and exploring municipal wastewater management in the village areas (70%).



3

Recreation and Recreation Economy

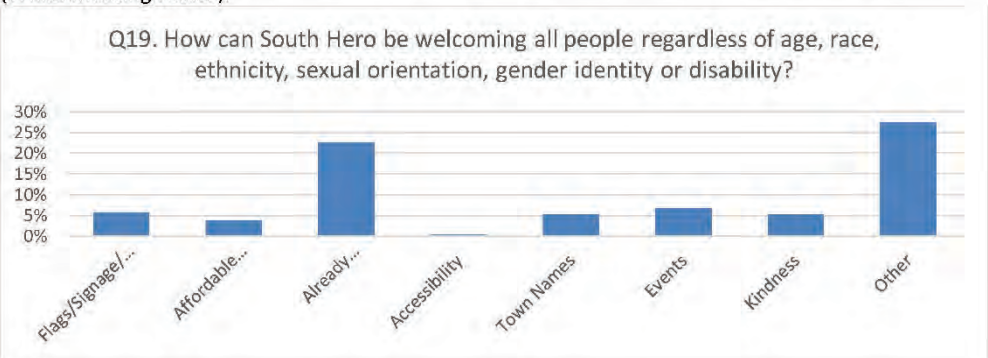
When asked what would help bicyclists be more safe and comfortable on South Hero's roads, the most common responses were wider shoulders & bike lanes (41%), and a bike path (19%). Respondents particularly identified South Street as too narrow to be safe, and many bike path suggestions were aimed at moving bike traffic off Route 2, South Street or Route 314. In regards to an open-ended question about the role of bike-centric tourism, 22% of respondents specifically stated support for it, with 16% noting it was a benefit to local businesses. 5% of respondents specifically stated they did not support bike tourism, and 6% believed it needed to be better planned or controlled. Roughly 80% of respondents stated they would use a multi-use recreation path.





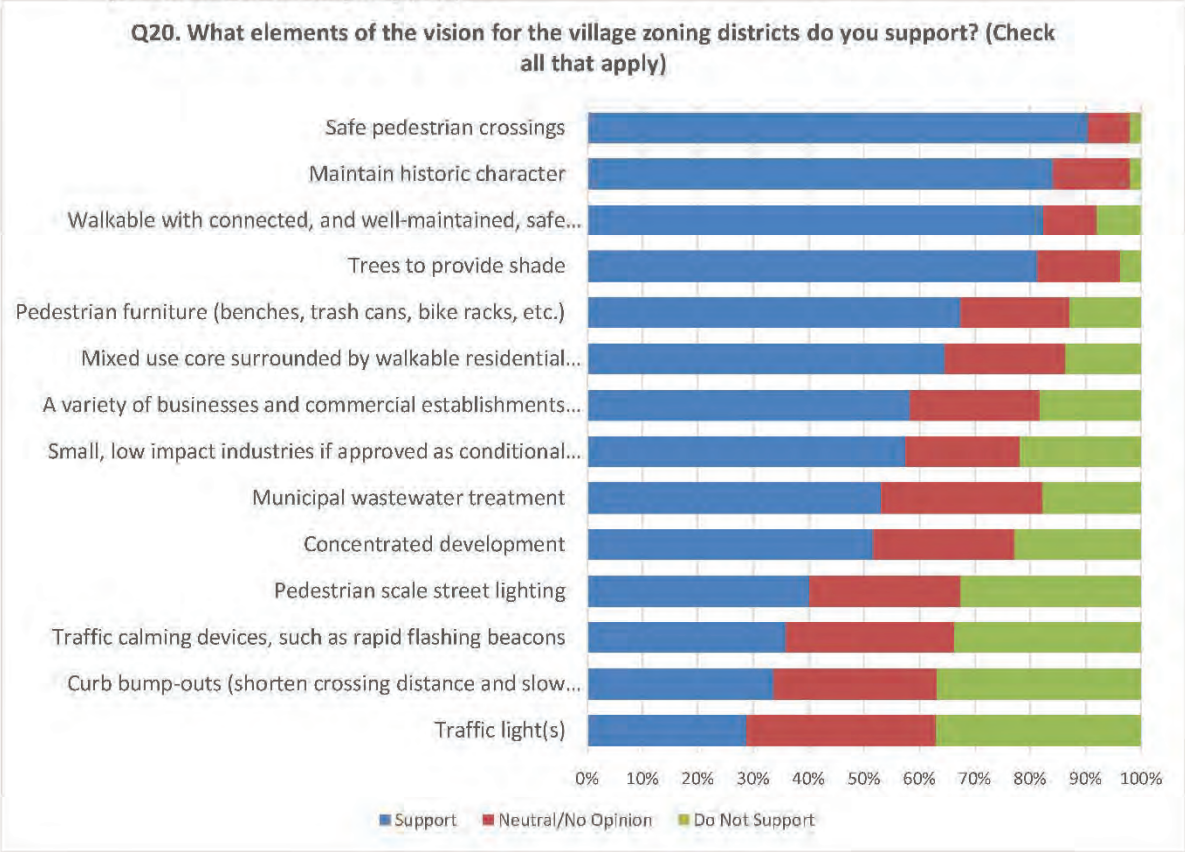
Equity and Inclusion

Roughly one-quarter of all respondents stated they felt South Hero was already welcoming to all people. Common ideas for making the community more welcoming included flags/signage/art (6%), diverse events (7%), and a culture of kindness (5%). 5% of respondents specifically mentioned changing the names of South Hero's municipally-owned beach (White's Beach) and the South Hero Meeting House (White Meeting House).



Vibrant Villages

Most elements of the village zoning district statement received at least 50% support from respondents. The most popular elements were: safe pedestrian crossings (90%), maintain historic character (84%), and walkable with connected, and well-maintained safe sidewalks (83%). Four elements received less than 50% support: traffic lights (29%), curb bump-outs (34%), traffic calming devices (36%) and pedestrian scale street lighting (40%).



Other Comments

10% of respondents used this space to state that they did not want to see any changes or increased density in South Hero. 8% had comments about town infrastructure.

APPENDIX G – SEWAGE DISPOSAL

Vermont Agency of Natural Resources

Vermont Agency of Natural Resources

vermont.gov



LEGEND

Soils - DEC On Site Sewage D

- IIIa
- IIIb
- IIIc
- IIId
- IIIe
- IIIf
- IIa
- IIb
- IIc
- IId
- IIe
- IIf
- IIg
- IIh
- IVa
- IVb
- IVc
- IVd
- Ia
- Ib
- Ic
- Id
- V

Parcels (standardized)

Roads

- Interstate

NOTES

Map created using ANR's Natural Resources Atlas

1: 24,000

March 31, 2022

4,000.0 0 2,000.00 4,000.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 2000 Ft. 1cm = 240 Meters

© Vermont Agency of Natural Resources

THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

2008 SOIL SUITABILITY GROUPS FOR SOIL-BASED RESIDENTIAL WASTEWATER DISPOSAL SYSTEMS IN VERMONT

USDA Natural Resources Conservation Service
Colchester, Vermont
Revised January 2008

The purpose of this report is to provide updated information on the suitability of the soils in Vermont for soil-based residential wastewater disposal systems, based on the 2007 Vermont Environmental Protection Rules (1). This report replaces the publication, "Ancillary Soil Interpretation Ratings for On-site Sewage Disposal in Vermont," published in January, 1997, by the Natural Resources Conservation Service (NRCS) (2). It updates the NRCS soil suitability ratings based on the 2002 Vermont Environmental Protection Rules (3).

NRCS has produced soil maps for every county in Vermont. (The soil mapping in Essex County is currently in progress.) Along with the soil maps, general information on the behavior of soil map units for various uses is provided by NRCS. In this report, the soil properties that affect soil-based wastewater disposal suitability and design have been compared to regulations set forth in the 2007 State of Vermont Environmental Protection Rules for wastewater systems. This review has led to a set of ancillary soil interpretations for soil-based residential wastewater disposal systems, with the soil map units in Vermont separated into five general suitability groups and then further separated into various subgroups.

Included in soil-based wastewater disposal systems are leachfields, also known as absorption beds or trenches and mound systems, in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. There must be unsaturated soil beneath the leachfield to filter the effluent effectively. Unsatisfactory performance, including surfacing of wastewater or it backing up into buildings and other structures or direct discharge of effluent into surface waters, can affect public health.

ASSUMPTIONS AND LIMITATIONS OF THIS REPORT

The ratings in this report are based on the installation of a new septic system for a new single-family home on a lot subdivided on or after June 14, 2002. Lots subdivided before June 14, 2002, have a 30% slope limitation, rather than the 20% slope limitation that these ratings are based on. The ratings do not necessarily apply to the siting of a replacement system for an existing residence. This report does not consider other site factors, such as wellhead and source protection areas, watershed classification, isolation distances and the size of the parcel, all of which can affect placement of wastewater disposal systems. The ratings are based on minimum site conditions set forth for prescriptive and enhanced prescriptive designs.

This report is intended for general planning purposes only and is not intended to replace or supersede an on-site soil investigation by a state-licensed designer or professional engineer. These ratings apply only to land within the State of Vermont.

SOIL RATINGS FOR SOIL-BASED RESIDENTIAL WASTEWATER DISPOSAL SYSTEMS

The five interpretive suitability groups and their subgroups are briefly described in this section. The rating symbols are based on the subgroup. A rating of **Ia** through **Id** indicates that soil properties and site features are well suited for soil-based wastewater disposal systems and good performance and low maintenance can be expected; a rating of **IIa** through **IIh** indicates that soil properties and site features are moderately suited for soil-based wastewater disposal systems and one or more soil properties or site features, such as the percent slope, make the soil less desirable than the soils rated well suited; a rating of **IIIa** through **IIIg** indicates that one or more soil properties or site features are marginally suited for soil-based wastewater disposal systems and overcoming those limitations requires special design, extra maintenance, or costly alteration; a rating of **IVa** through **IVd** indicates that the soil map unit is generally not suited for soil-based wastewater disposal systems. A rating of **V** indicates that the map unit is not rated.

I - Well Suited. This group is composed of coarse textured, sandy and gravelly glacial outwash soil map units with rapid to very rapid permeability in the substratum and well drained glacial till soil map units with a friable substratum with moderate permeability on slopes generally less than 20 percent. Some map units have slopes greater than 20 percent in some areas.

Ia - soil map units with rapid permeability and slopes less than 20 percent.

Ib - soil map units with rapid permeability and a slope range that includes some areas with slopes greater than 20 percent.

Ic - soil map units with moderate permeability and slopes less than 20 percent.

Id - soil map units with moderate permeability and a slope range that includes some areas with slopes greater than 20 percent.

II - Moderately Suited. This group is composed of several distinct types of soil map units: 1) map units of soils with moderately slow to very slow permeability, 2) map unit complexes with moderate depth to bedrock, with one or more soil underlain by bedrock within 40 inches, 3) map units of soil series listed in Group I, but with a slope range greater than 20 percent, and 4) map units of soils that have a seasonal high water table at moderate depths, generally at a depth of one-and-a-half feet or deeper.

IIa - soil map units with moderately slow to very slow permeability and slopes less than 20 percent.

IIb - soil map units with moderately slow to very slow permeability and a slope range that includes some areas with slopes greater than 20 percent.

IIc - soil map units with moderate depth to bedrock, within 40 inches in some areas, and slopes less than 20 percent.

IId - soil map units with moderate depth to bedrock, within 40 inches in some areas, and a slope range that includes some areas with slopes greater than 20 percent.

IIe - soil map units with rapid permeability and steep slopes, having a slope range greater than 20 percent.

IIf - soil map units with moderate permeability and steep slopes, having a slope range greater than 20 percent.

IIg - soil map units previously assigned to this subgroup have been re-assigned to IIIg in this revision.

IIh - soil map units with moderate depth to a seasonal high water table, generally at a depth of one-and-a-half feet or deeper, and slopes less than 20 percent.

III - Marginally Suited. This group is composed of soil map units that have a greater degree of limitations than Group II. They may require more intensive on-site investigations to locate suitable areas or they may require more sophisticated designs to overcome the limitations. Soil map units with a shallow seasonal high water table may require seasonal on-site monitoring of the water table to determine if the site is suitable. Some areas of these soil map units may not be suited for soil-based wastewater disposal systems.

IIIa - soil map units with marginal depth to bedrock, within 10 inches in some areas. Some map units are limited by a slope range that includes some areas with slopes greater than 20 percent.

IIIb - soil map units with a flooding hazard and a moderate depth to a seasonal high water table.

IIIc - soil map units with marginal depth to a seasonal high water table, generally at a depth of one foot or less, and slopes less than or equal to 8 percent.

IIId - soil map units with marginal depth to a seasonal high water table, generally at a depth of one foot or less, and slopes between 8 percent and less than or equal to 20 percent.

IIIe - soil map units with a seasonal high water table at a depth generally between zero and two feet and a slope range that includes some areas with slopes greater than 20 percent.

IIIf - soil map units with a seasonal high water and limited depth to bedrock. Areas of these map units may be limited by either the depth to the seasonal high water table or the depth to bedrock. Some map units are limited by a slope range that includes some areas with slopes greater than 20 percent.

IIIg – soil map units with a flooding hazard.

IV – Generally Not Suited. This group is composed of soil map units that are typically too wet, rocky, steep or otherwise generally not suited for use in soil-based wastewater disposal systems.

IVa - soil map units generally not suited due to excessive wetness.

IVb - soil map units generally not suited due to limited depth to bedrock and steep slopes, having a slope range entirely greater than 20 percent.

IVc - soil map units generally not suited due to very limited depth to bedrock on moderate slopes.

IVd - soil map units generally not suited due to moderately slow to very slow permeability and steep slopes, having a slope range entirely greater than 20 percent. Some map units have a seasonal high water table.

V - Not Rated. This group is composed of miscellaneous map units that been filled, excavated, re-graded or otherwise disturbed by human activities. They have a wide range of soil properties and require on-site investigations to determine their suitability for most uses, including soil-based wastewater disposal systems. Also included are areas mapped at a higher level of Soil Taxonomy than the soil series level. These areas also have a wide range of soil properties and require on-site investigations to determine their suitability for most uses, including soil-based wastewater disposal systems. Finally, also included are areas mapped as Water.

GENERAL NARRATIVES FOR SUBGROUPS

These narrative paragraphs are intended for use by consultants, planners, and others, in any report based on these ancillary ratings. The term "unit" refers to a soil map unit or a grouping of soil map units that are singularly or collectively assigned to each subgroup. The first sentence is a statement of suitability. The second sentence is a statement of limitations. The remaining text provides more information and discusses how limitations may be addressed and overcome.

Ia. This unit is well 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. The rapid permeability in the substratum is a concern. Backfilling absorption trenches with at least one foot of finer textured material or other site modifications may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent.

Ib. This unit is well 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. The rapid permeability in the substratum and slopes greater than 20 percent in some areas are concerns. Backfilling absorption trenches with at least one foot of finer textured material or other site modifications may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

Ic. This unit is well 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. With moderate permeability and slopes less than 20 percent, there are few limitations.

Id. This unit is well 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. Slopes greater than 20 percent in some areas are a concern. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIa. This unit is moderately 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. The slow permeability in the substratum is the primary concern. Mound system construction and other site modifications may be necessary.

IIb. This unit is moderately 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. The slow permeability in the substratum and slopes greater than 20 percent in some areas are the primary concerns. Mound system construction and other site modifications may be necessary. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIc. This unit is moderately 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. The depth to bedrock in some areas is the primary concern. A significant percentage of this map unit has sufficient soil depth over bedrock to accept a range of designs. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock.

IId. This unit is moderately 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. The depth to bedrock and slopes greater than 20 percent in some areas are the primary concerns. A significant percentage of this map unit has sufficient soil depth over bedrock to accept a range of designs. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIe. This unit is moderately 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. The rapid permeability in the substratum and slopes greater than 20 percent are the primary concerns. Backfilling absorption trenches and beds with at least one foot of finer textured material, or other site modifications, may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent. Cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIf. This unit is moderately 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. Slopes greater than 20 percent are the primary concern. Cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIg. (Deleted - see narrative for IIIg.)

IIh. This unit is moderately 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. The depth to the seasonal high water table is the primary concern. Mound system construction and other site modifications are often necessary. On sloping sites, curtain drains can help lower the water table to an acceptable level. In some cases, a detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit.

IIIa. This unit is marginally 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. The depth to bedrock is the major limitation. On-site investigations are needed to locate areas with sufficient soil depth. A significant percentage of the soils in this unit are less than 18 inches to bedrock and are not suitable as a site. However, there may be deeper areas that are suitable. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock.

IIIb. This unit is marginally 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. The hazard of flooding and the depth to the seasonal high water table are the major limitations. This unit is on floodplains and typically includes land in the floodway and the special flood hazard area. Consult flood hazard maps prepared by the Federal Emergency Management Agency (FEMA) in local town offices for more information. Wastewater systems must be located, designed and constructed in a manner that avoids impairment to the system and contamination from the system due to flooding. A detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit. Mound system construction and other site modifications are often necessary.

IIIc. This unit is marginally 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. The depth to the seasonal high water table in association with the minimal slope is the major limitation. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level, however, the minimal slope may prevent their use in many areas.

IIId. This unit is marginally 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. The depth to the seasonal high water table is the major limitation. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level.

IIIe. This unit is marginally 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. The depth to the seasonal high water table and slopes greater than 20 percent in some areas are the major limitations. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIIf. This unit is marginally 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. The depth to the seasonal high water table and the restricted depth to bedrock in some areas are the major limitations. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock. A detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit. Mound system construction and other site modifications are often necessary. On sloping sites, curtain drains can help lower the water table to an acceptable level.

IIIg. This unit is marginally 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. The hazard of flooding is the major limitation. This unit is on floodplains and typically includes land in the floodway and the special flood hazard area. Consult flood hazard maps prepared by the Federal Emergency Management Agency (FEMA) in local town offices for more information. Wastewater systems must be located, designed and constructed in a manner that avoids impairment to the system and contamination from the system due to flooding.

IVa. 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. Excessive soil wetness in association with the minimal slope is the limiting condition. Prolonged periods of saturation at or near the soil surface do not allow for the proper functioning of septic systems.

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.

IVc. 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. The very shallow to shallow depth to bedrock is the limiting condition.

IVd. 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 slowly permeable substratum is the limiting condition. Cut and fill site modifications that reduce the slope gradient are not generally effective due to the slowly permeable substratum.

V. This unit is not rated as a site for soil-based residential wastewater disposal systems. Due to the variable nature of the soils, on-site investigations are needed to determine their suitability.

CONTACT INFORMATION

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Colchester, VT 05446
802-951-6795, ext. 236
stephen.gourley@vt.usda.gov

CORRECT CITATION

USDA, NRCS. January, 2008. 2008 Soil Suitability Groups for Soil-based Residential Wastewater Disposal Systems in Vermont. Soil Survey Staff. Colchester, VT.

REFERENCES

1. State of Vermont, Agency of Natural Resources. September 29, 2007. Environmental Protection Rules, Chapter 1, Wastewater System and Potable Water Supply Rules. Wastewater Management Division, Department of Environmental Conservation. Waterbury, VT. 164 pgs.

2. USDA, NRCS. January, 1997. Ancillary Soil Interpretation Ratings for On-site Sewage Disposal in Vermont. Winooski, VT. 64 pgs.

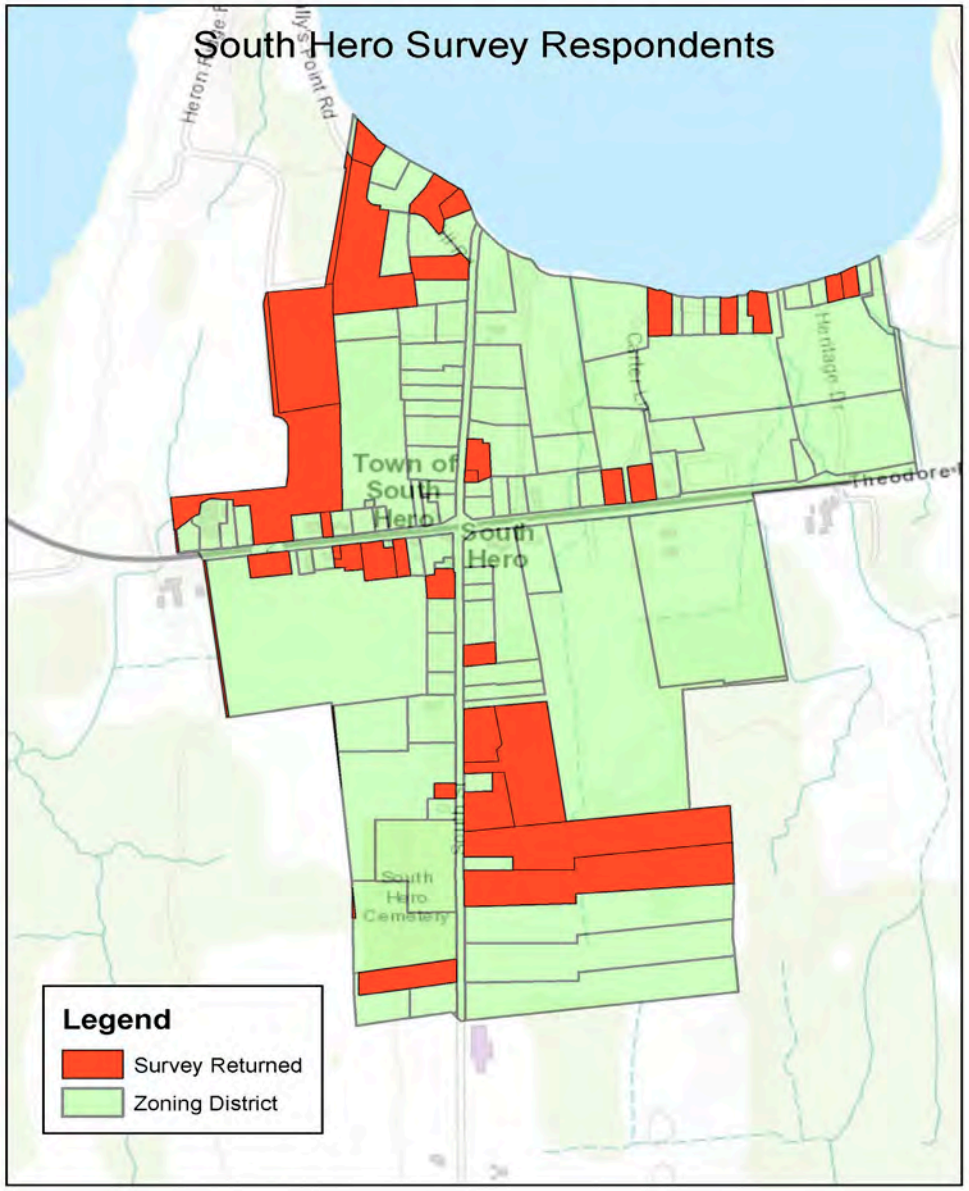
3. USDA, NRCS. July, 2004. 2003 Ancillary Soil Ratings for Residential On-site Waste Disposal in Vermont. Soil Survey Staff. Colchester, VT.

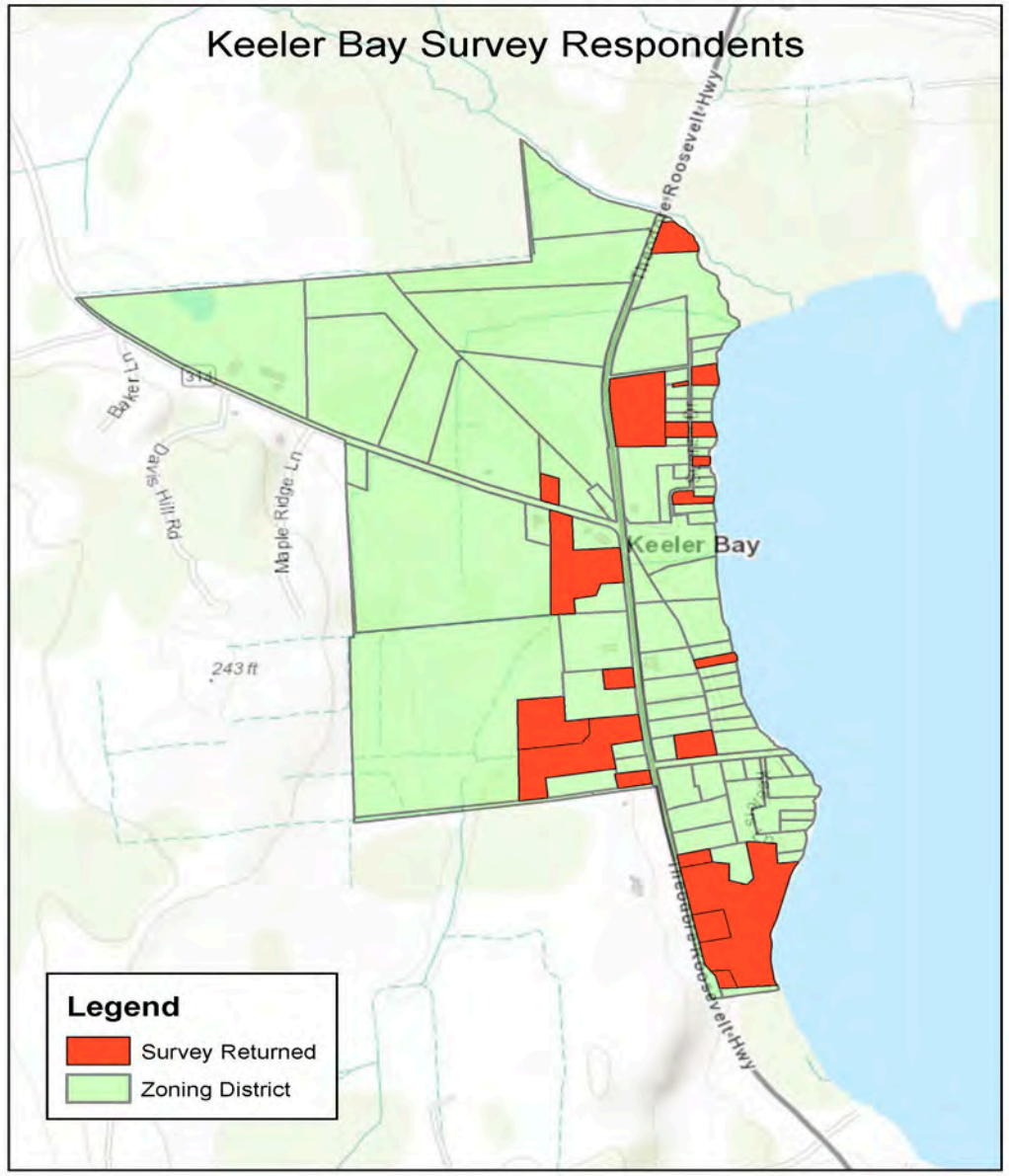
APPENDIX H – SURVEY RESPONSES OVERVIEW

Survey Responses Overview

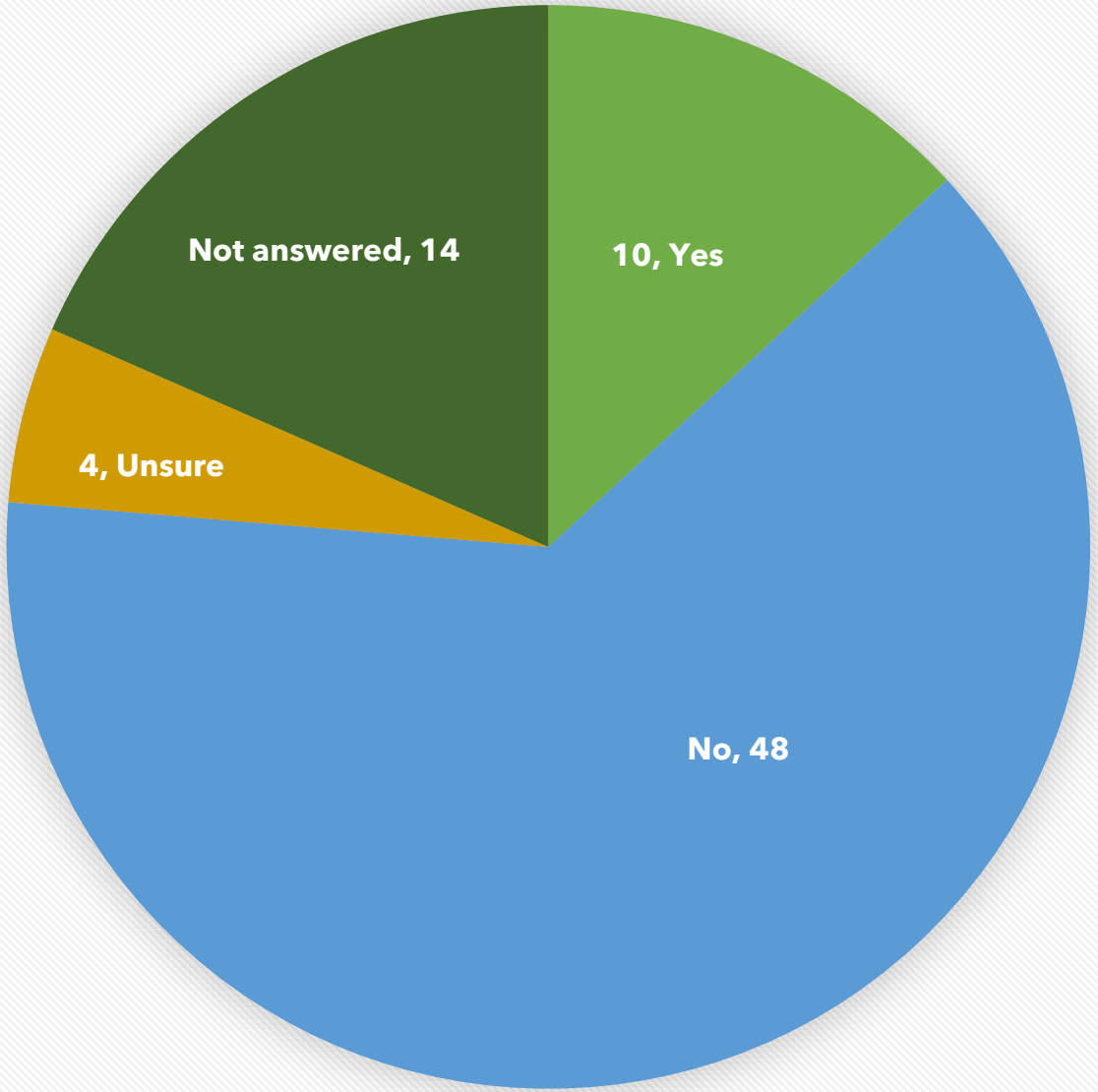
Overview of Survey Participants

- **76 total respondents**
- *33 Respondents via Survey Monkey link*
- *43 Respondents mailed in their survey*
- **65 respondents reported being within the study area**
- *5 reported being outside of it, and 6 were unsure*
- **64 respondents reported residential property use**
- *11 respondents reported commercial use*
- *7 respondents reported vacant land or did not want to answer.*

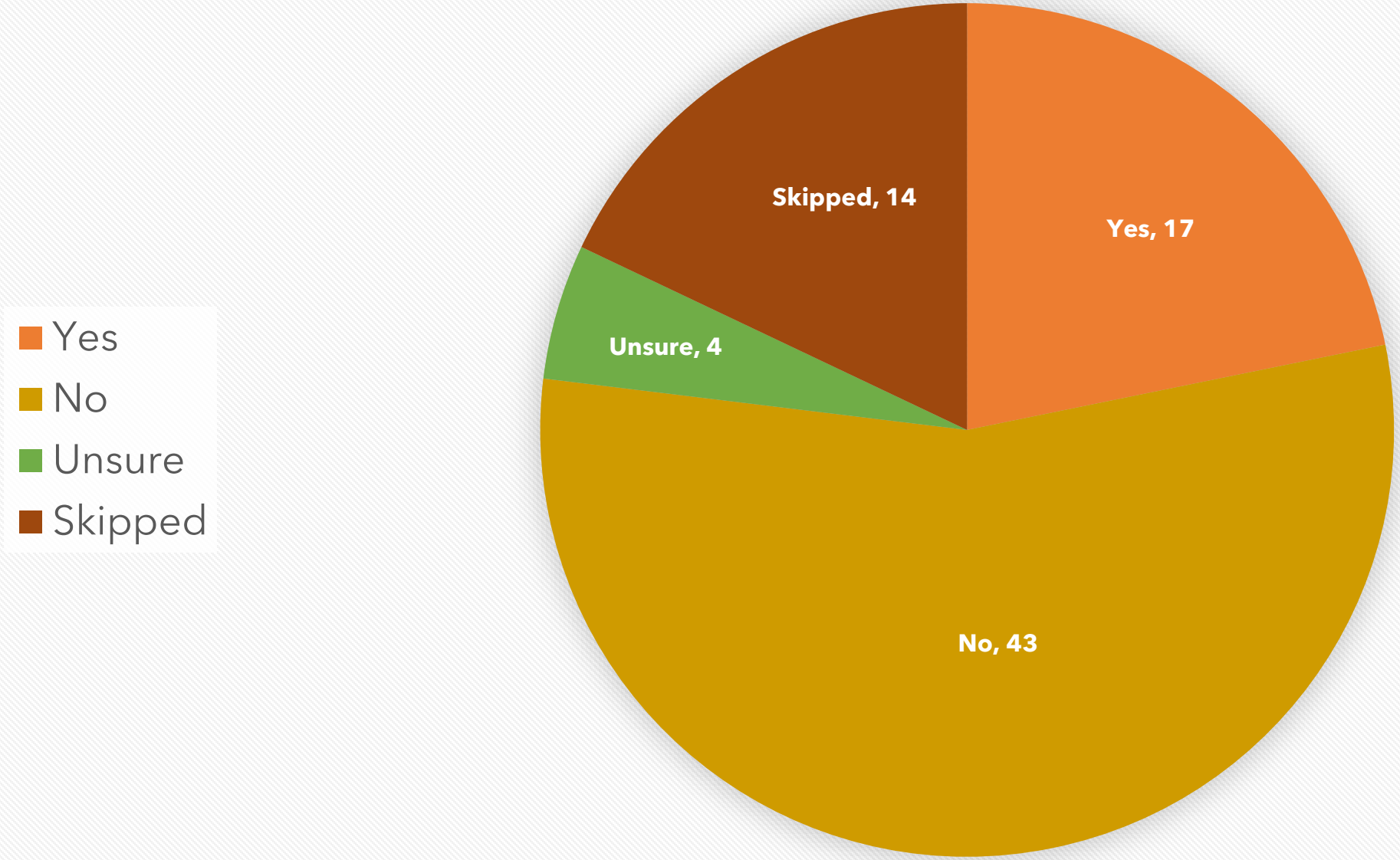

South Hero Survey Respondents
Town of South Hero
South Hero
South Hero Cemetery
Legend
Survey Returned
Zoning District

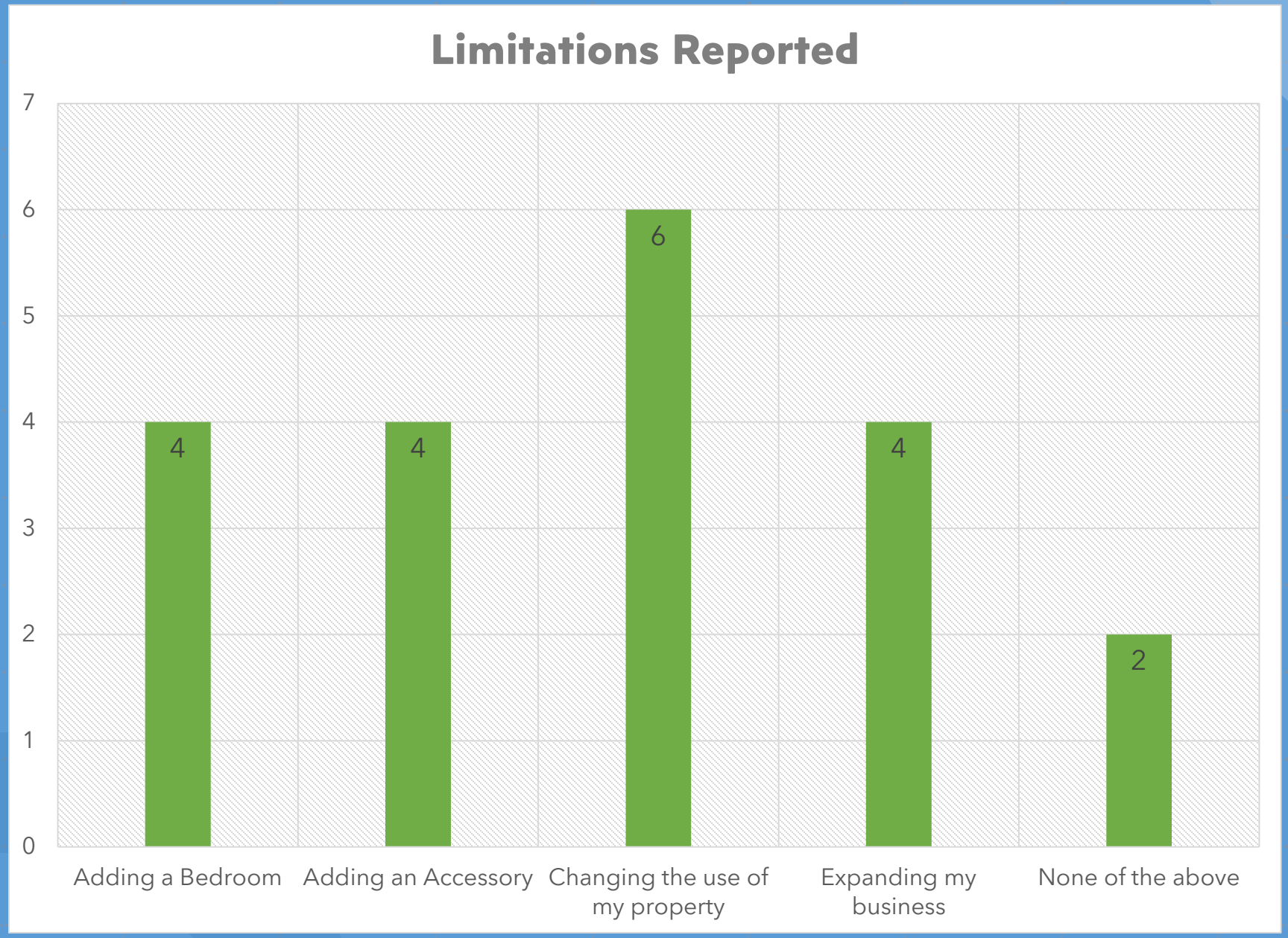

Keeler Bay Survey Respondents
Keeler Bay
Maple Ridge Ln
243 ft
Legend
Survey Returned
Zoning District

Have you had any issues with your watewater system?



Has your wastewater system limited the use of your property?

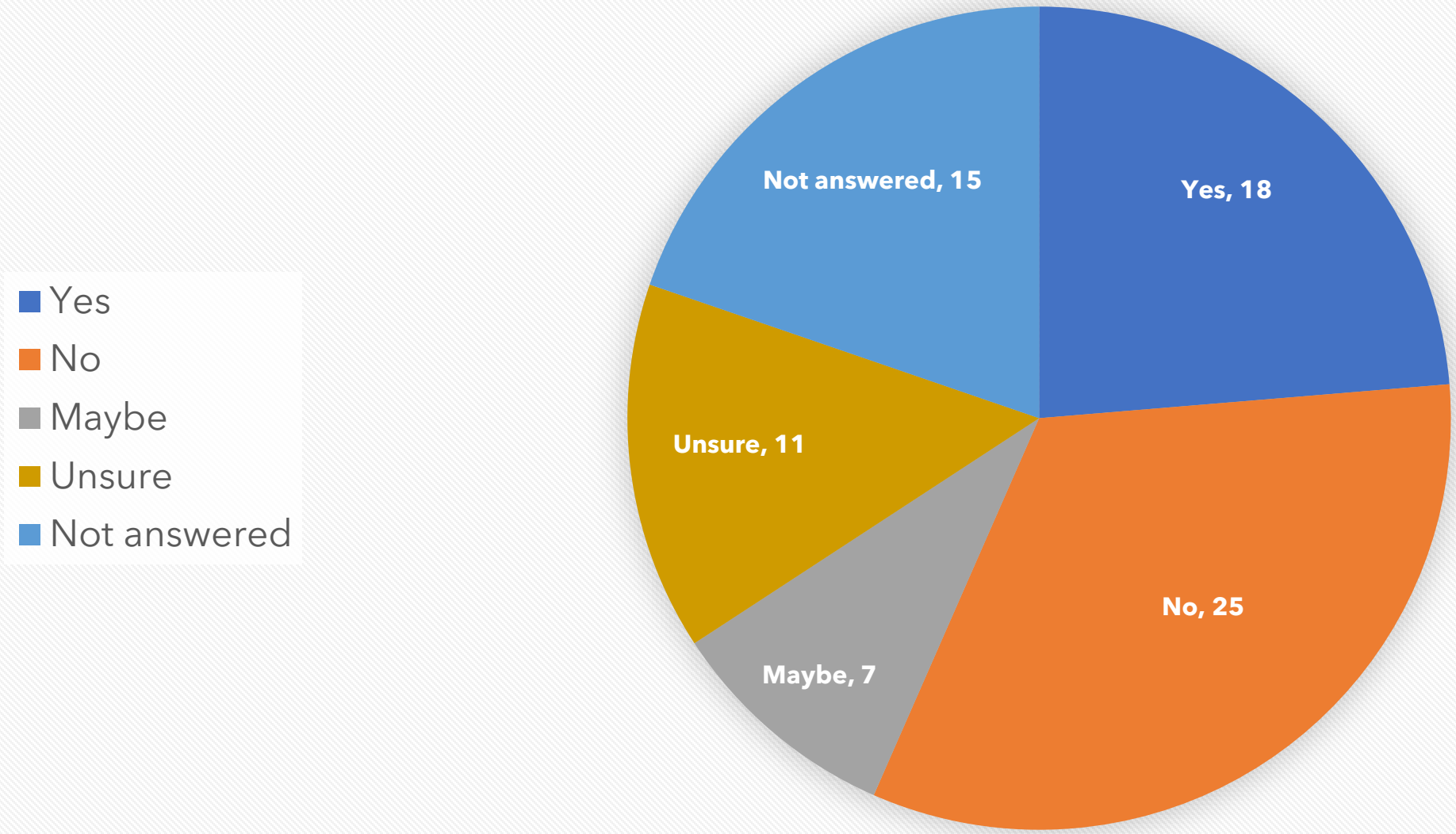




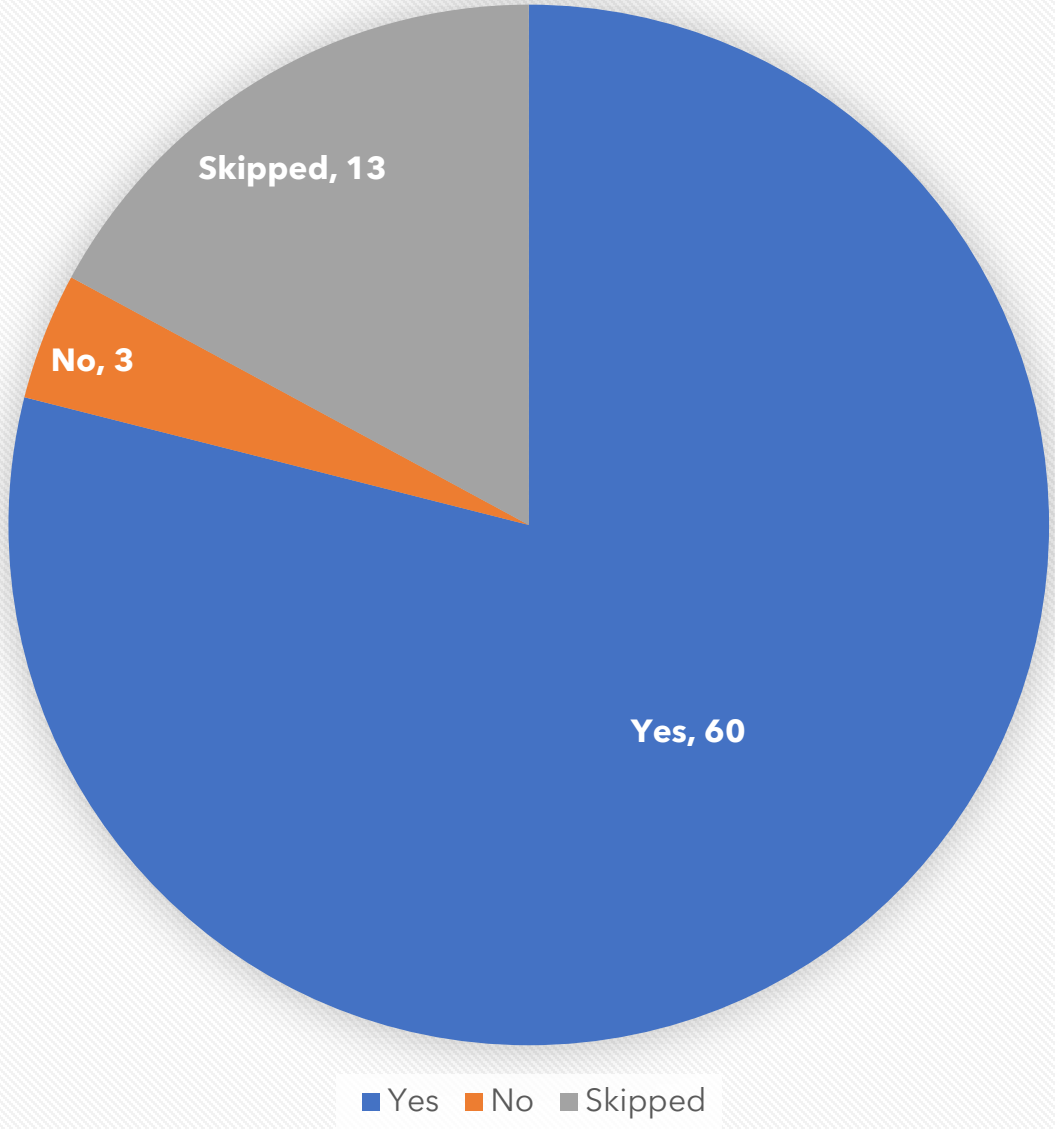
Additional comments on property limitations included:

- Must be conservative about guests
- Future development is limited
- Would have to give up bedrooms to convert home to full time use on current septic.
- Backyard use is limited/floods.

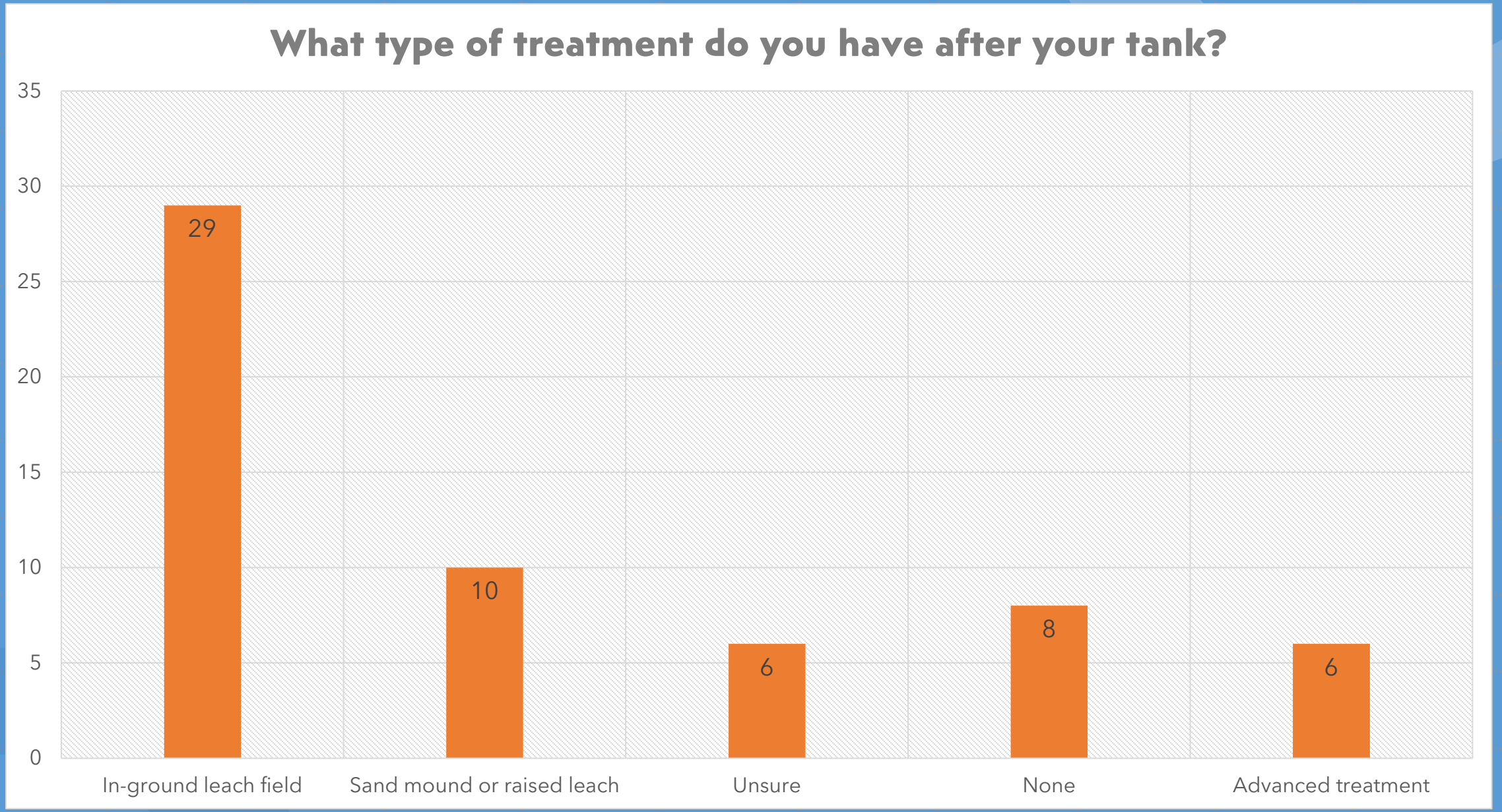
Would a better wastewater system, such as additional septic system capacity, benefit you or your business?



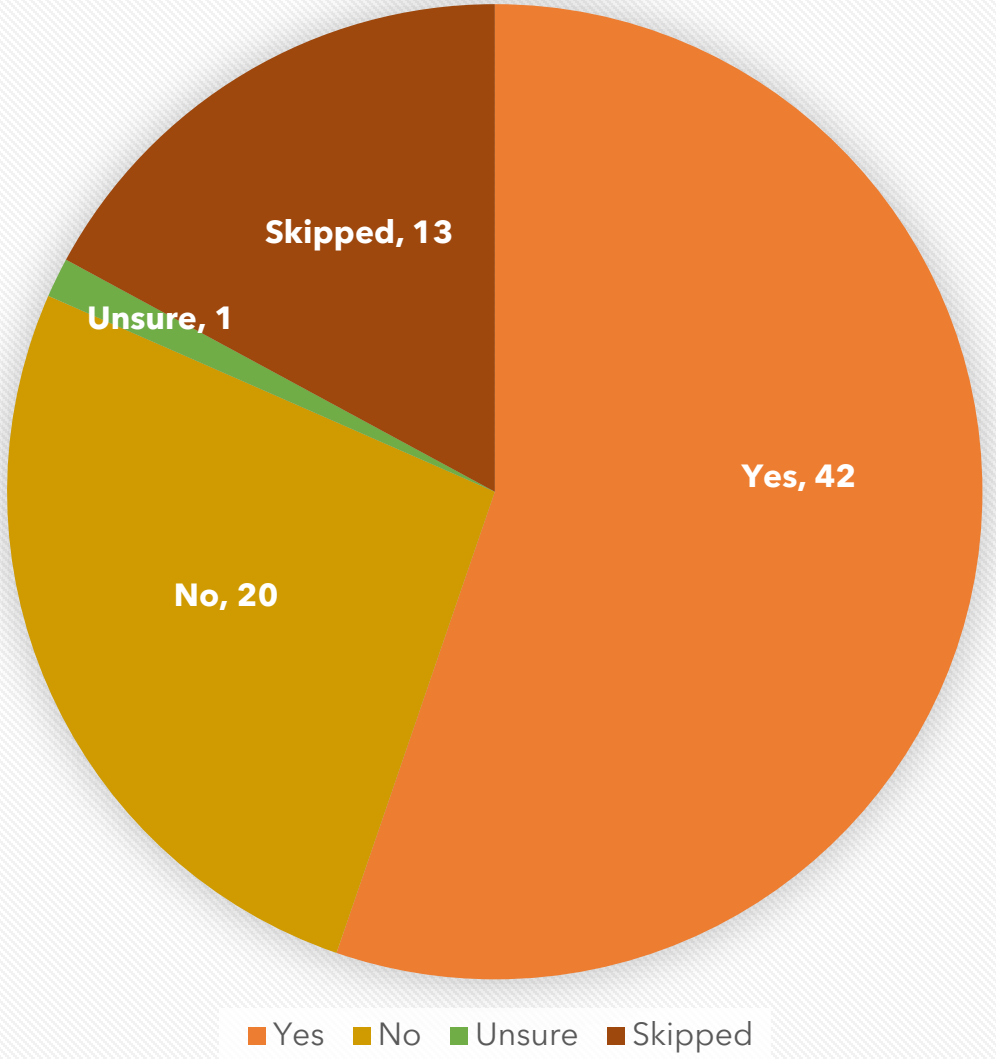
Do you have a septic system?



What type of treatment do you have after your tank?

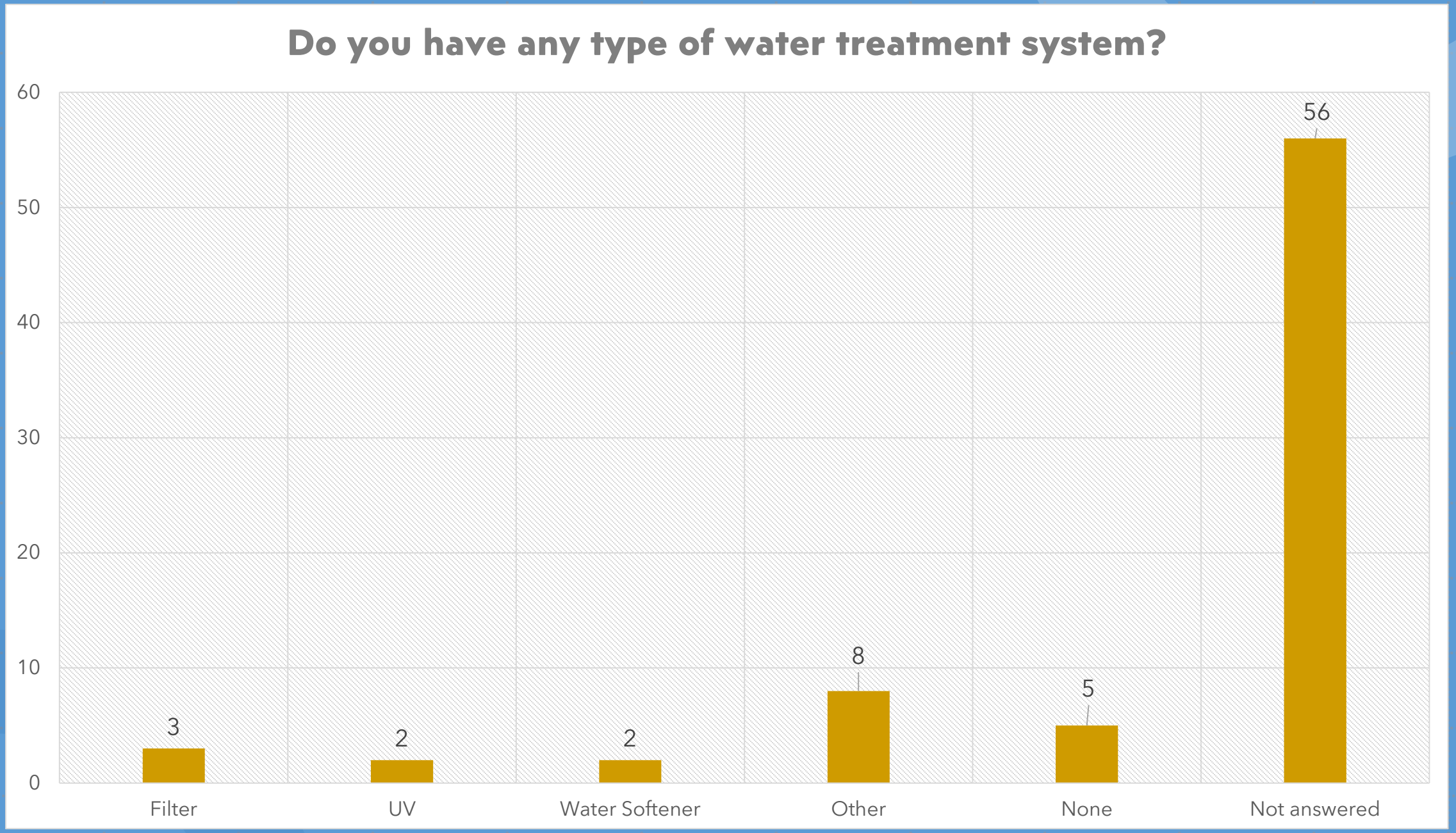


Is your water supply served by the South Hero Fire District #4?



Note: Of the 20 respondents who said no, 6 respondents reported using lake water as drinking water supply.

Do you have any type of water treatment system?

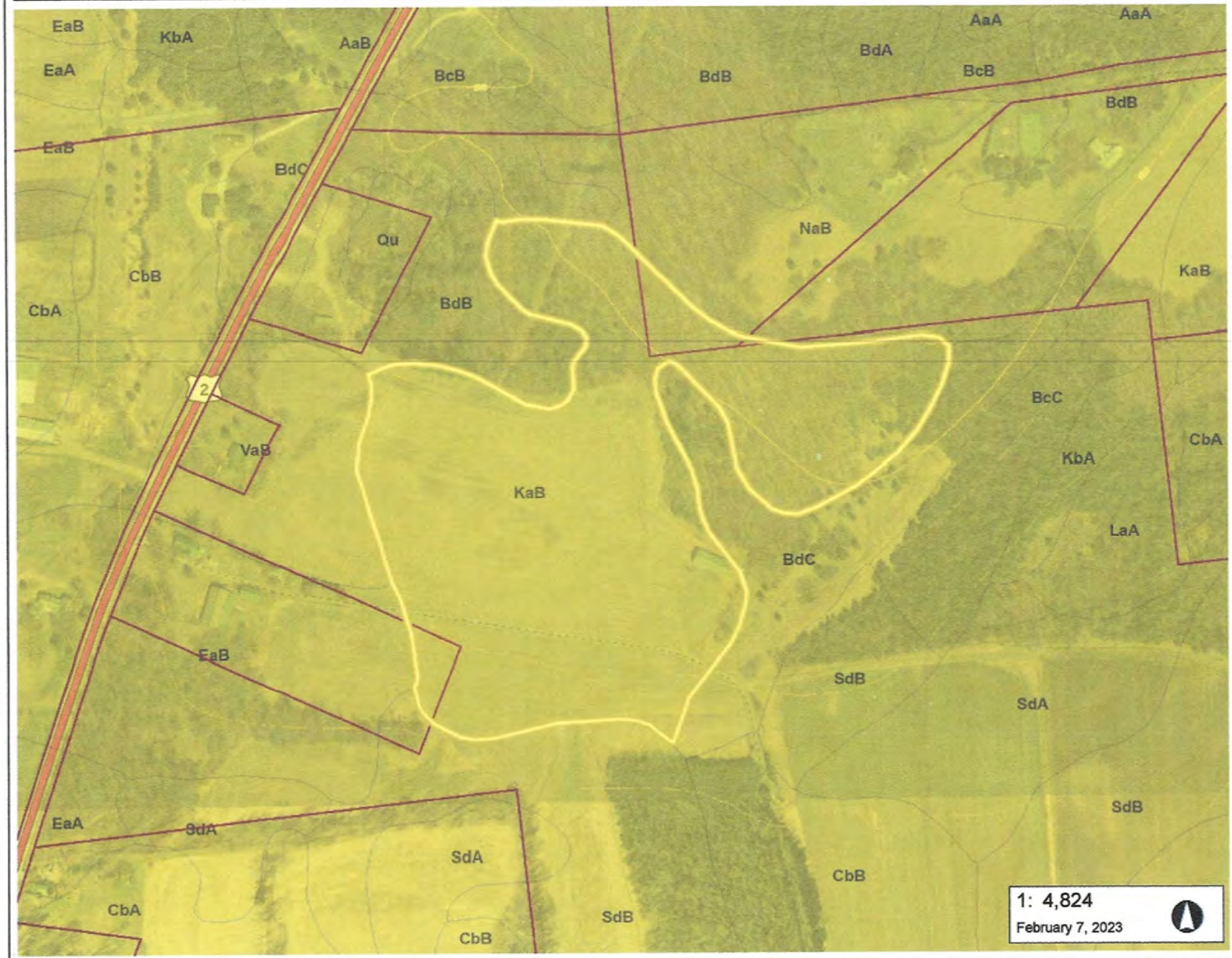


APPENDIX I – DESKTOP SOIL ANALYSIS

South Hero Village WW Study

Vermont Agency of Natural Resources

vermont.gov





LEGEND

Soils

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

Parcels (standardized)

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

Area 1
Drawing 1 A

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 402 Ft. 1cm = 48 Meters

© Vermont Agency of Natural Resources

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DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

NOTES

Parcels, Topography, Soil types

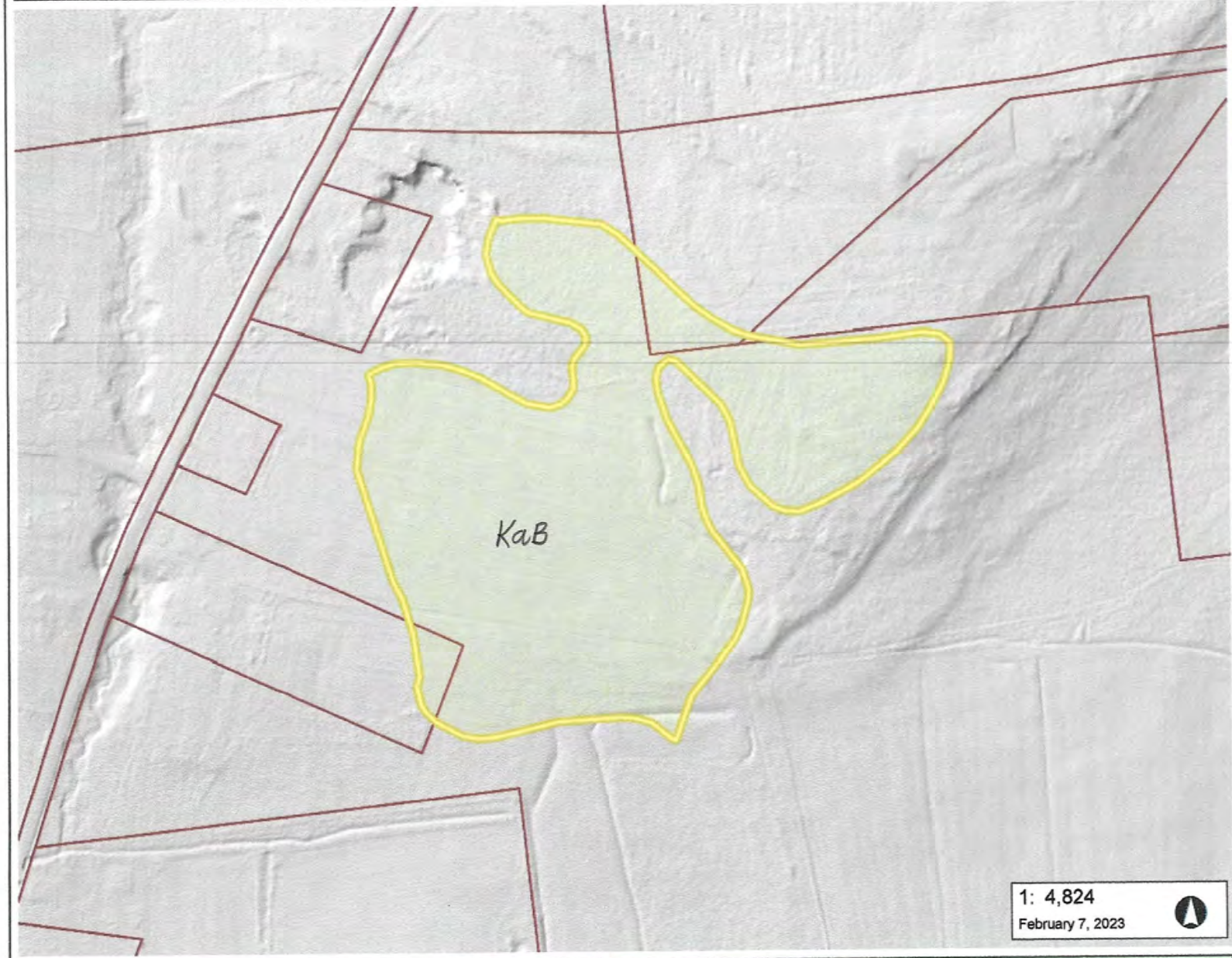
KaB, Kars fine sandy loam, 3-8% slopes

VERMONT

South Hero Village WW Study

Vermont Agency of Natural Resources

vermont.gov





LEGEND

- Parcels (standardized)
- Town Boundary

Area 1
Drawing 1 B

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 402 Ft. 1cm = 48 Meters

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NOTES

Parcels, Lidar Hillshade

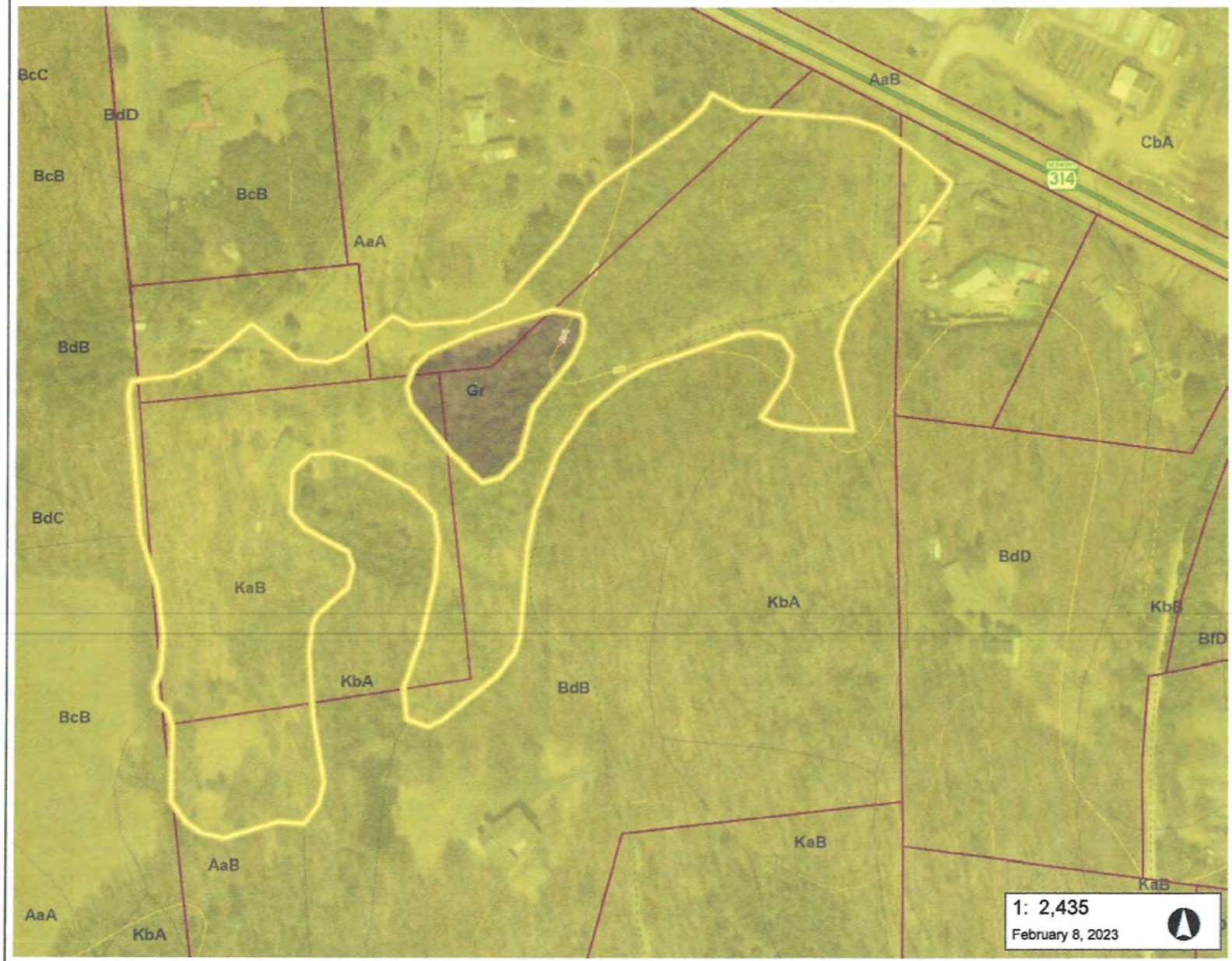
KaB, Kars fine sandy loam, 3-8% slopes

VERMONT

South Hero Village WW Study

Vermont Agency of Natural Resources

vermont.gov





LEGEND

Soils

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

Parcels (standardized)

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

Area 2
Drawing 1A

NOTES

Parcels, Topography, Soil Types

KaB, Kars fine sandy loam, 3-8% slopes

406.0 0 203.00 406.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 203 Ft. 1cm = 24 Meters

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THIS MAP IS NOT TO BE USED FOR NAVIGATION

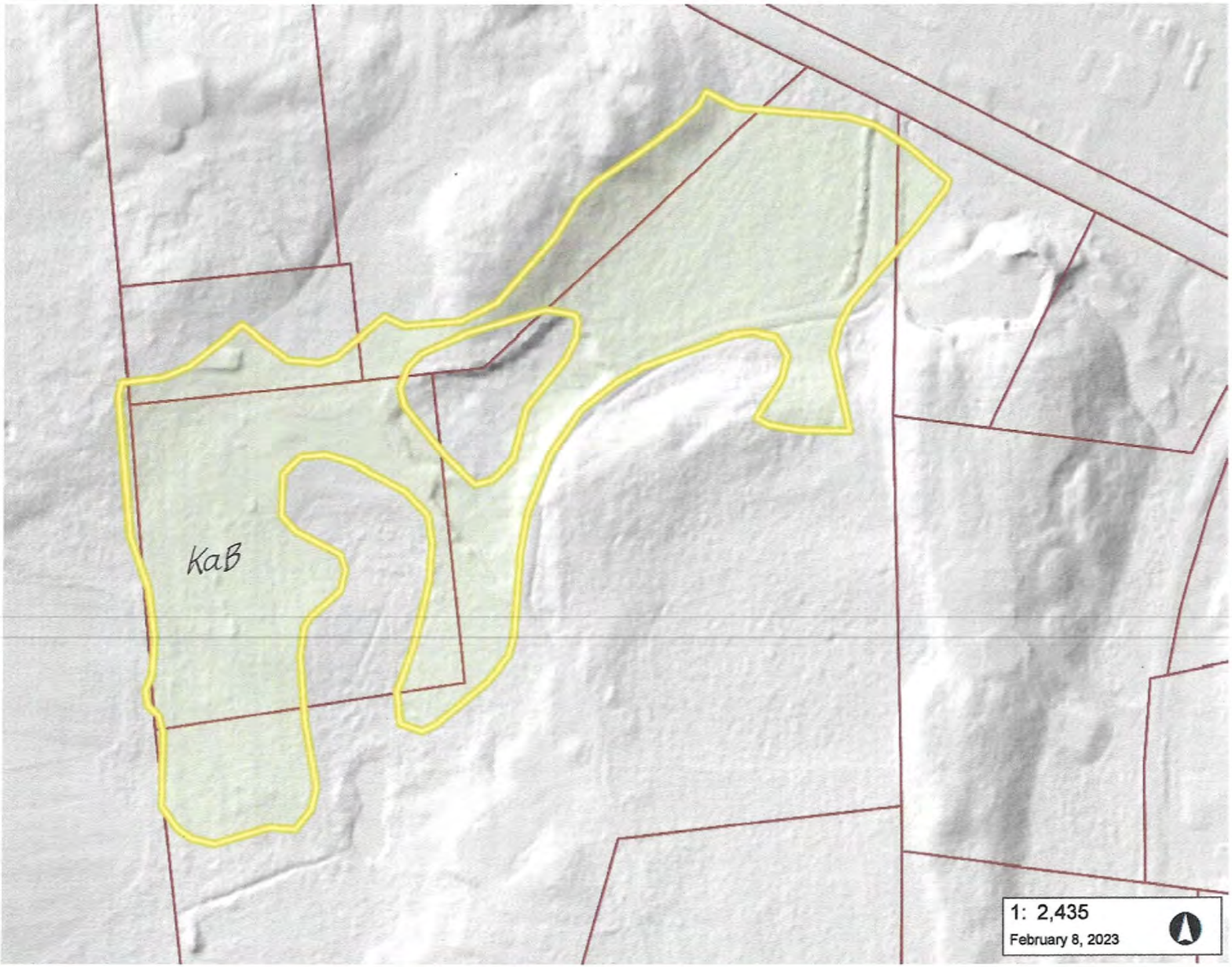
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VERMONT

South Hero Village WW Study

Vermont Agency of Natural Resources

vermont.gov





LEGEND

- Parcels (standardized)
- Town Boundary

Area 2
Drawing 1B

1: 2,435
February 8, 2023

406.0 0 203.00 406.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 203 Ft. 1cm = 24 Meters

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NOTES

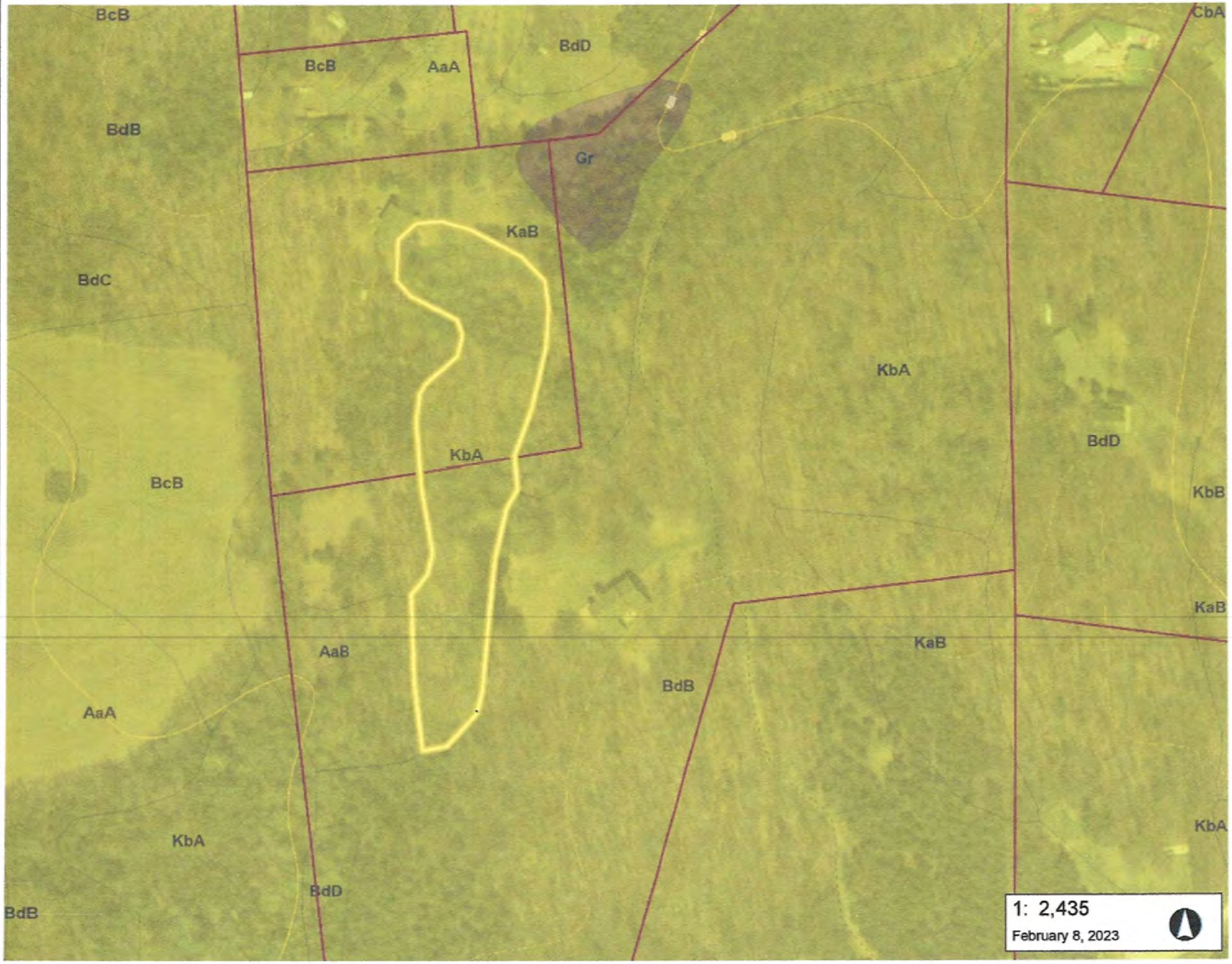
Parcels, Lidar Hillshade

KaB, Kars fine sandy loam, 3-8% slopes

South Hero Village WW Study

Vermont Agency of Natural Resources

vermont.gov



1: 2,435

February 8, 2023



LEGEND

Soils

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

Parcels (standardized)

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

Area 2
Drawing 2A

406.0 0 203.00 406.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 203 Ft. 1cm = 24 Meters

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NOTES

Parcels, Topography, Soil Types

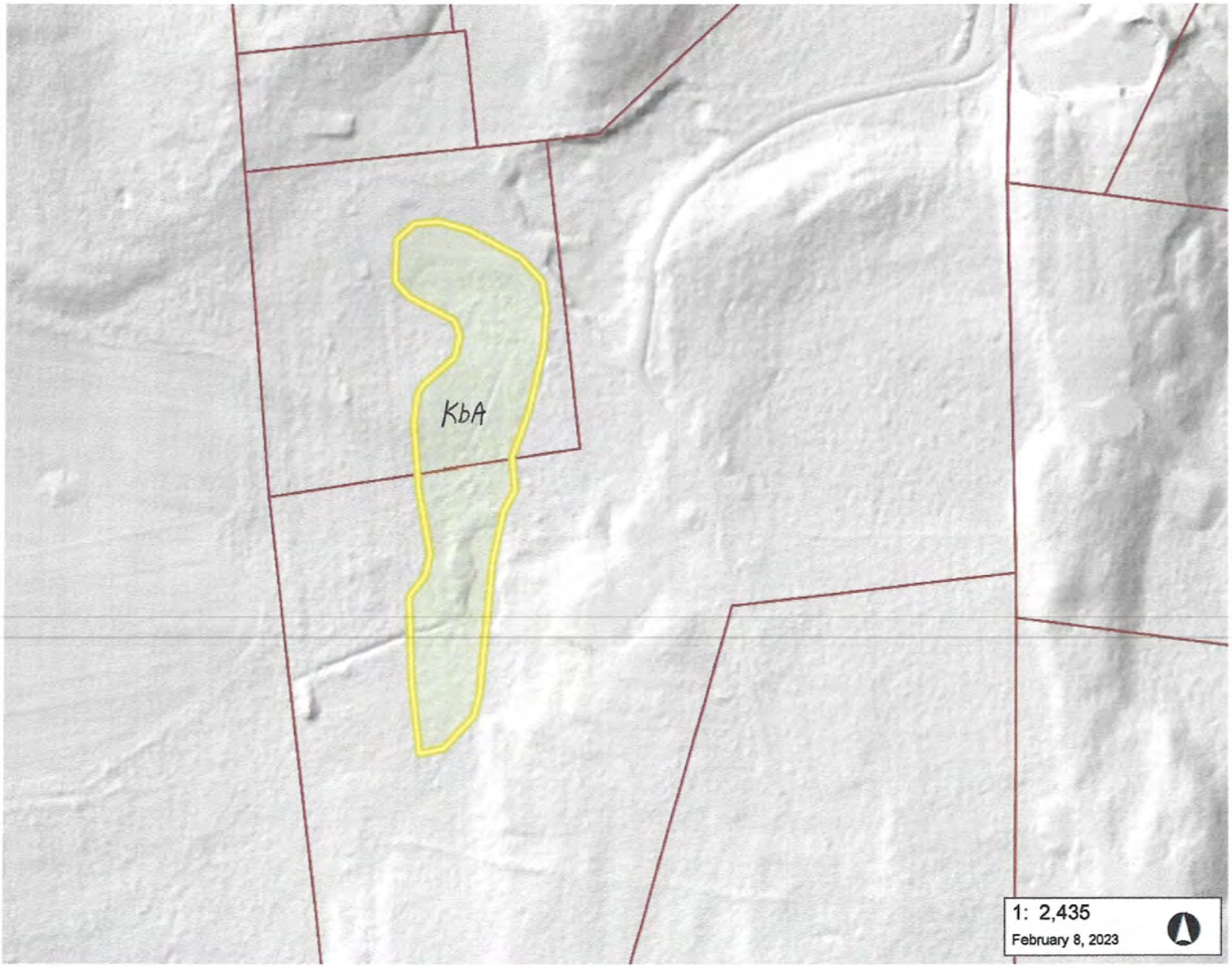
KbA, Kendaia silt loam, 0-3% slopes

VERMONT

South Hero Village WW Study

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 2
Drawing 2B

1: 2,435
February 8, 2023

406.0 0 203.00 406.0 Feet

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NOTES

Parcels, Lidar Hillshade

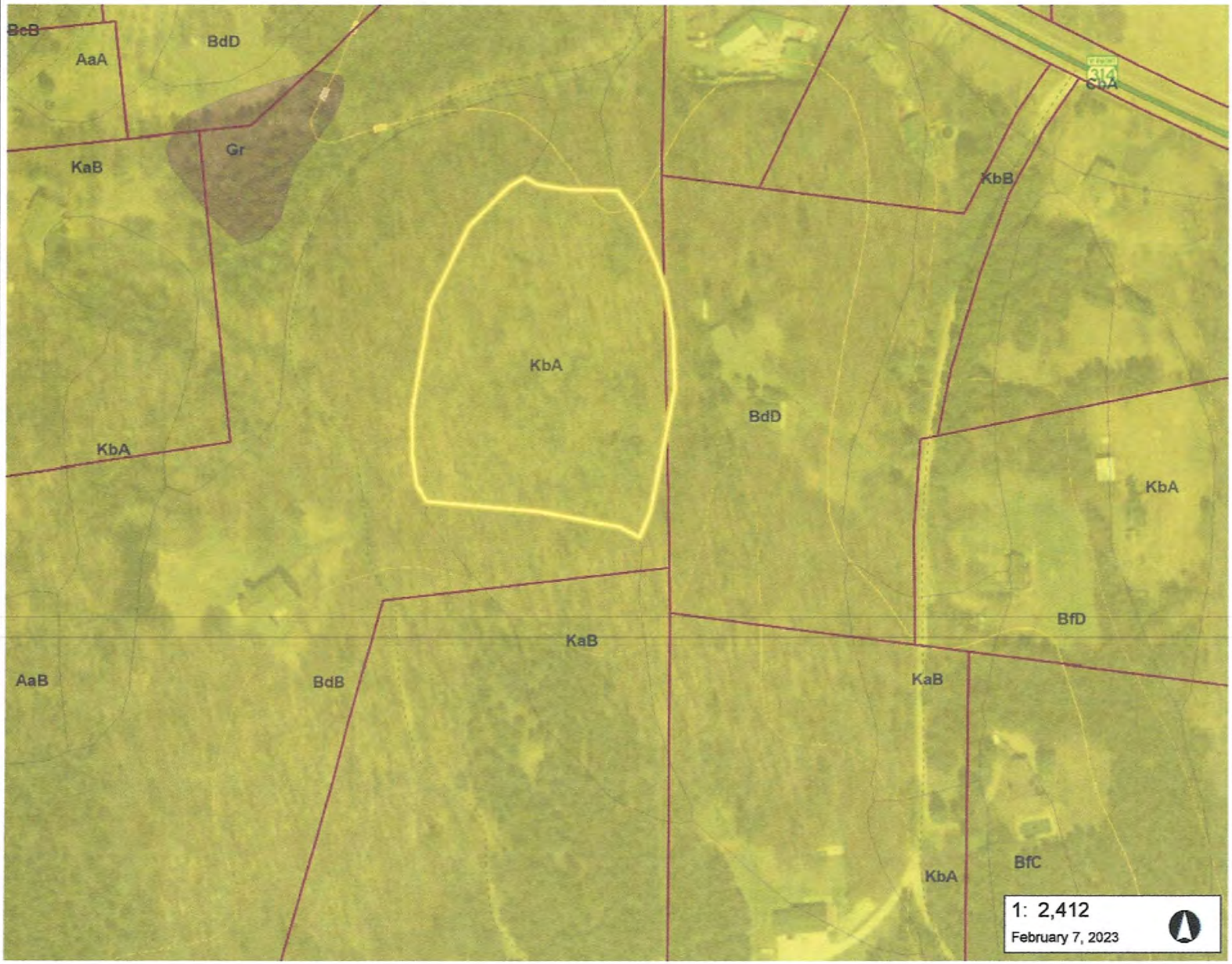
KbA, Kendaia silt loam, 0-3% slopes

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1: 2,412

February 7, 2023



LEGEND

Soils

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

Parcels (standardized)

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

Area 2
Drawing 3A

NOTES

Parcels, Topography, Soil Types

KbA, Kendaia silt loam, 0-3% slopes

402.0 0 201.00 402.0 Feet

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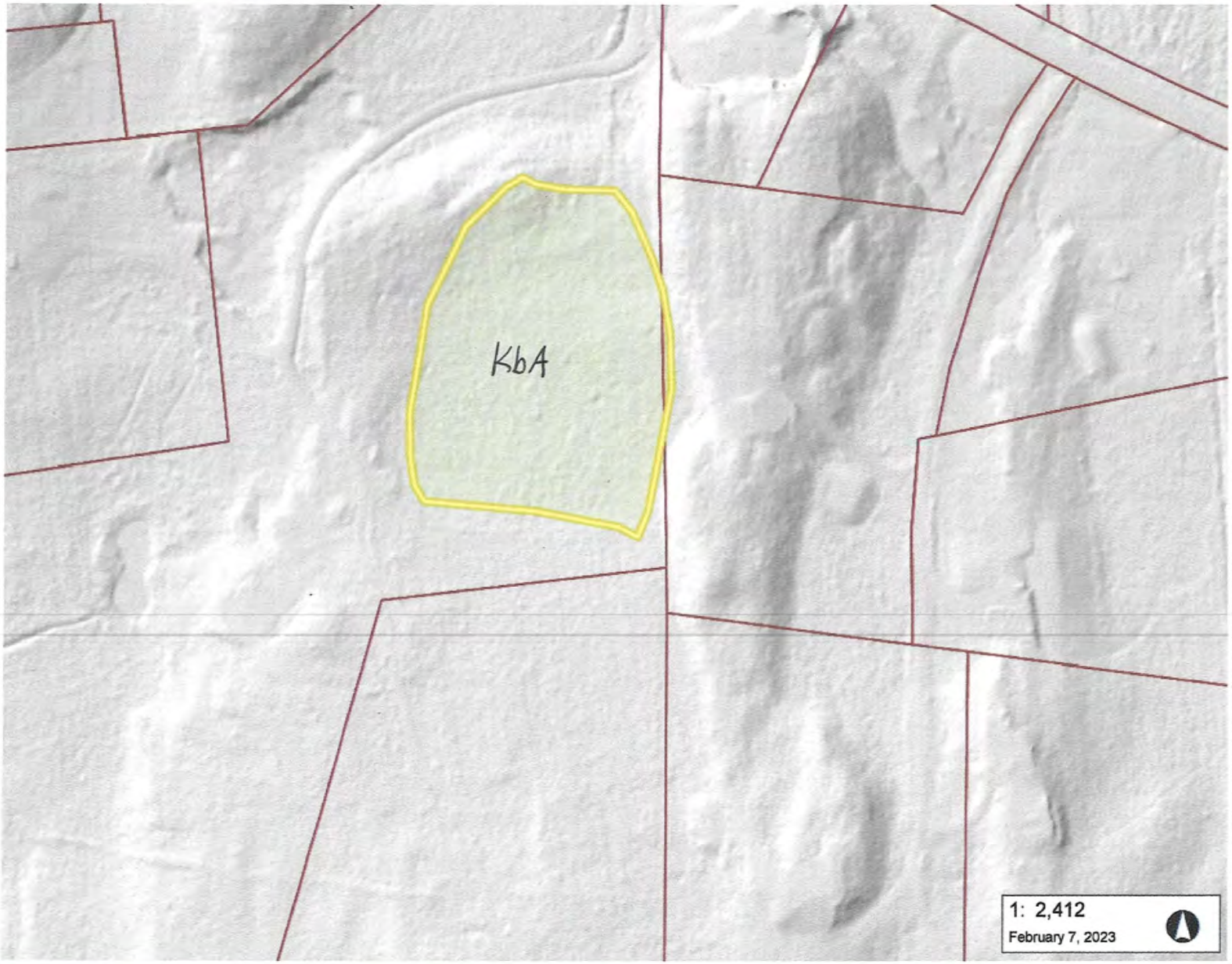
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 2
Drawing 3B

1: 2,412
February 7, 2023

402.0 0 201.00 402.0 Feet

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NOTES

Parcels, Lidar Hillshade

KbA, Kendaia silt loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 2
Drawing 4A

1: 2,412
February 7, 2023

402.0 0 201.00 402.0 Feet

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NOTES

Parcels, Topography, Soil Types

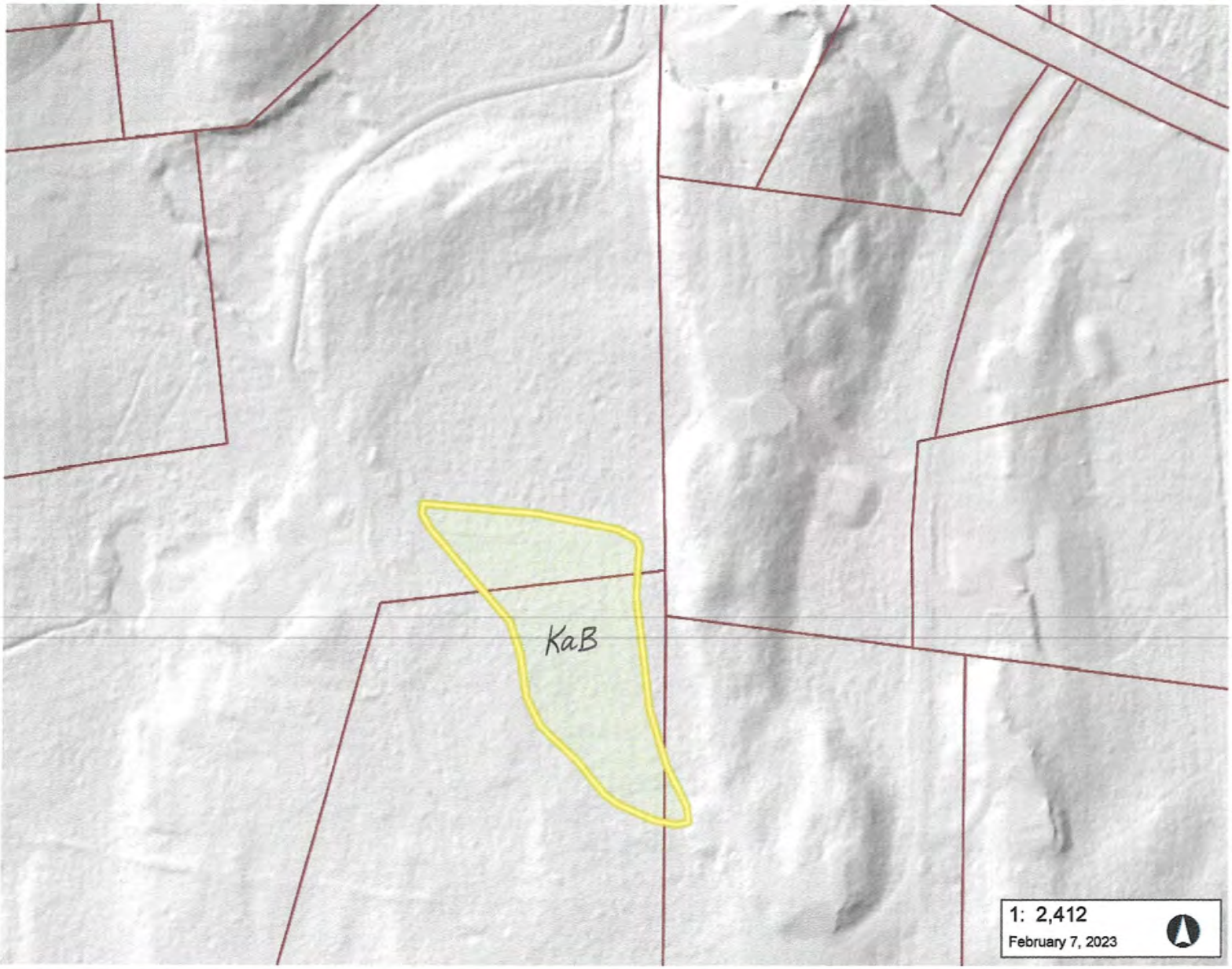
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 2
Drawing 4B

1: 2,412
February 7, 2023

402.0 0 201.00 402.0 Feet

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Parcels, Lidar Hillshade

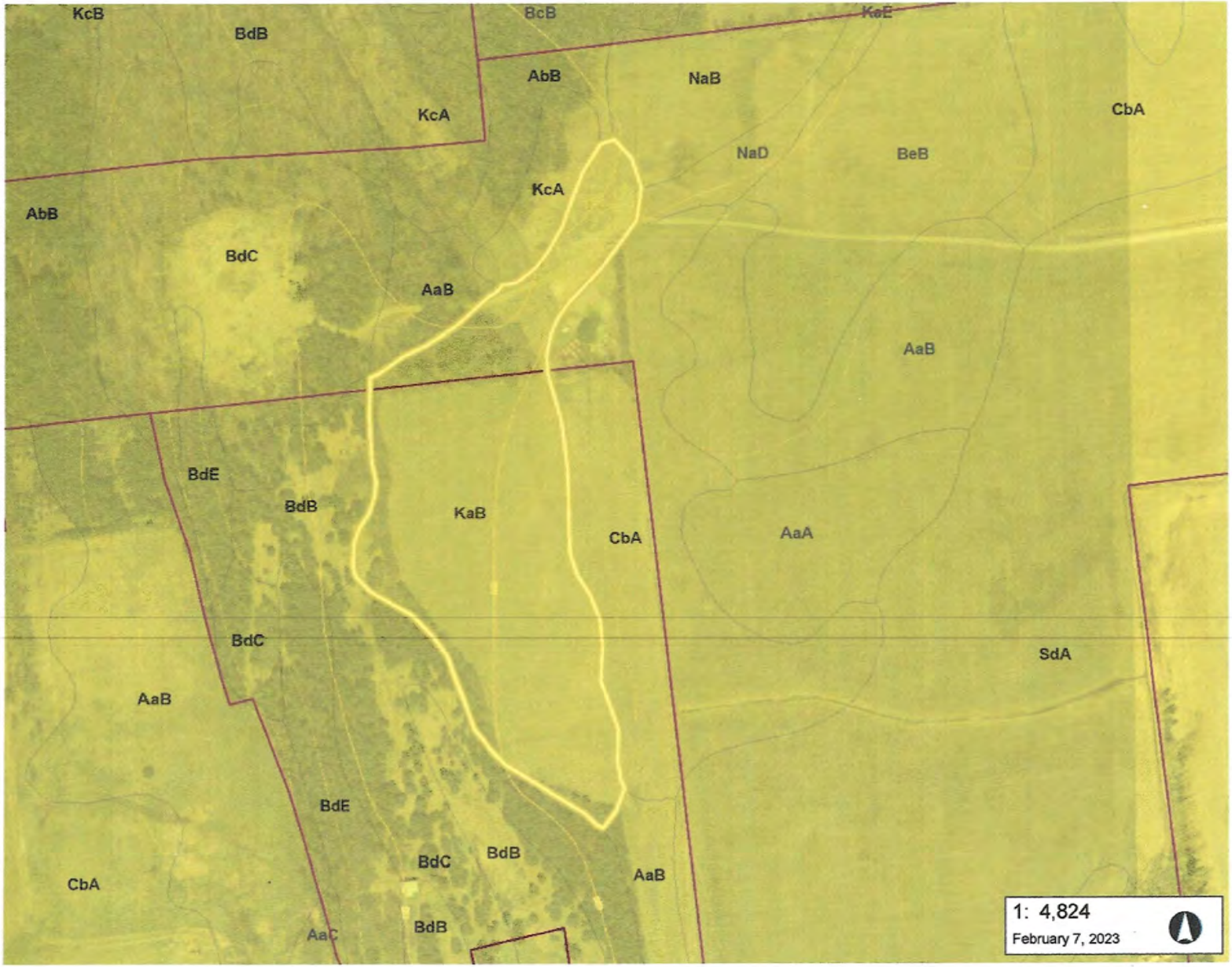
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 1A

1: 4,824

February 7, 2023

804.0 0 402.00 804.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 402 Ft. 1cm = 48 Meters

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NOTES

Parcels, Topography, Soil Types

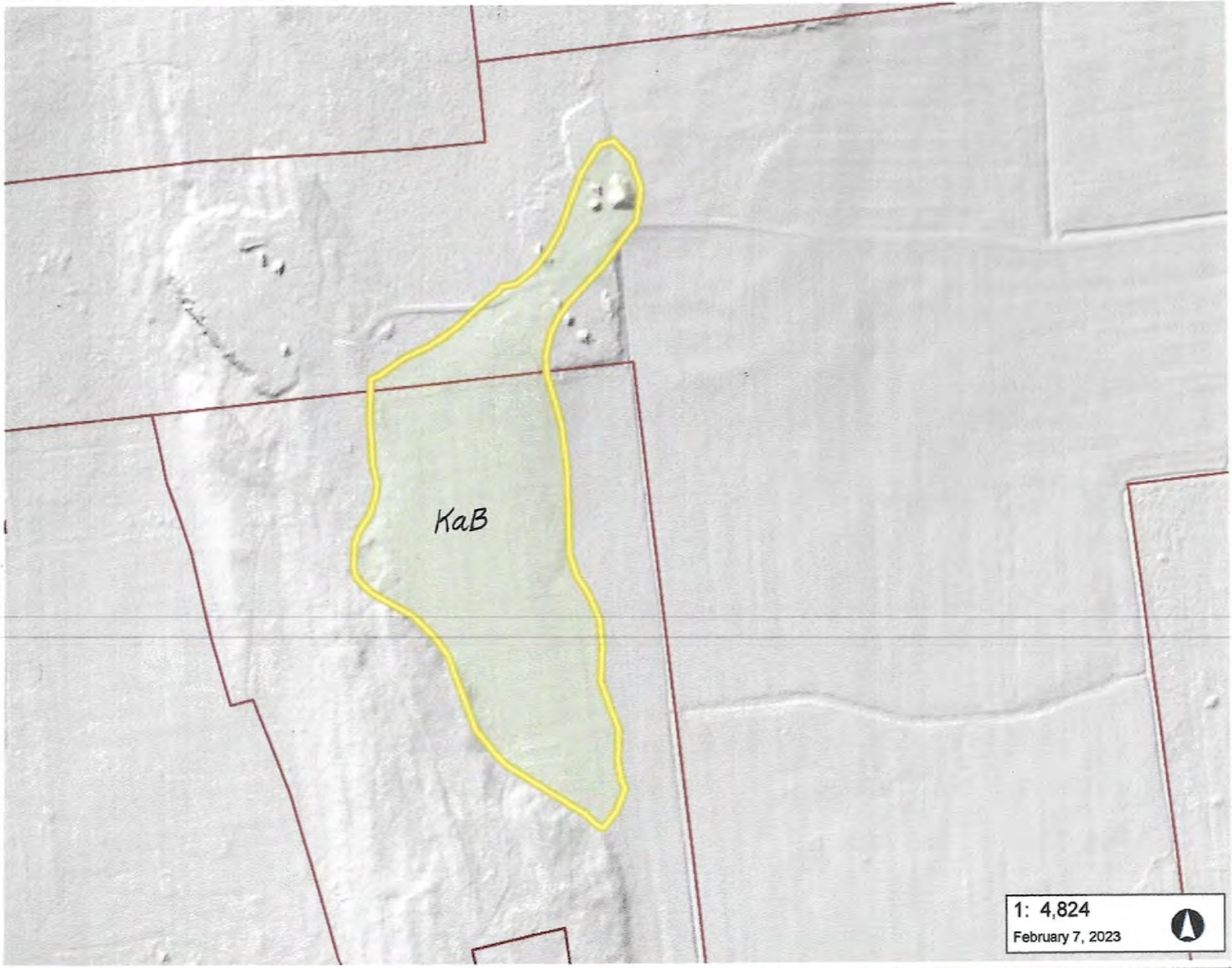
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 1B

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

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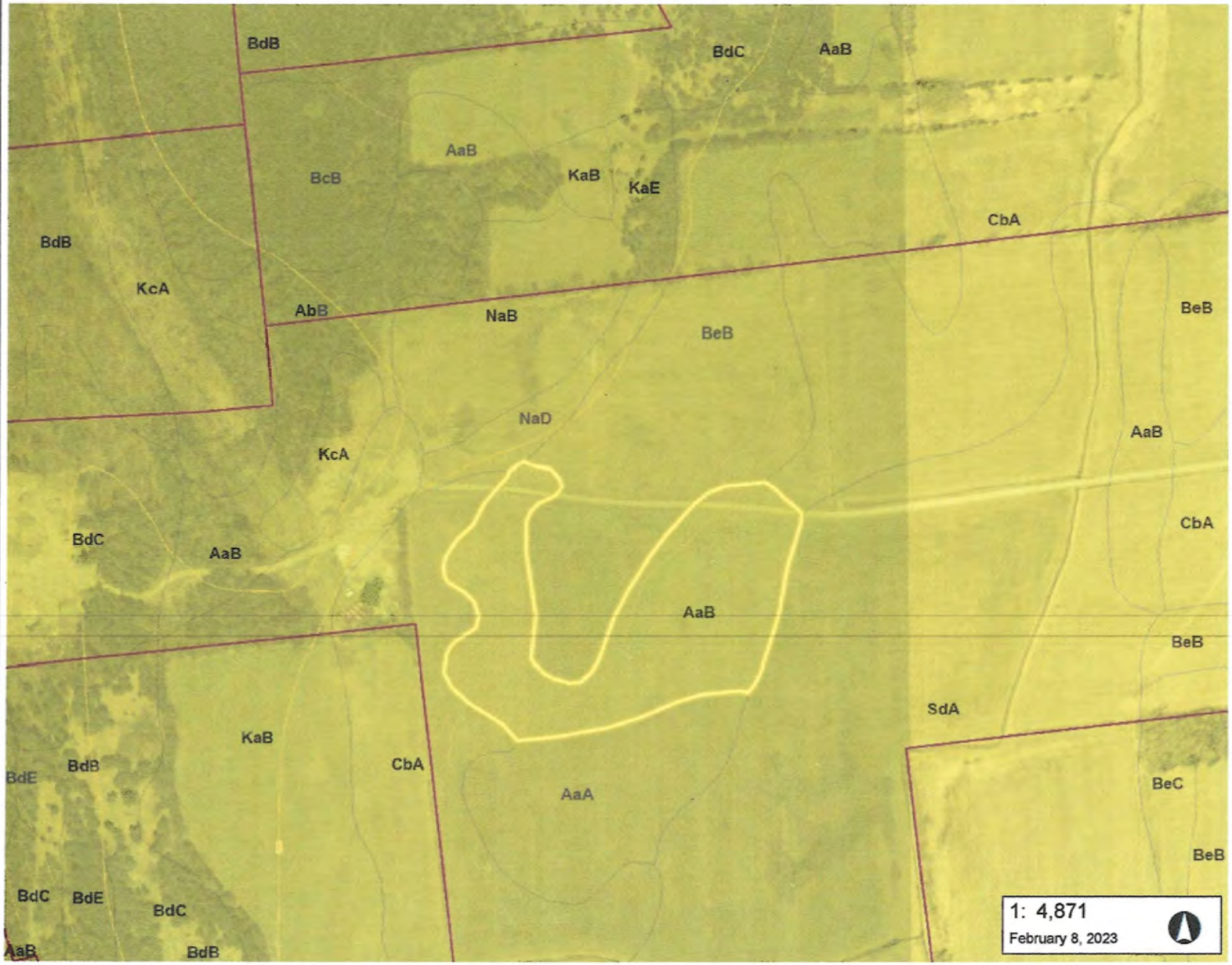
Parcels, Lidar Hillshade

KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 2A

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

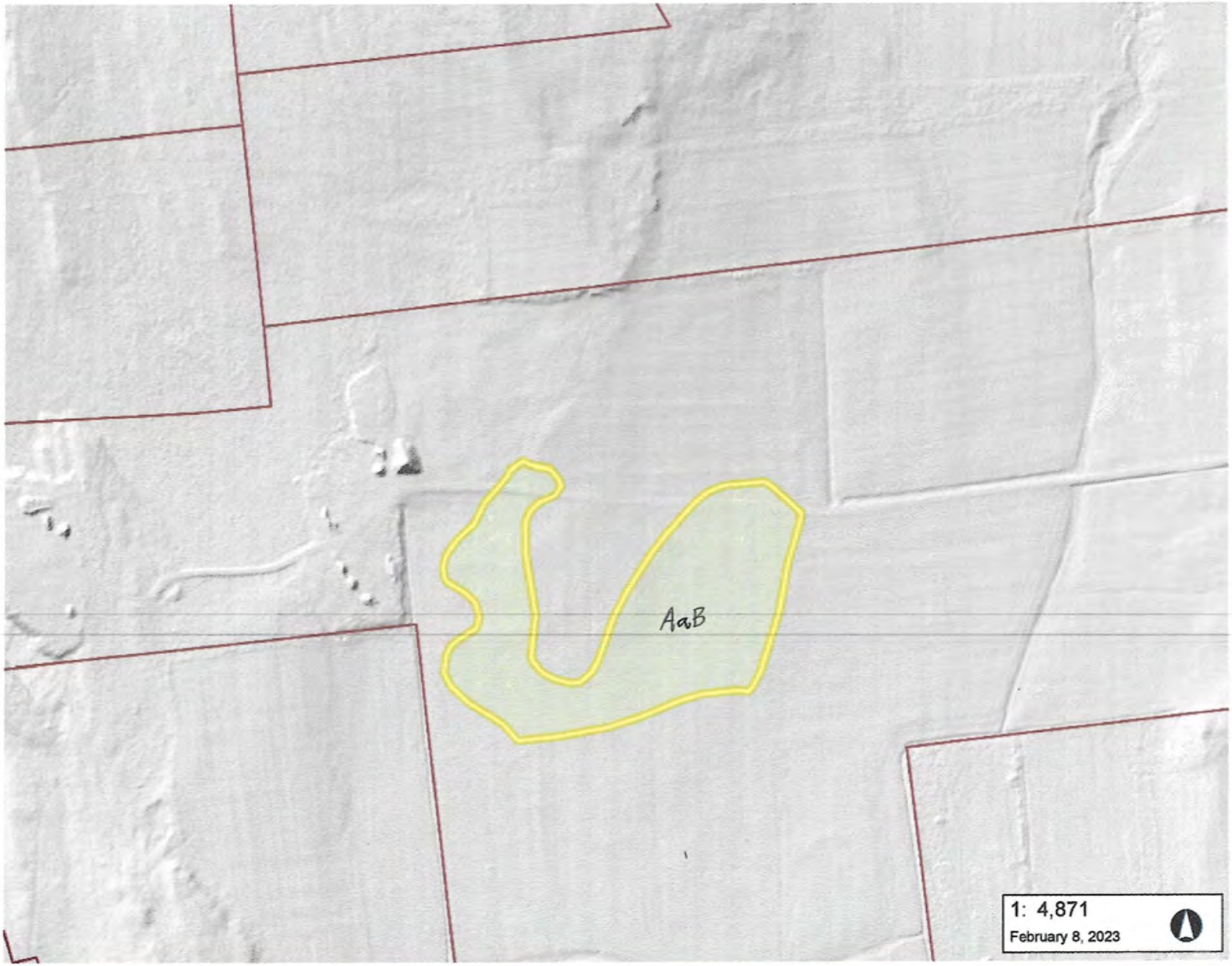
AaB, Amenia silt loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 2B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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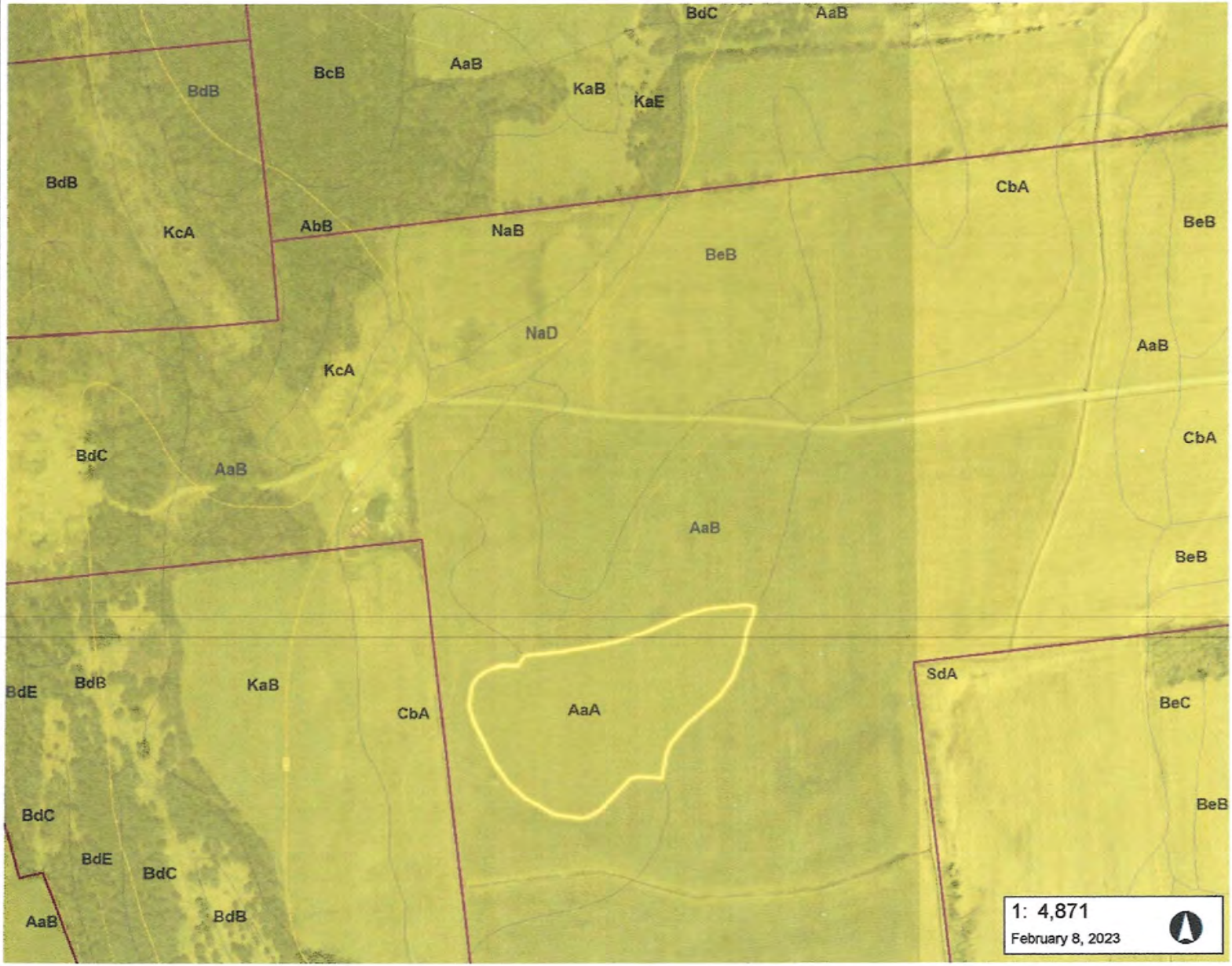
Parcels, Lidar Hillshade

AaB, Amenia silt loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 3A

1: 4,871

February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

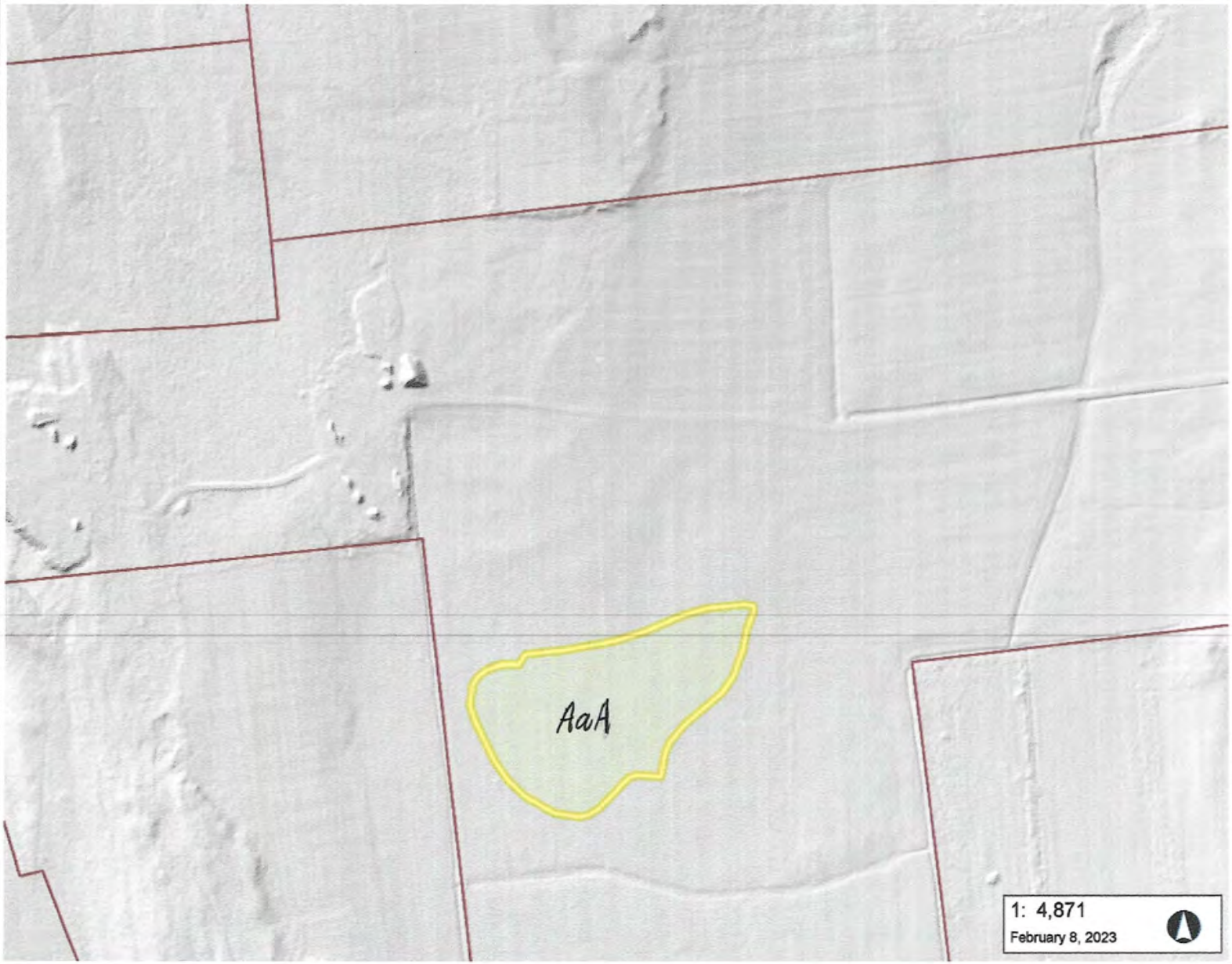
AaA, Amenia silt loam, 0-3% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 3B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Lidar Hillshade

AaA, Amenia silt loam
0-3% slopes

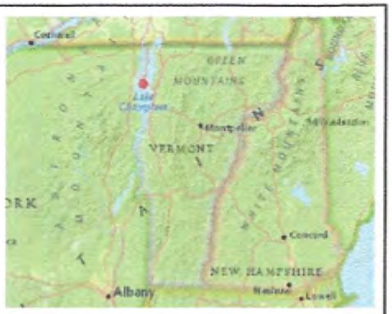
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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 4A

NOTES

Parcels, Topography, Soil Types
AaB, Amenia silt loam, 3-8% slopes

812.0 0 406.00 812.0 Feet

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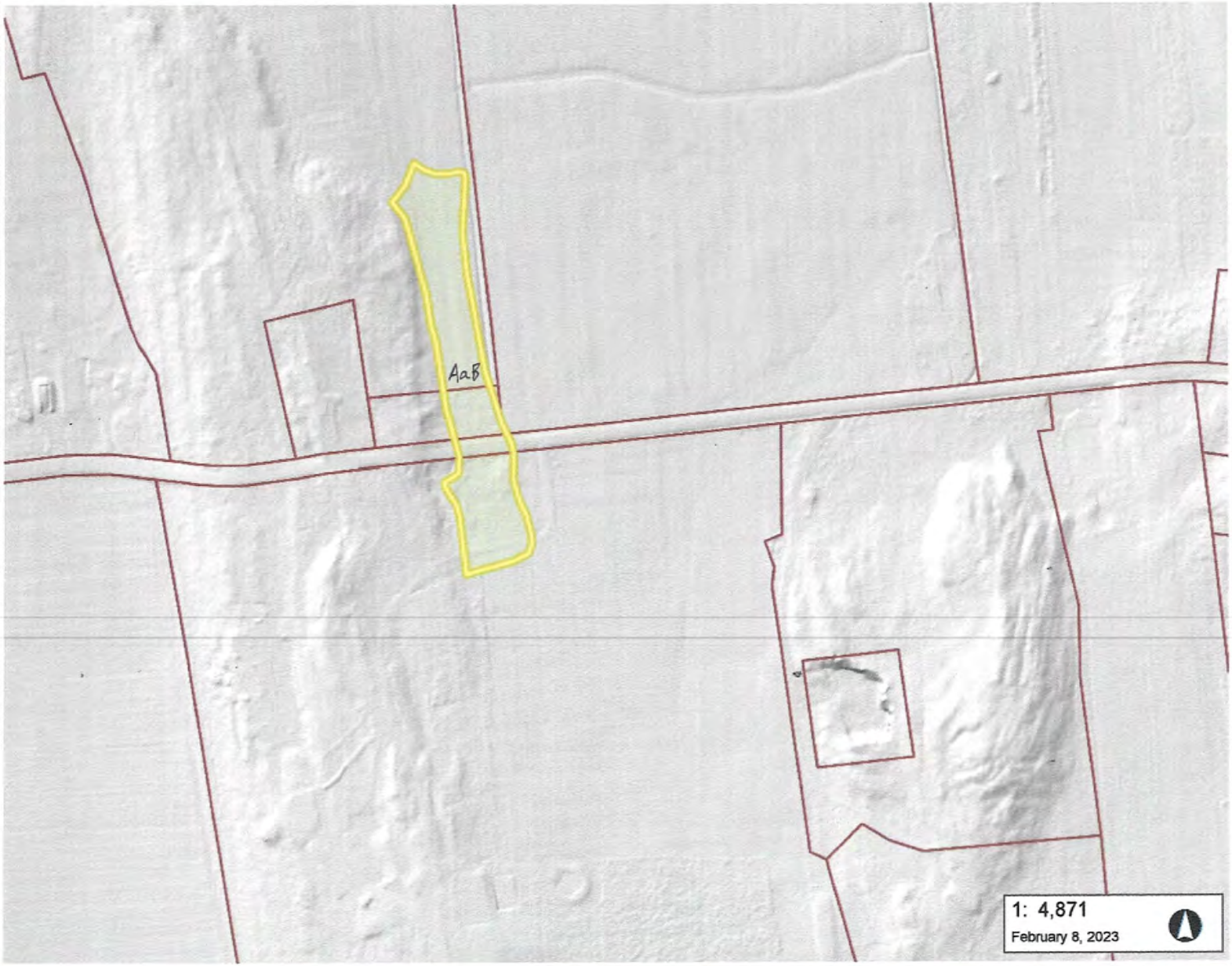
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 4B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Lidar Hillshade

AaB, Amenia silt loam, 3-8% slopes

South Hero Village WW Study

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1: 4,871

February 8, 2023

812.0 0 406.00 812.0 Feet

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 5A

NOTES

Parcels, Topography, Soil Types

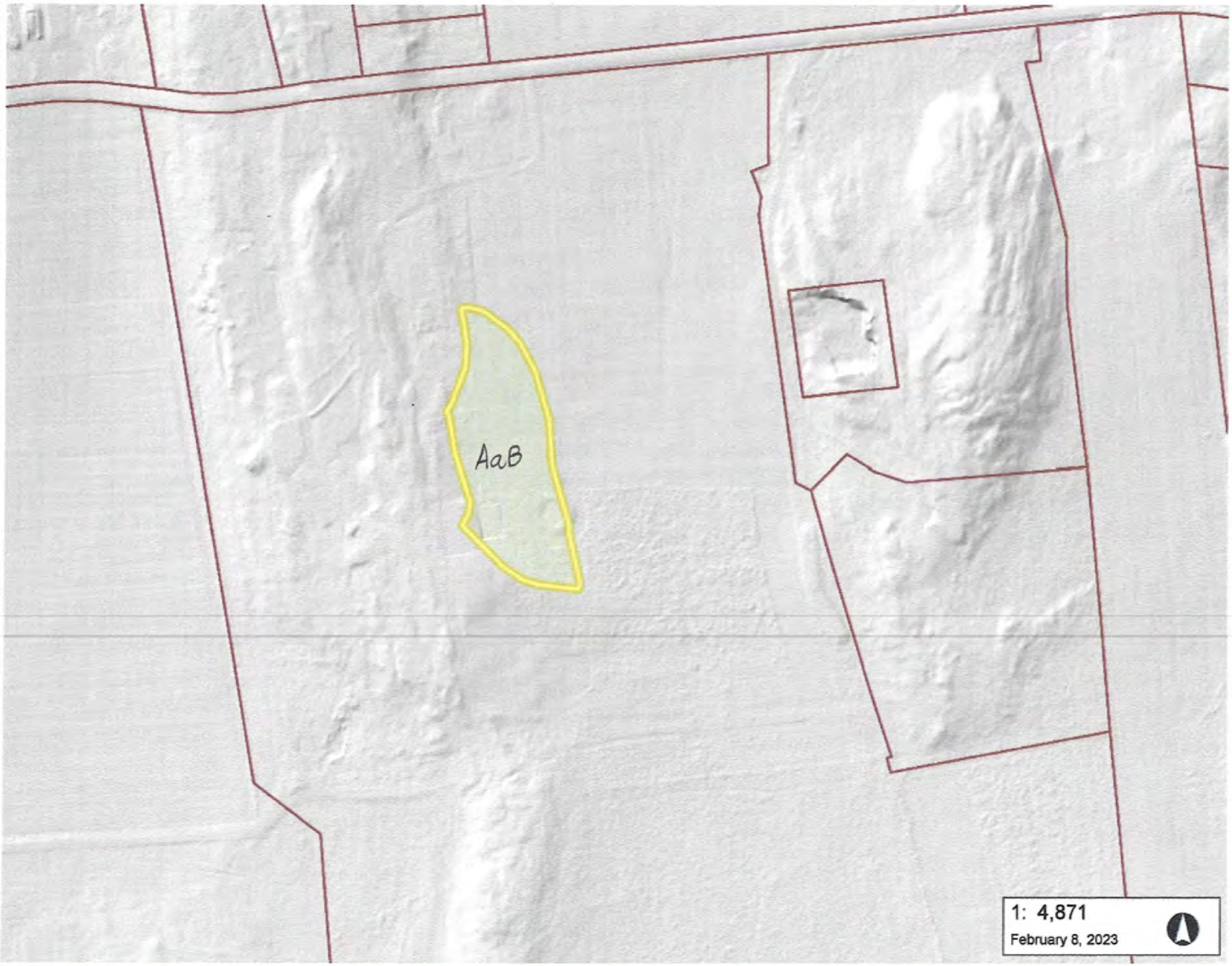
AaB, Amenia silt loam
3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 5B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

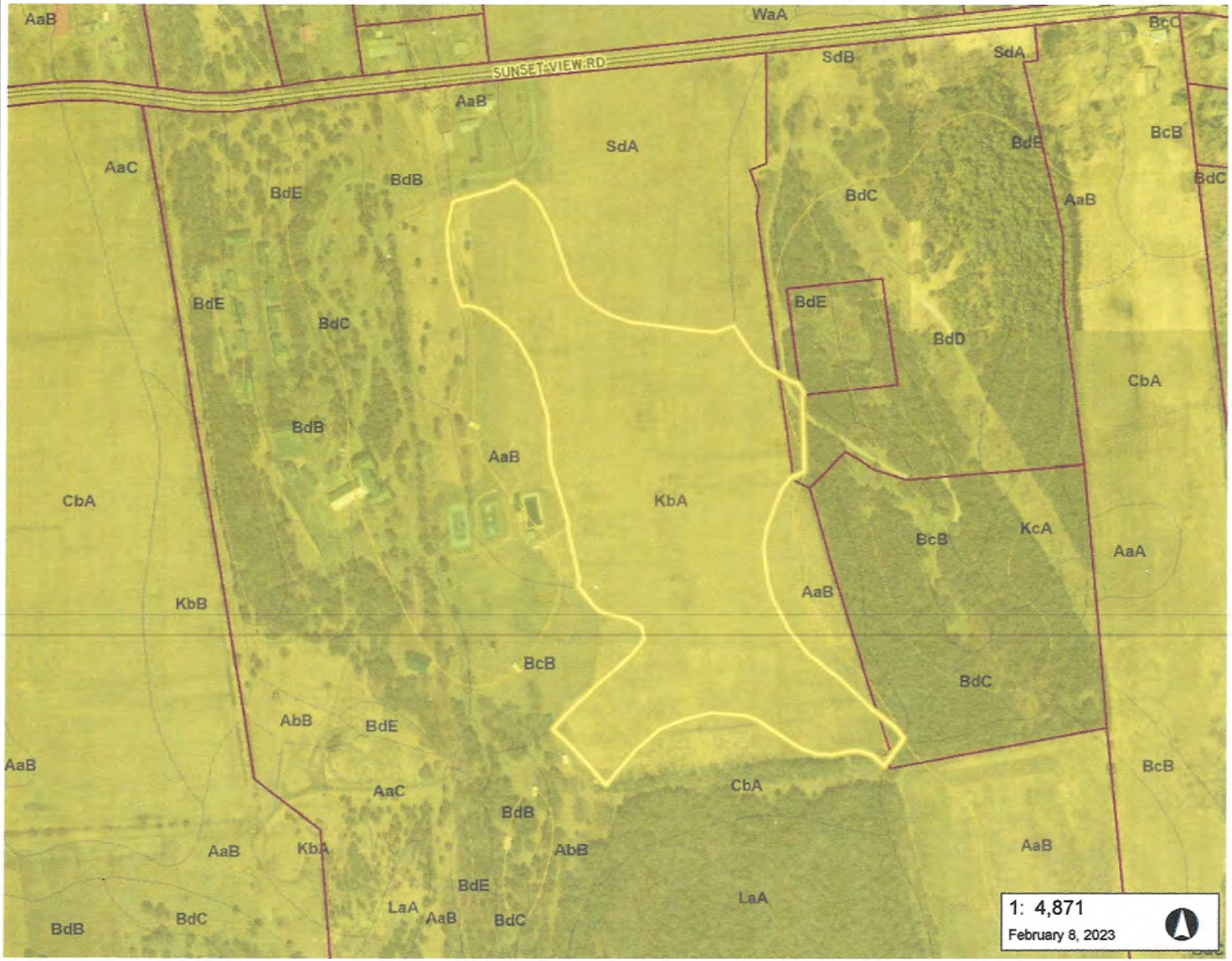
Parcels, Lidar Hillshade

AaB, Amenia silt loam, 3-8% slopes

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Vermont Agency of Natural Resources

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 6A

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

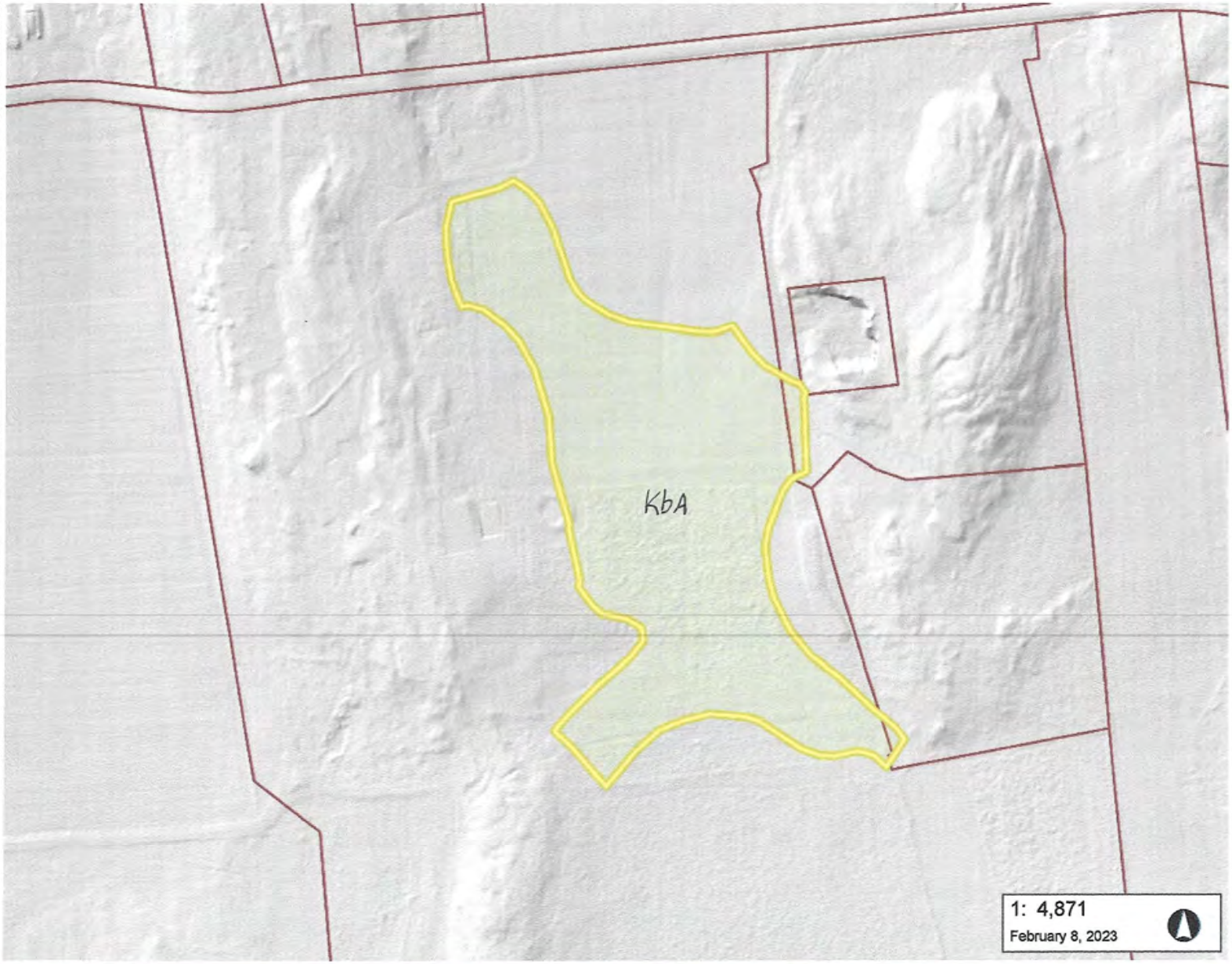
KbA, Kendaia silt loam, 0-3% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 6B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Lidar Hillshade

KbA, Kendaia silt loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 7A

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

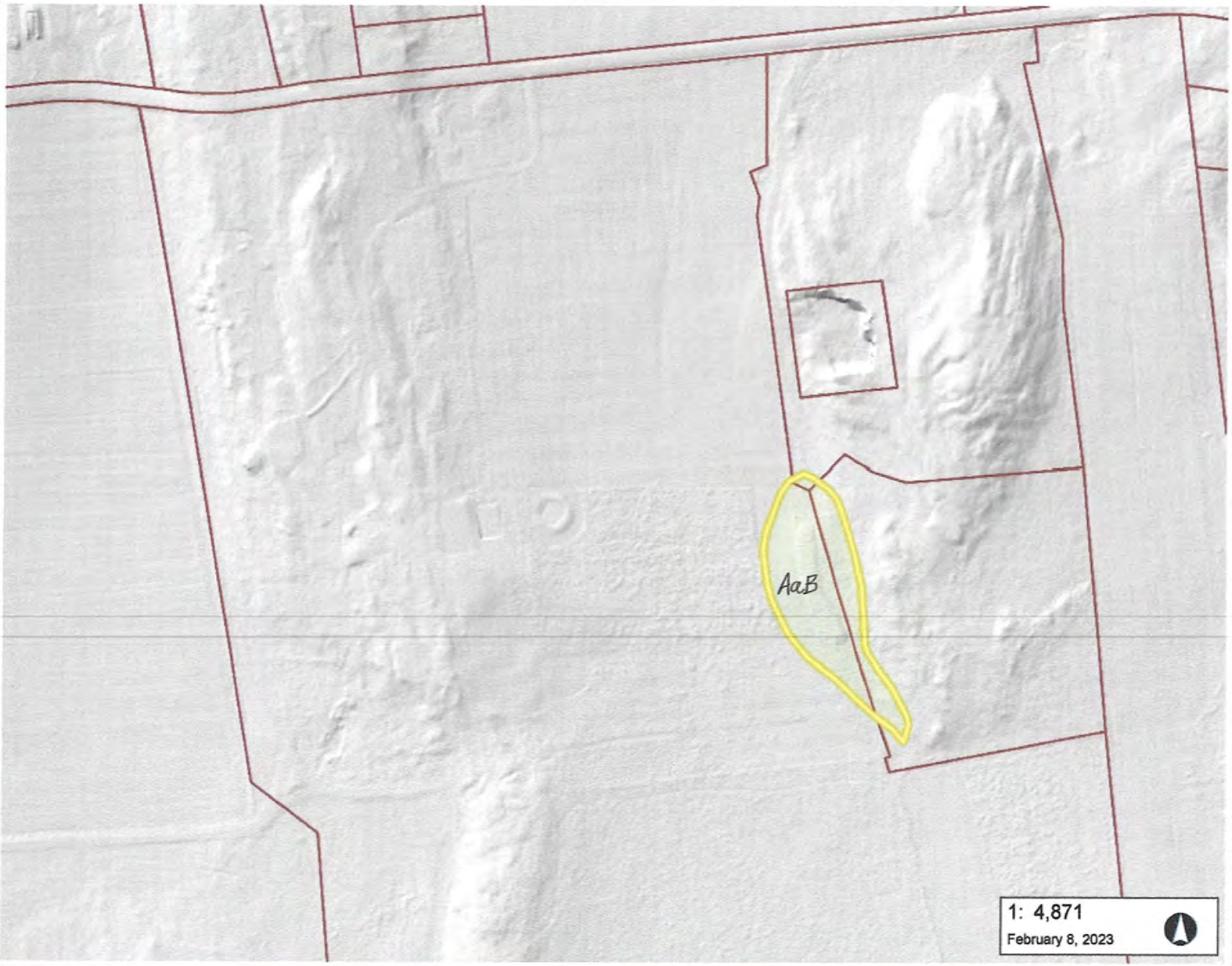
AaB, Amenia silt loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 7B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft. 1cm = 49 Meters

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NOTES

Parcels, Lidar Hillshade

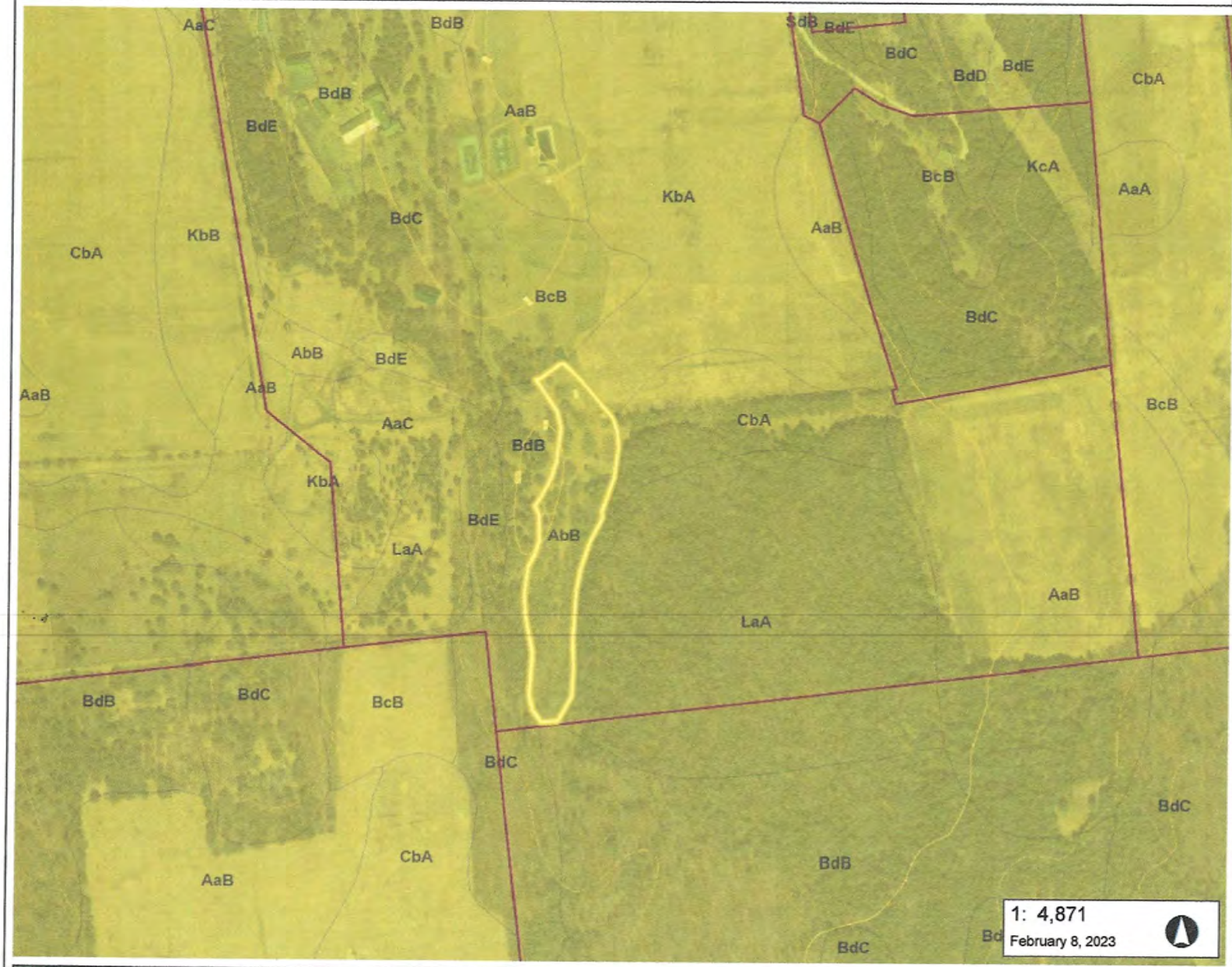
AaB, Amenia silt loam, 3-8% slopes

VERMONT

South Hero Village WW Study

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LEGEND

Soils

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

Parcels (standardized)

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

Area 3
Drawing 8A

NOTES

Parcels, Topography, Soil Types

AbB, Amenia very stony silt loam, 3-8% slopes

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft. 1cm = 49 Meters

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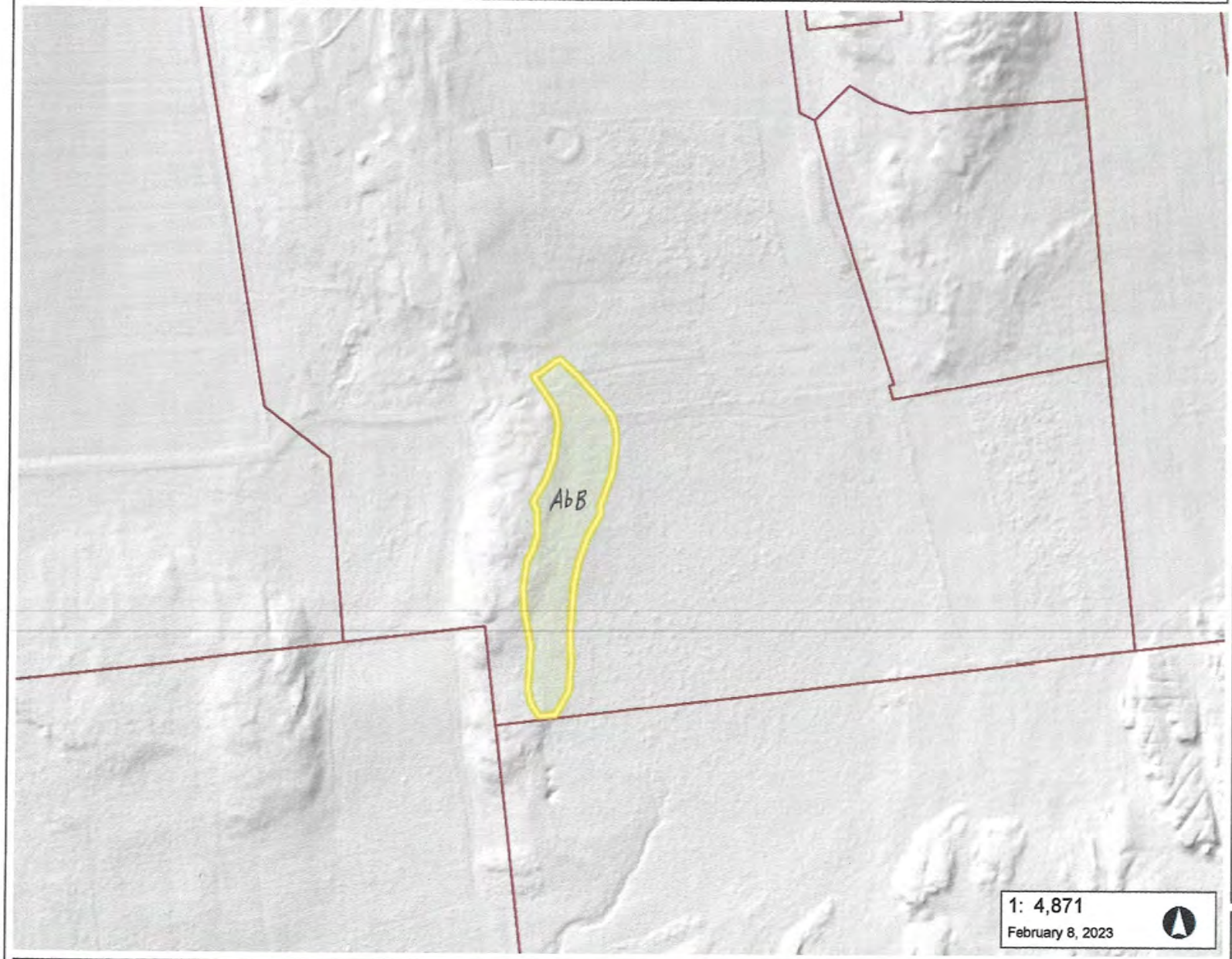
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 3
Drawing 8B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft. 1cm = 49 Meters

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NOTES

Parcels, Lidar Hillshade

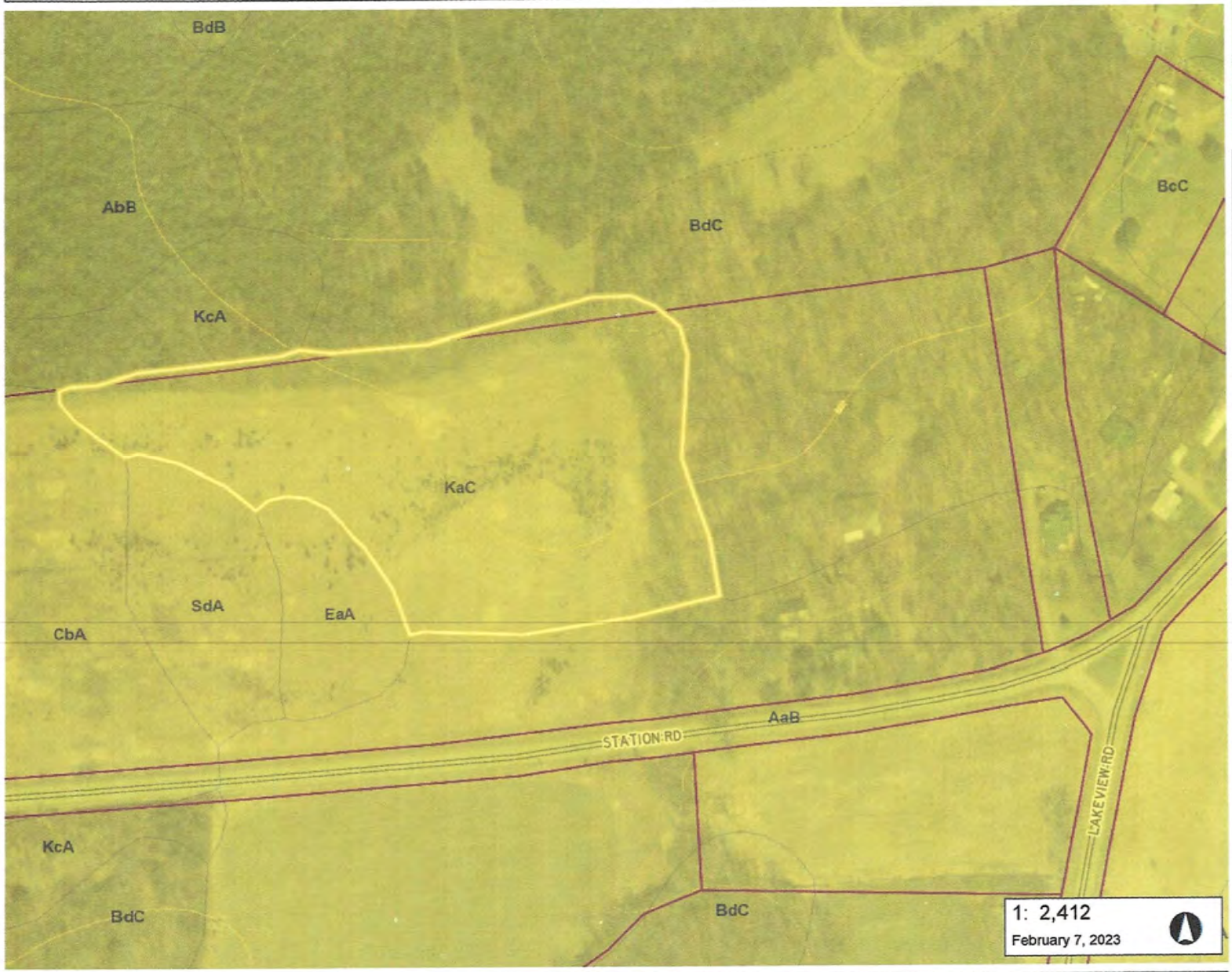
AbB, Amenia very stony silt loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 4
Drawing 1A

1: 2,412
February 7, 2023

402.0 0 201.00 402.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 201 Ft. 1cm = 24 Meters

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NOTES

Parcels, Topography, Soil Types

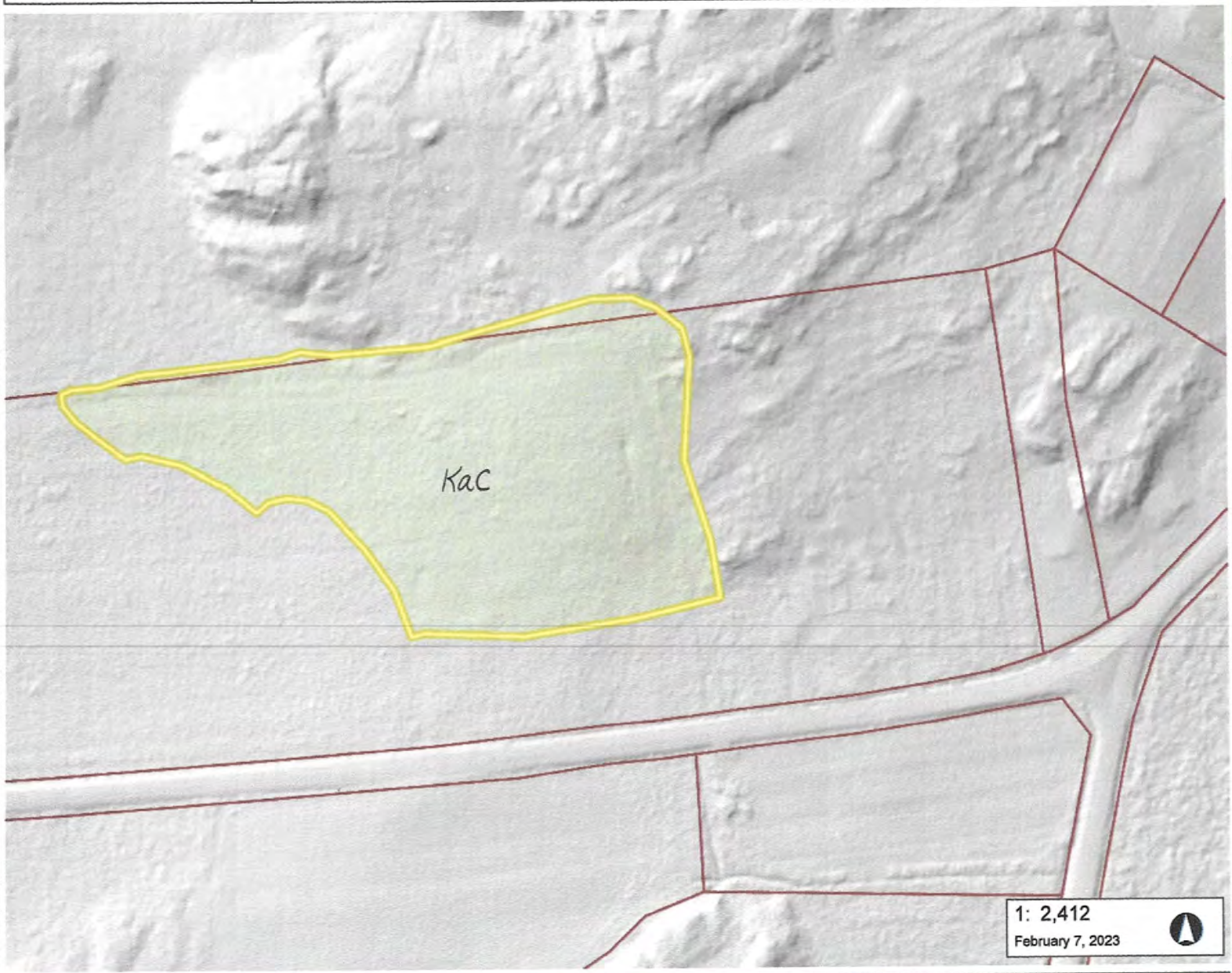
KaC, Kars fine sandy loam, 8-15% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 4
Drawing 1B

1: 2,412
February 7, 2023

402.0 0 201.00 402.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 201 Ft. 1cm = 24 Meters

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NOTES

Parcels, Lidar Hillshade

KaC, Kars fine sandy loam, 8-15% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 1A

NOTES

Parcels, Topography, Soil Types

KaB, Kars fine sandy loam, 3-8% slopes

804.0 0 402.00 804.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 402 Ft 1cm = 48 Meters

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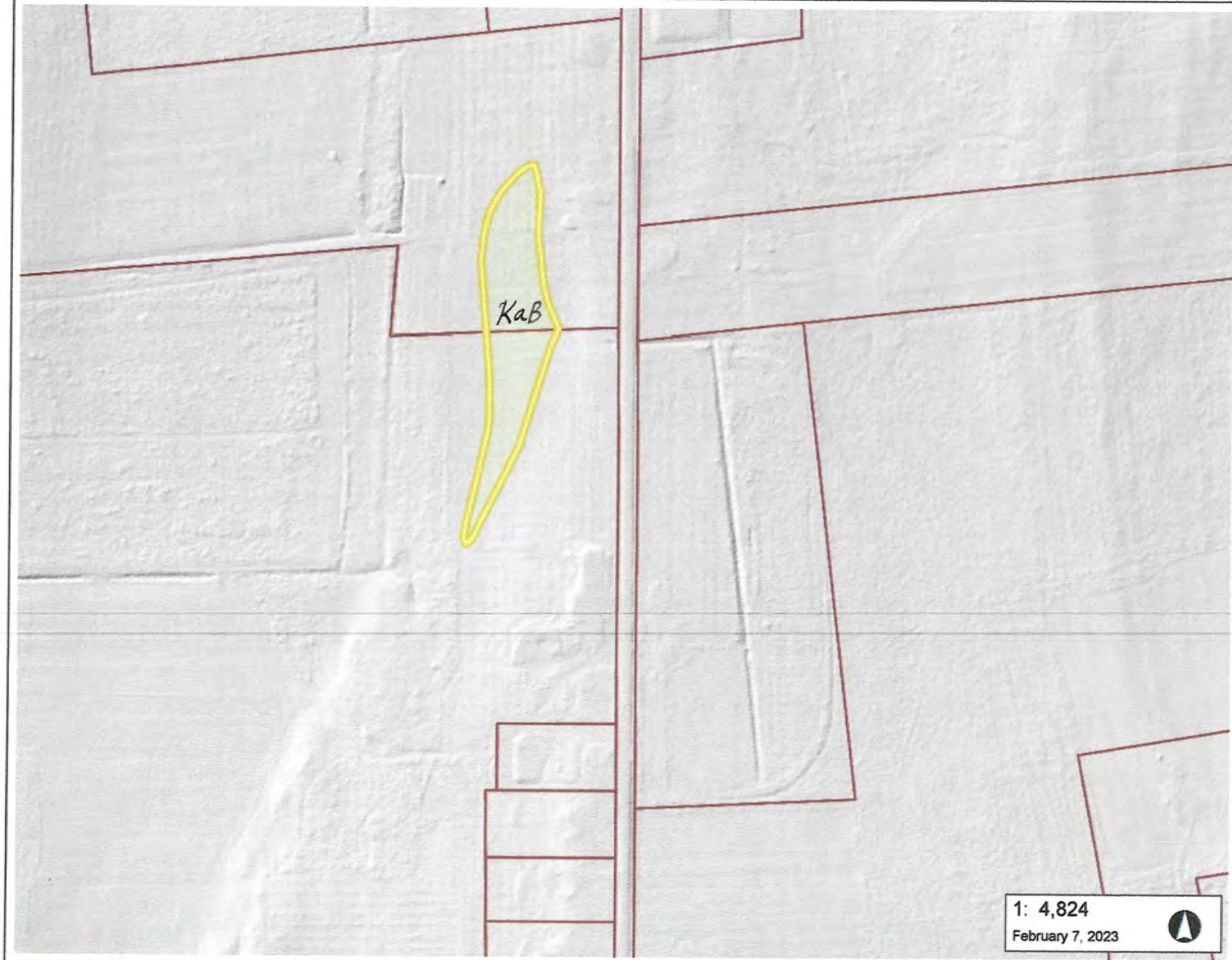
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 1B

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 402 Ft. 1cm = 48 Meters

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NOTES

Parcels, Lidar Hillshade

KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 2A

804.0 0 402.00 804.0 Feet

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NOTES

Parcels, Topography, Soil Types

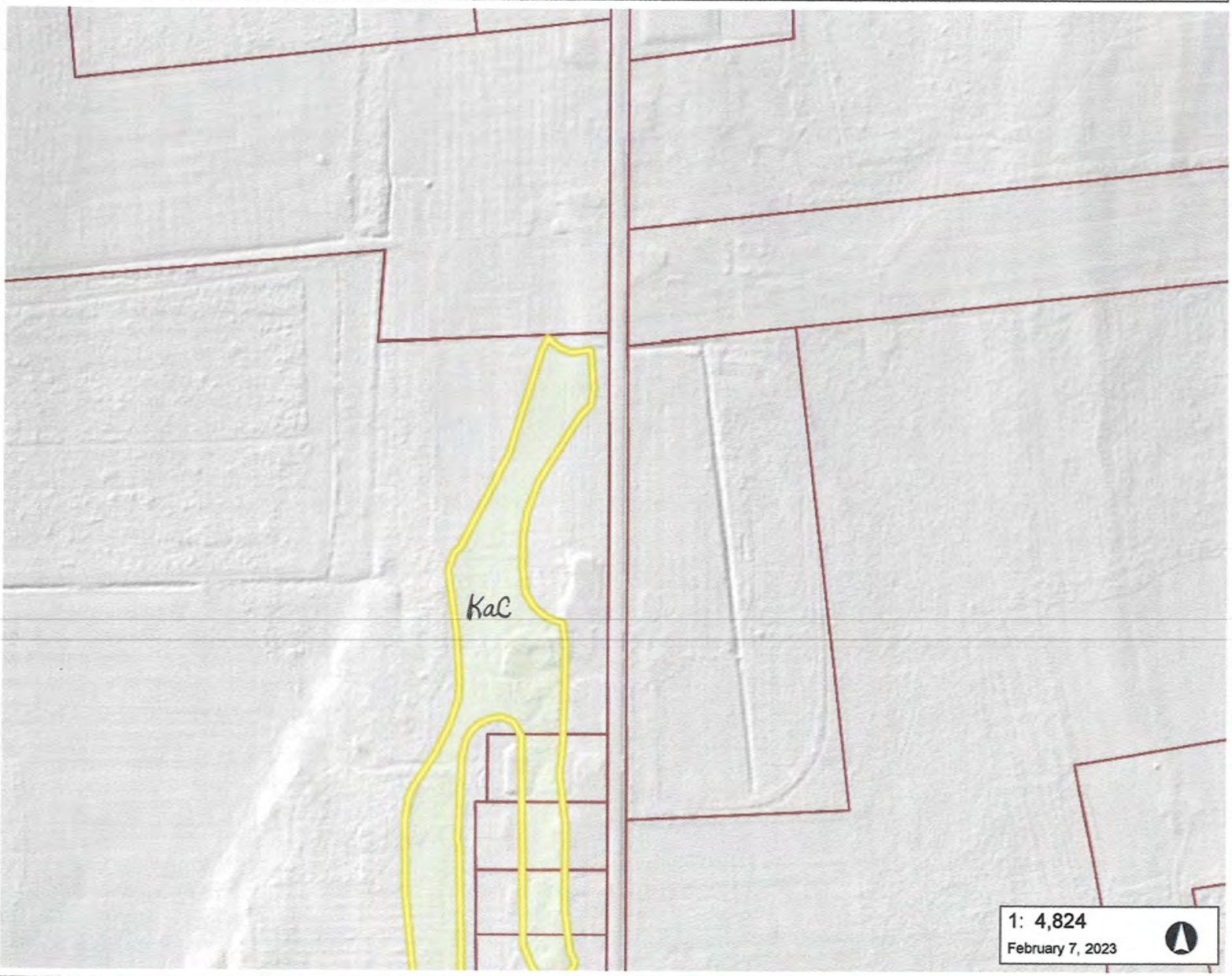
KaC, Kars fine sandy loam, 8-15% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 2B

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

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NOTES

Parcels, Lidar Hillshade

KaC, Kars fine sandy loam, 8-15% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 3A

804.0 0 402.00 804.0 Feet

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NOTES

Parcels, Topography, Soil Types

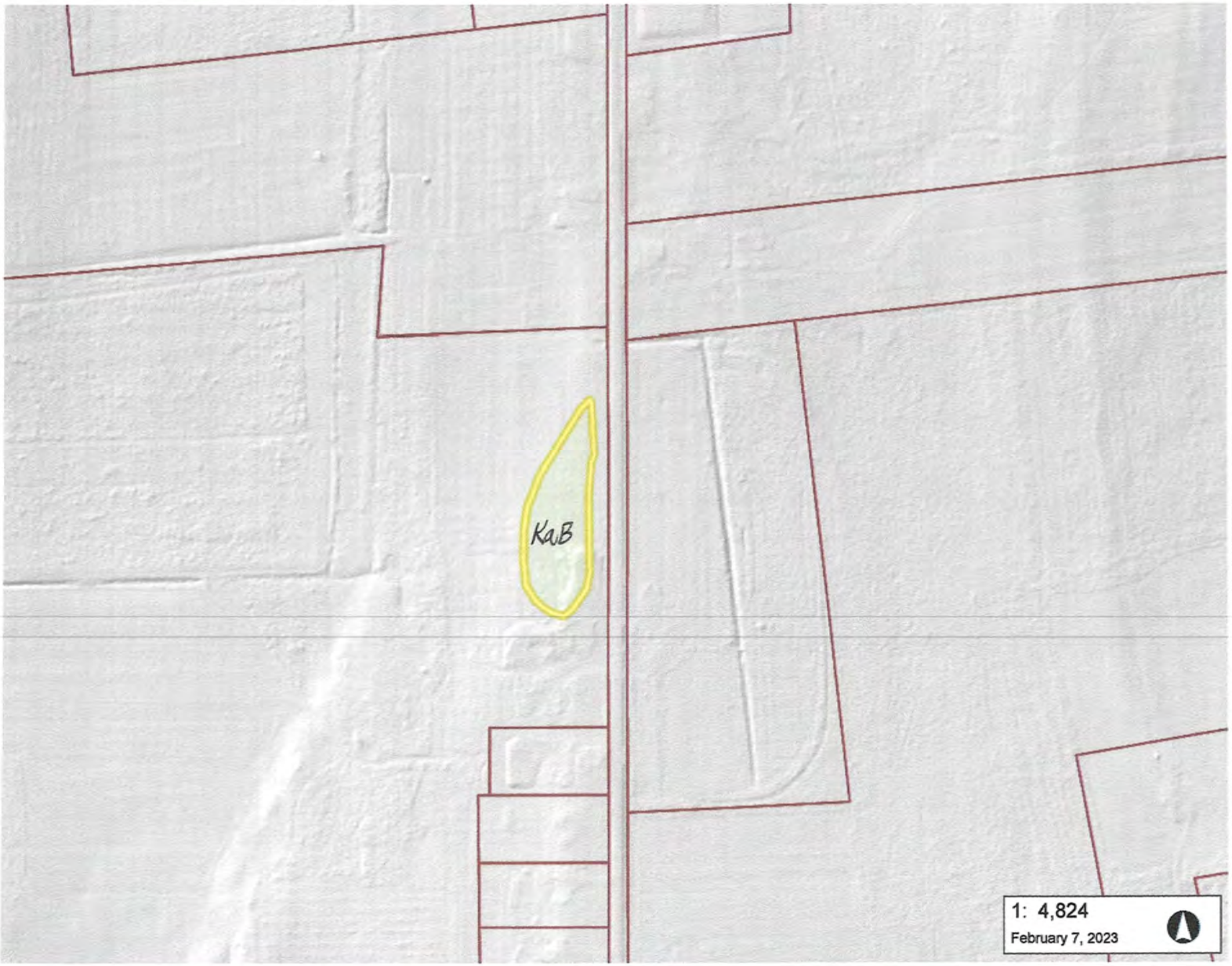
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 3B

1: 4,824
February 7, 2023

804.0 0 402.00 804.0 Feet

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NOTES

Parcels, Lidar Hillshade

KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 4A

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

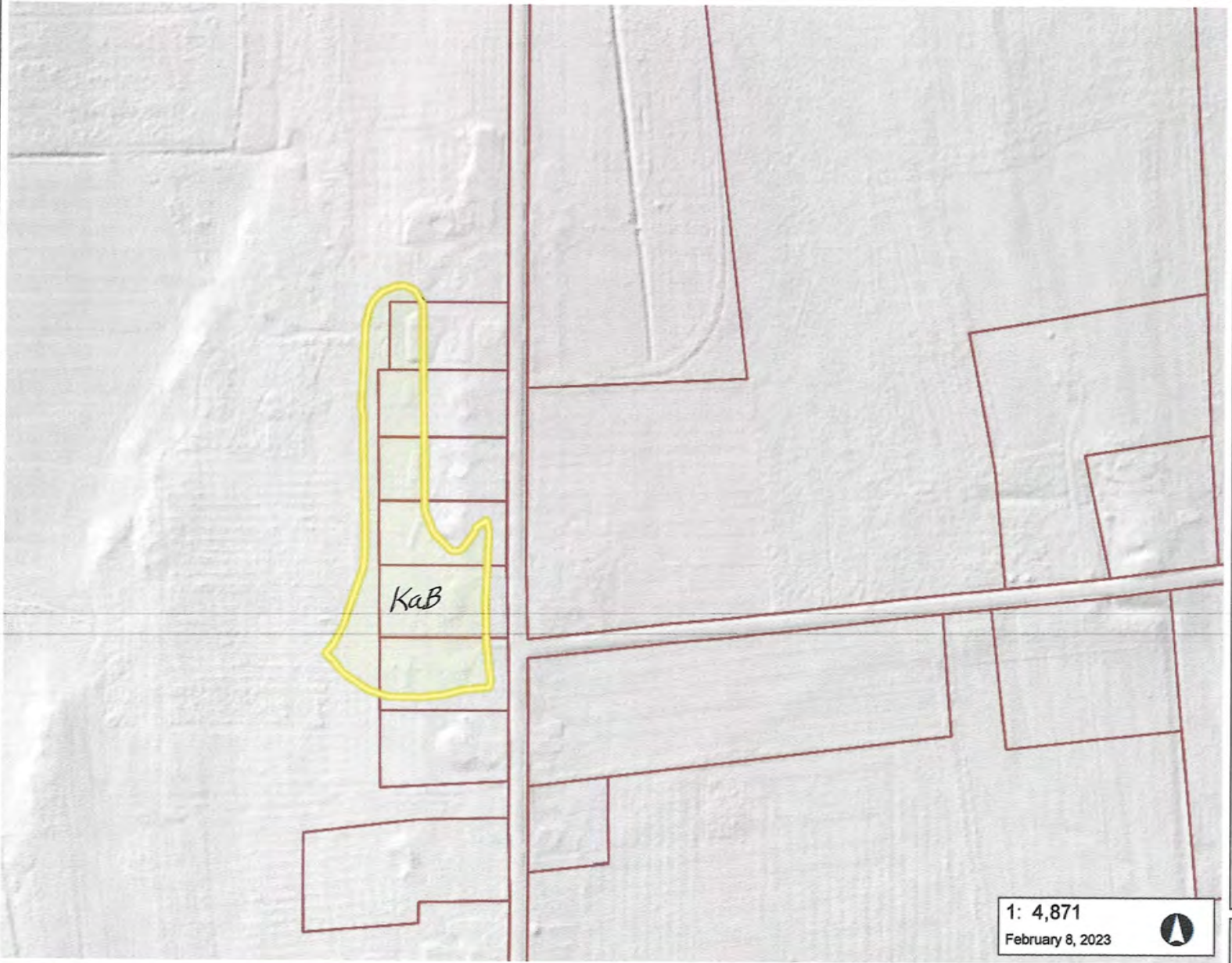
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 4B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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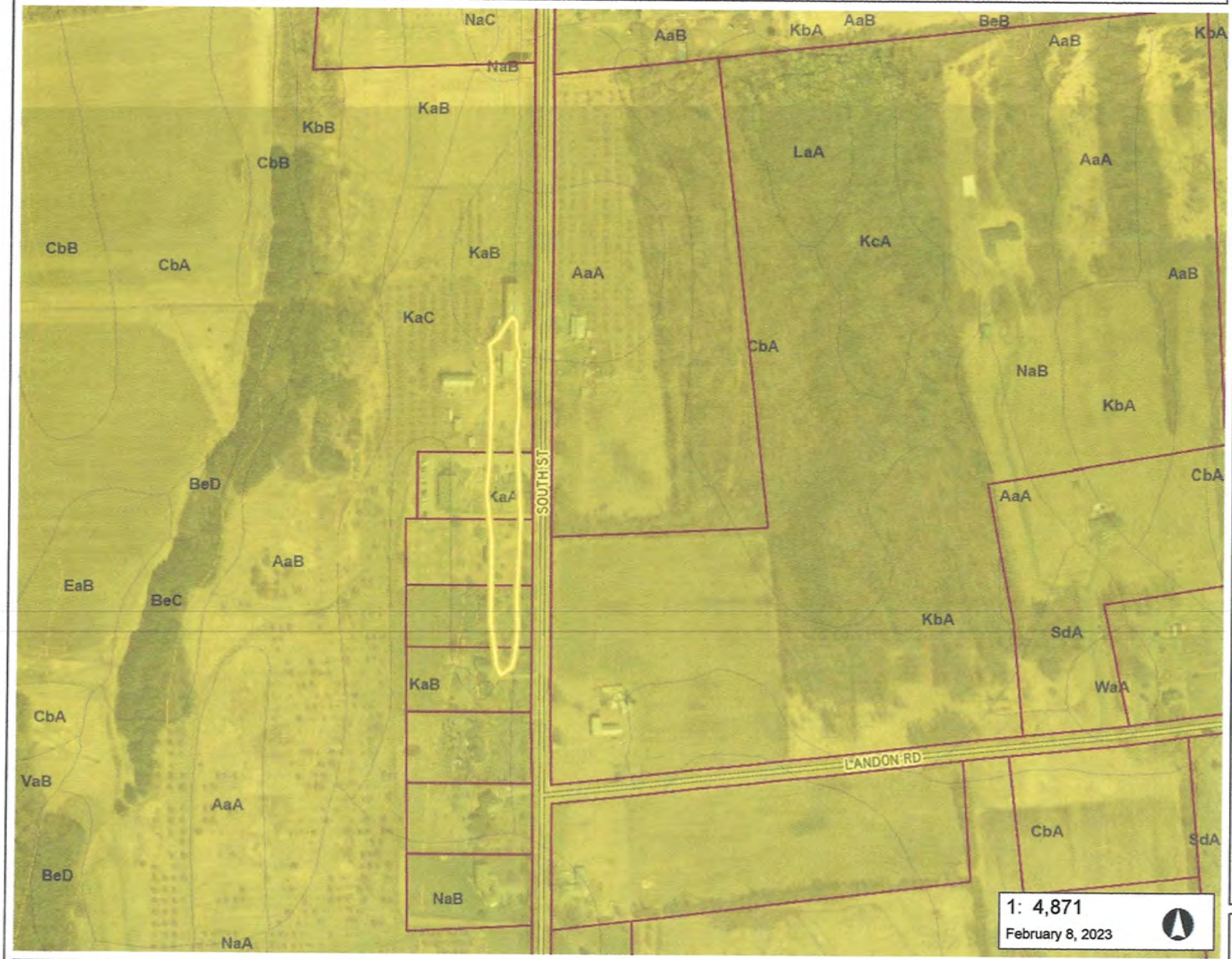
Parcels, Lidar Hillshade

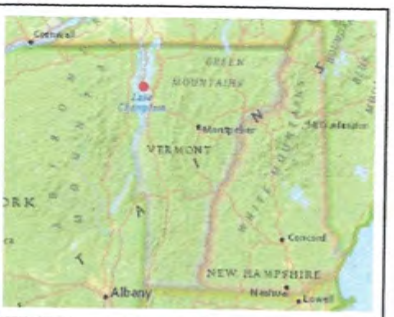
KaB, Kars fine sandy loam, 3-8% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 5A

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

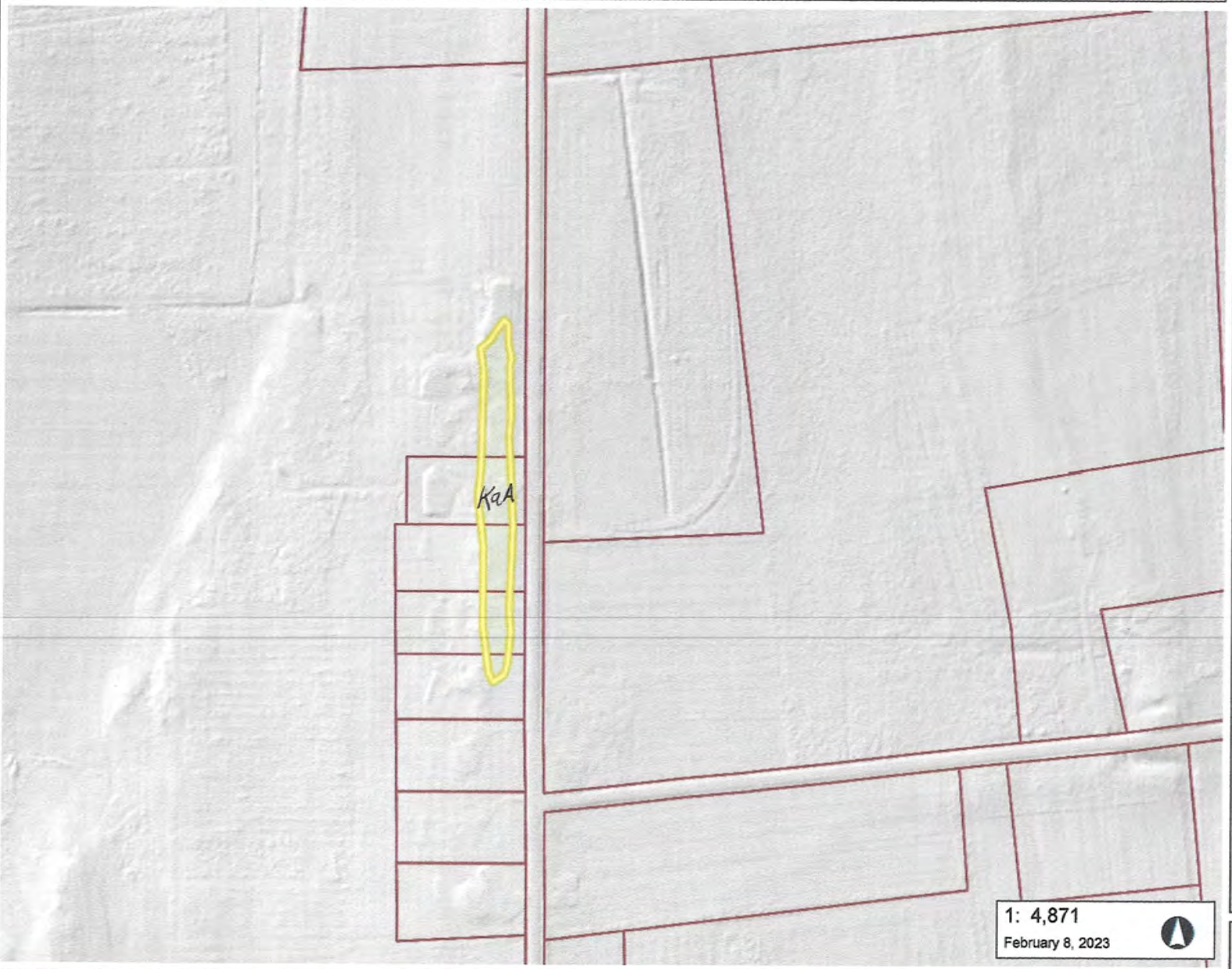
KaA, Kars fine sandy loam, 0-3% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 5B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft 1cm = 49 Meters

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NOTES

Parcels, Lidar Hillshade

KaA, Kars fine sandy loam, 0-3% slopes

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1: 4,871

February 8, 2023

812.0 0 406.00 812.0 Feet

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 6A

NOTES

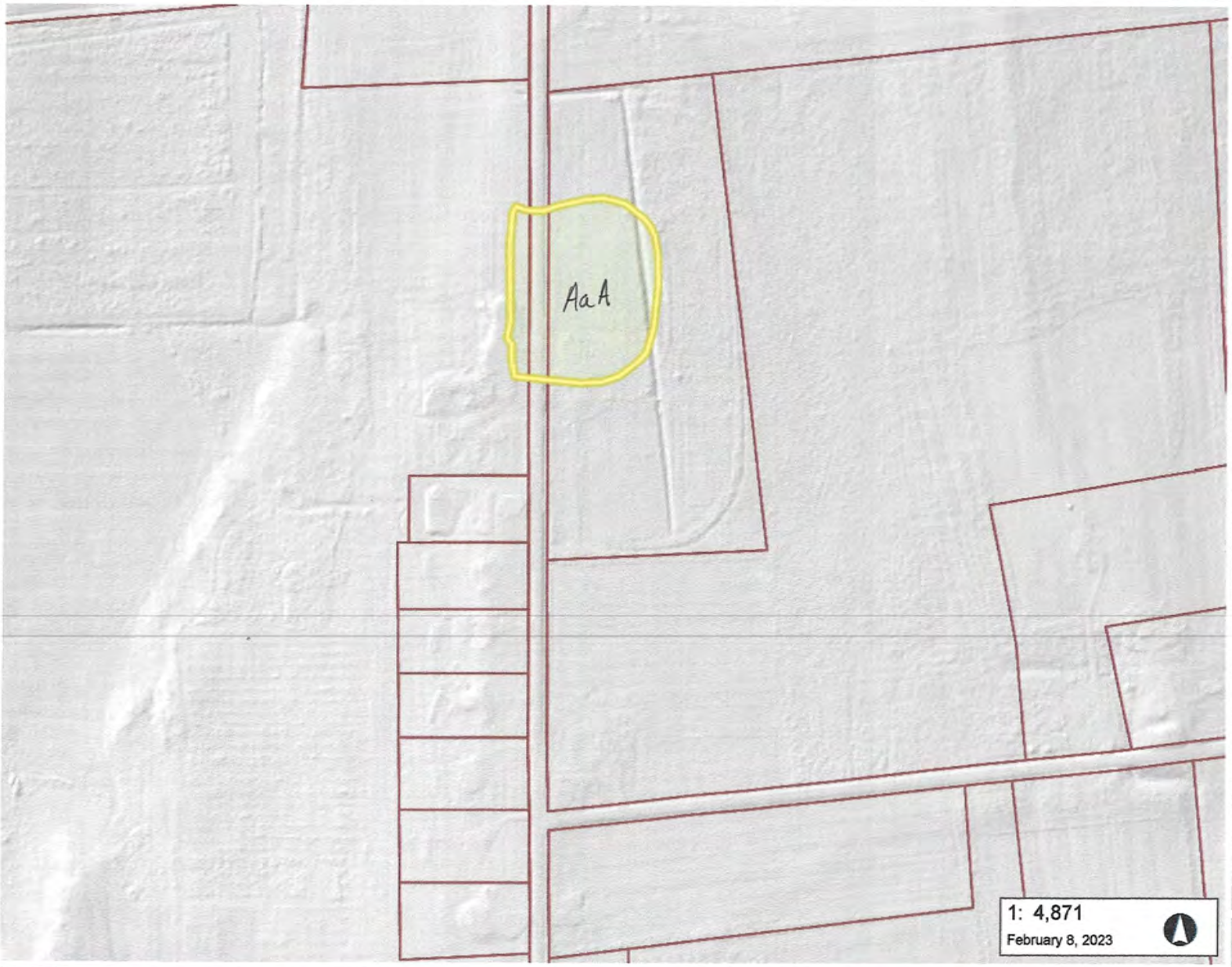
Parcels, Topography, Soil Types

AaA - Amenia silt loam, 0-3% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 6B

1: 4,871

February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Lidar Hillshade

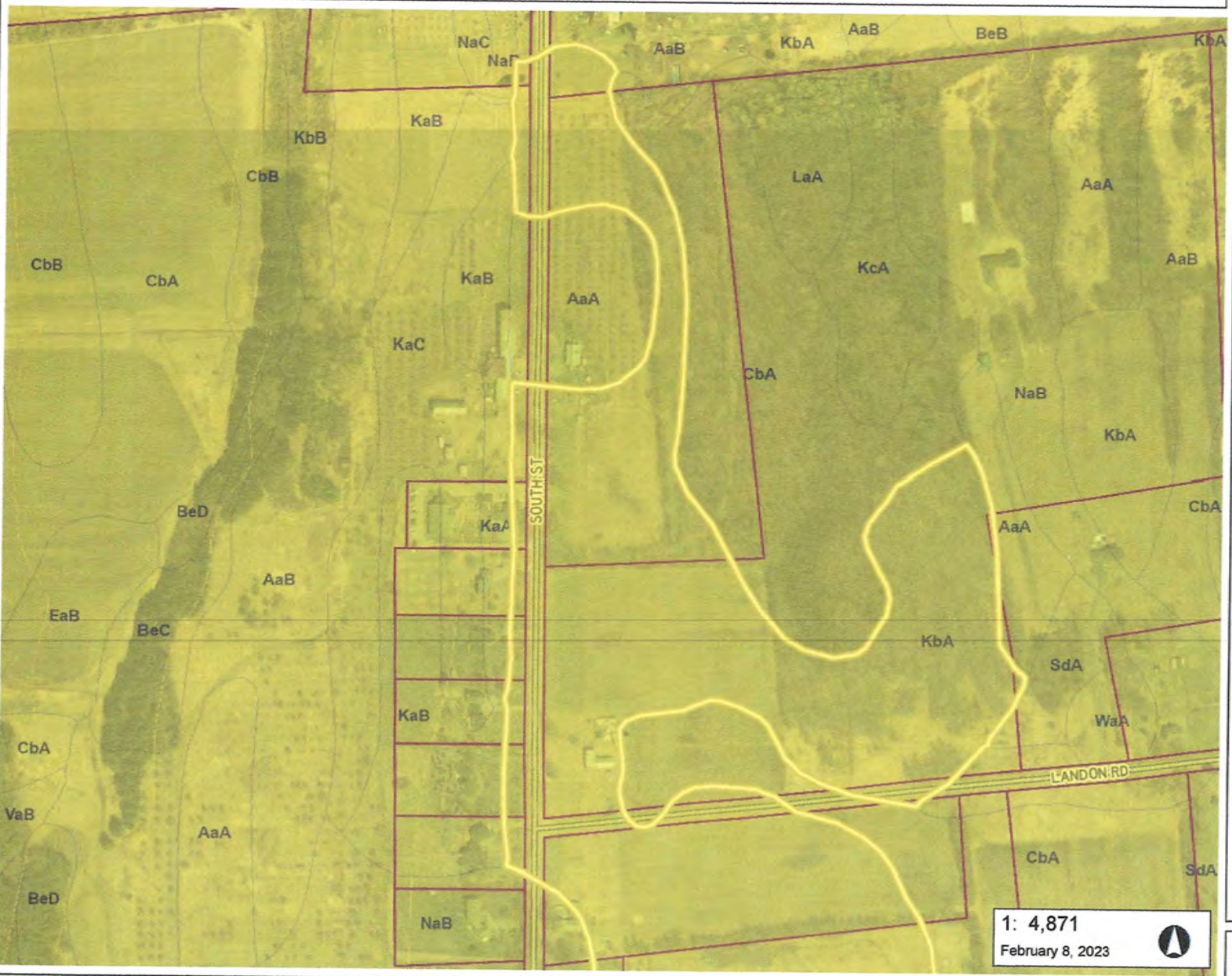
AaA, Amenia silt loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

Roads

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

Town Boundary

Area 5
Drawing 7A

NOTES

Parcels, Topography, Soil Types

KbA, Kendaia silt loam, 0-3% slopes

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

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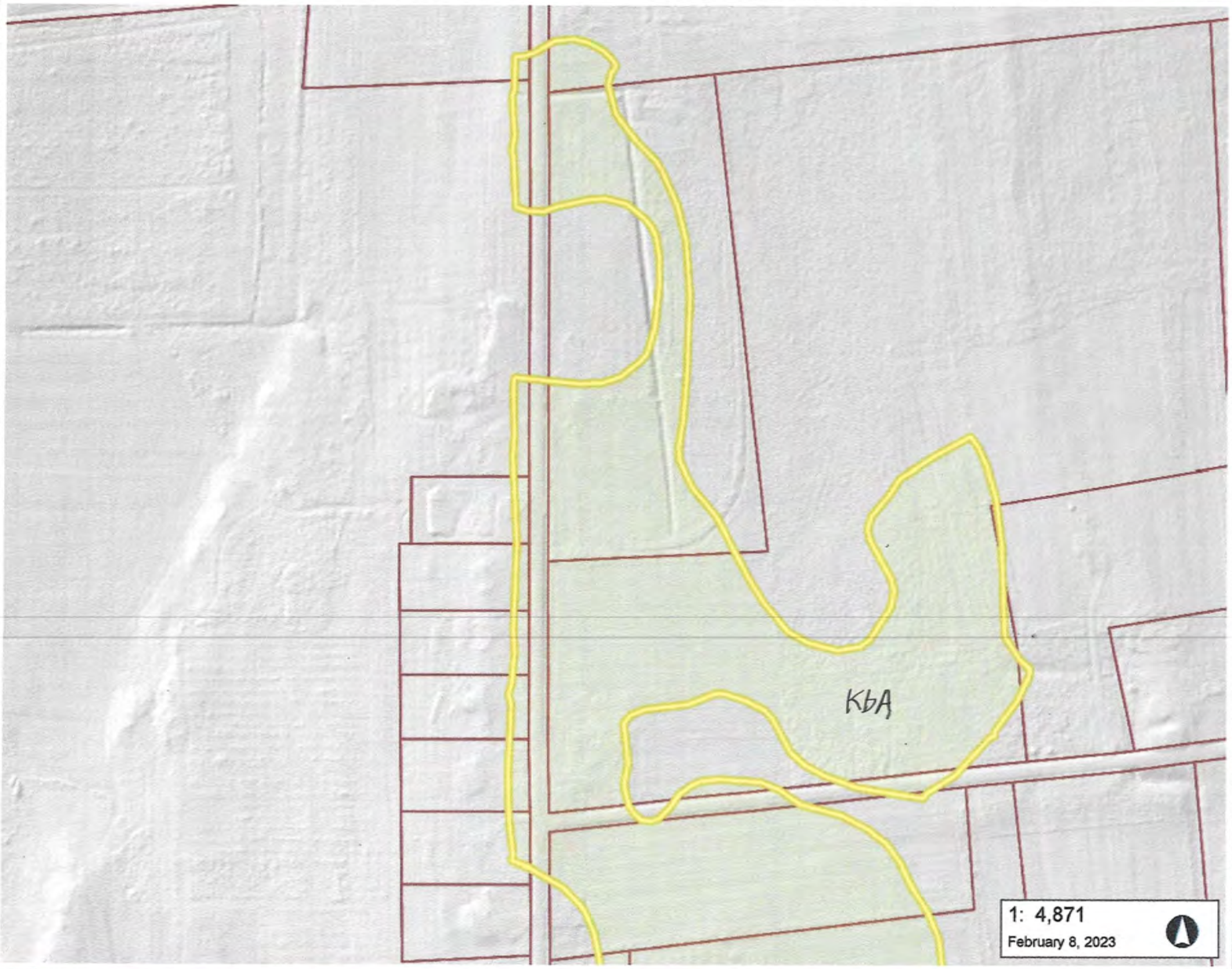
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 7B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Lidar Hillshade

KbA, Kendaia silt loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 8A

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

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NOTES

Parcels, Topography, Soil Types

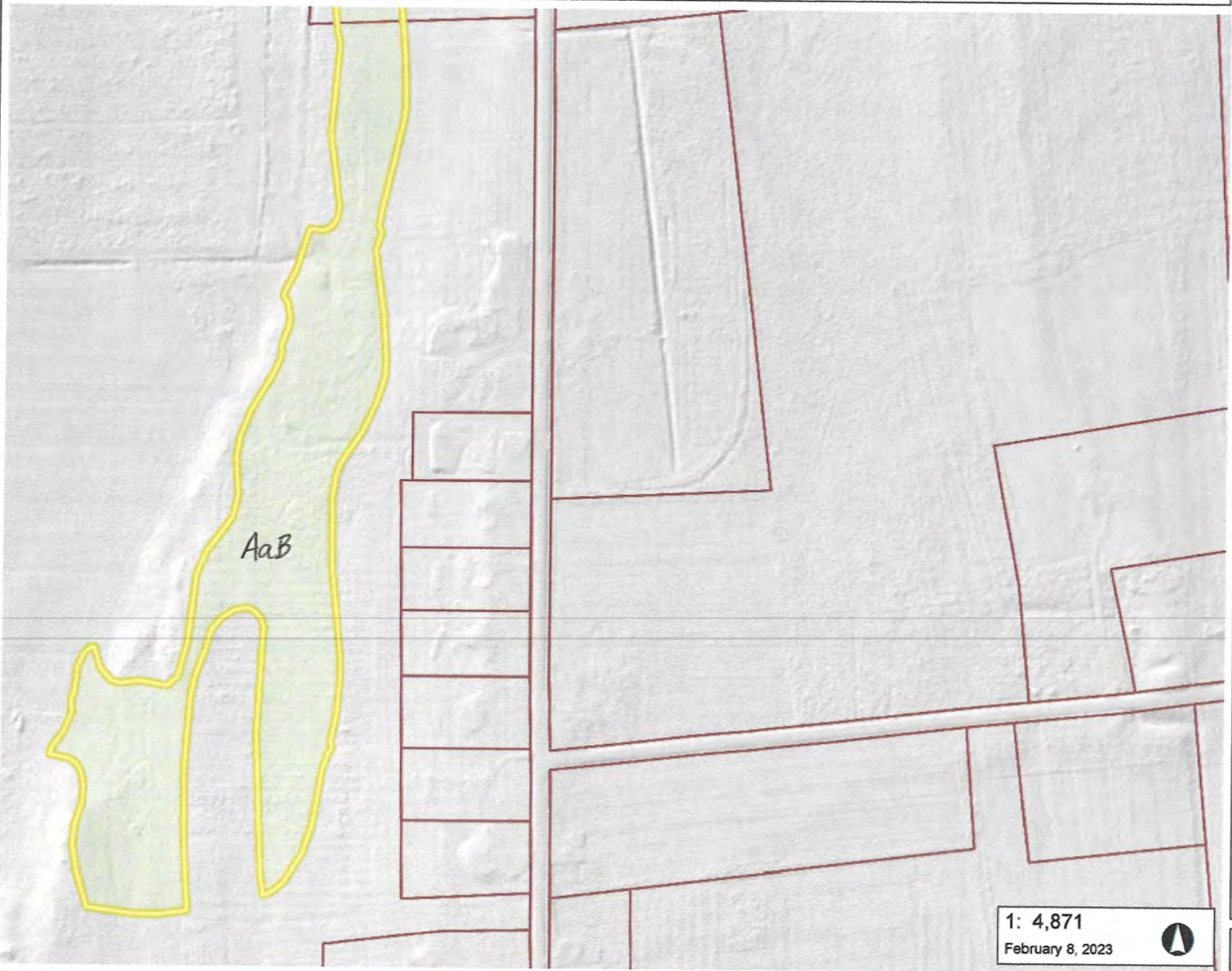
AaB, Amenia silt loam, 3-8% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 8B

1: 4,871
February 8, 2023

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft. 1cm = 49 Meters

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NOTES

Parcels, Lidar Hillshade

AaB, Amenia silt loam, 3-8% slopes

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1: 4,871

February 8, 2023



LEGEND

Soils

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

Parcels (standardized)

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

Area 5
Drawing 9A

NOTES

Parcels, Topography, Soil Types

AaA, Amenia silt loam, 0-3% slopes

812.0 0 406.00 812.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

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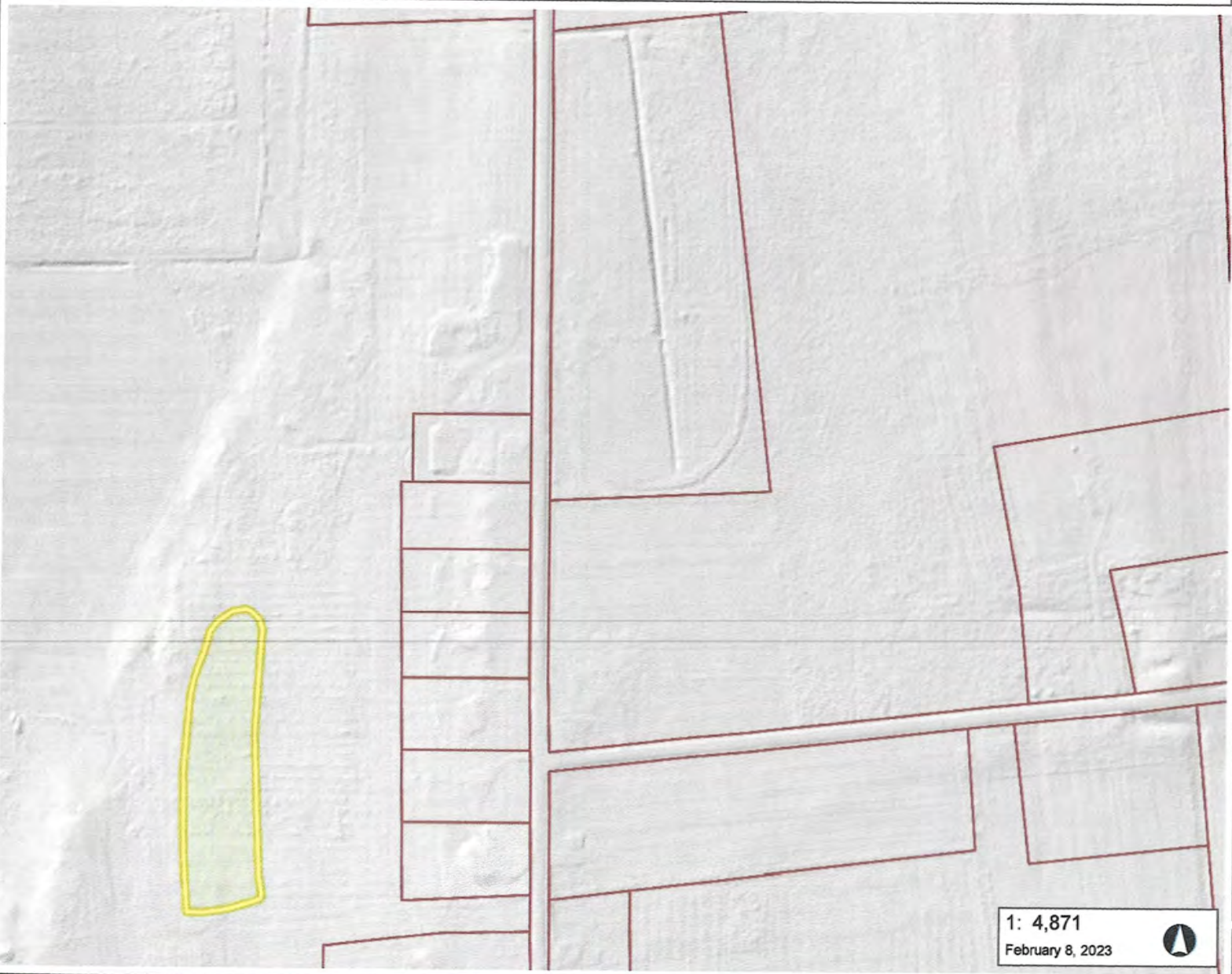
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 5
Drawing 9B

1: 4,871
February 8, 2023

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NOTES

Parcels, Lidar Hillshade

AaA, Amenia silt loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

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Town Boundary

Area 6
Drawing 1A

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NOTES

Parcels, Topography, Soil Types

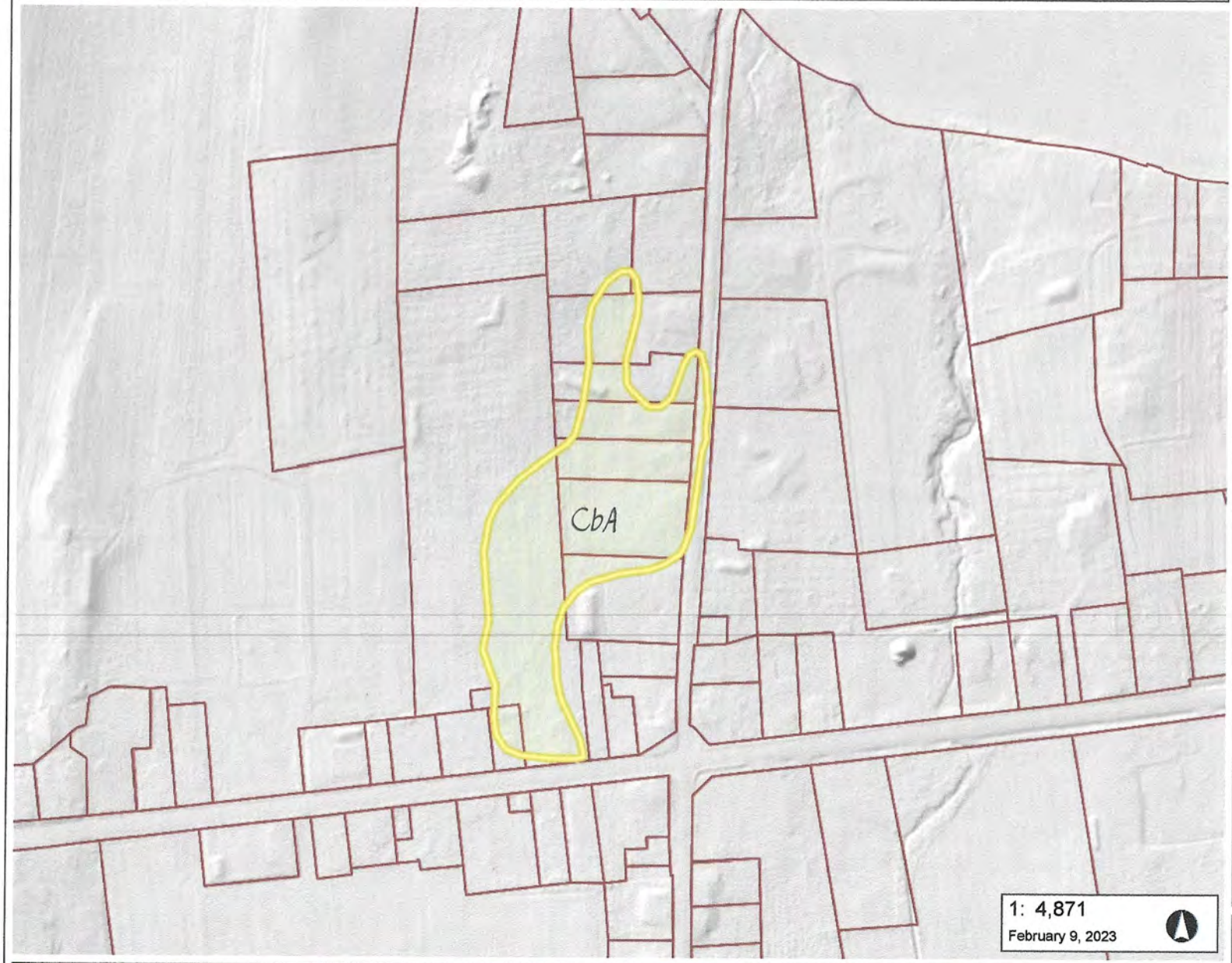
CbA, Covington silty clay loam, 0-3% slopes

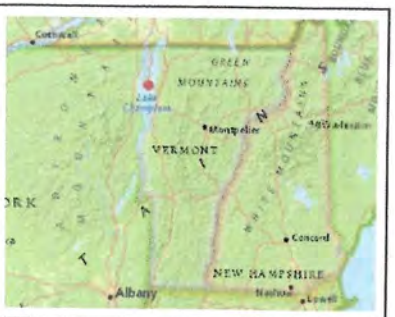
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 6
Drawing 1B

1: 4,871
February 9, 2023

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NOTES

Parcels, Lidar Hillside

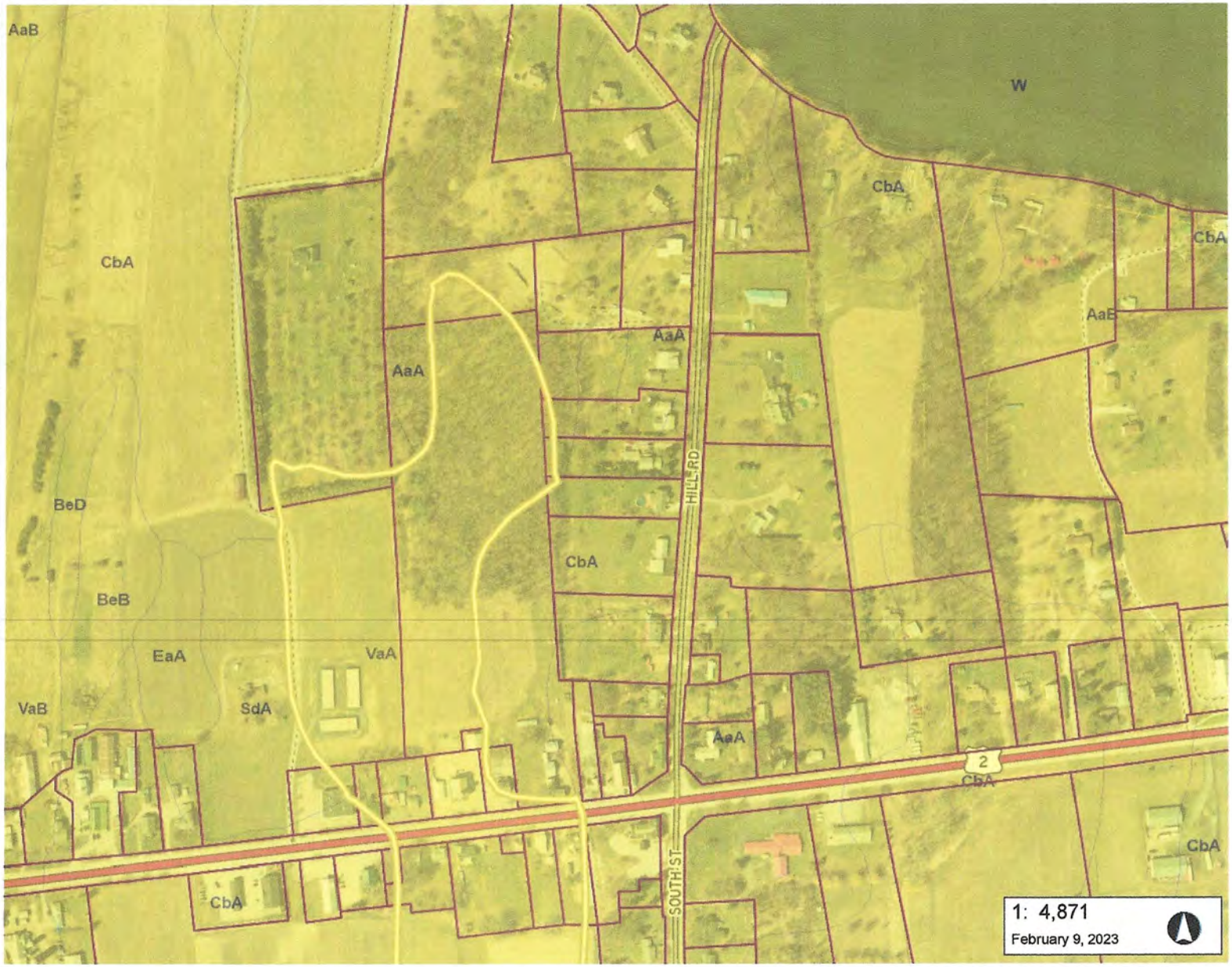
CbA, Covington silty clay loam, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

Roads

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- Town Highway (Class 4)
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Town Boundary

Area 6
Drawing 2A

NOTES

Parcels, Topography, Soil Types

VaA, Vergennes silty clay, 0-3% slopes

812.0 0 406.00 812.0 Feet

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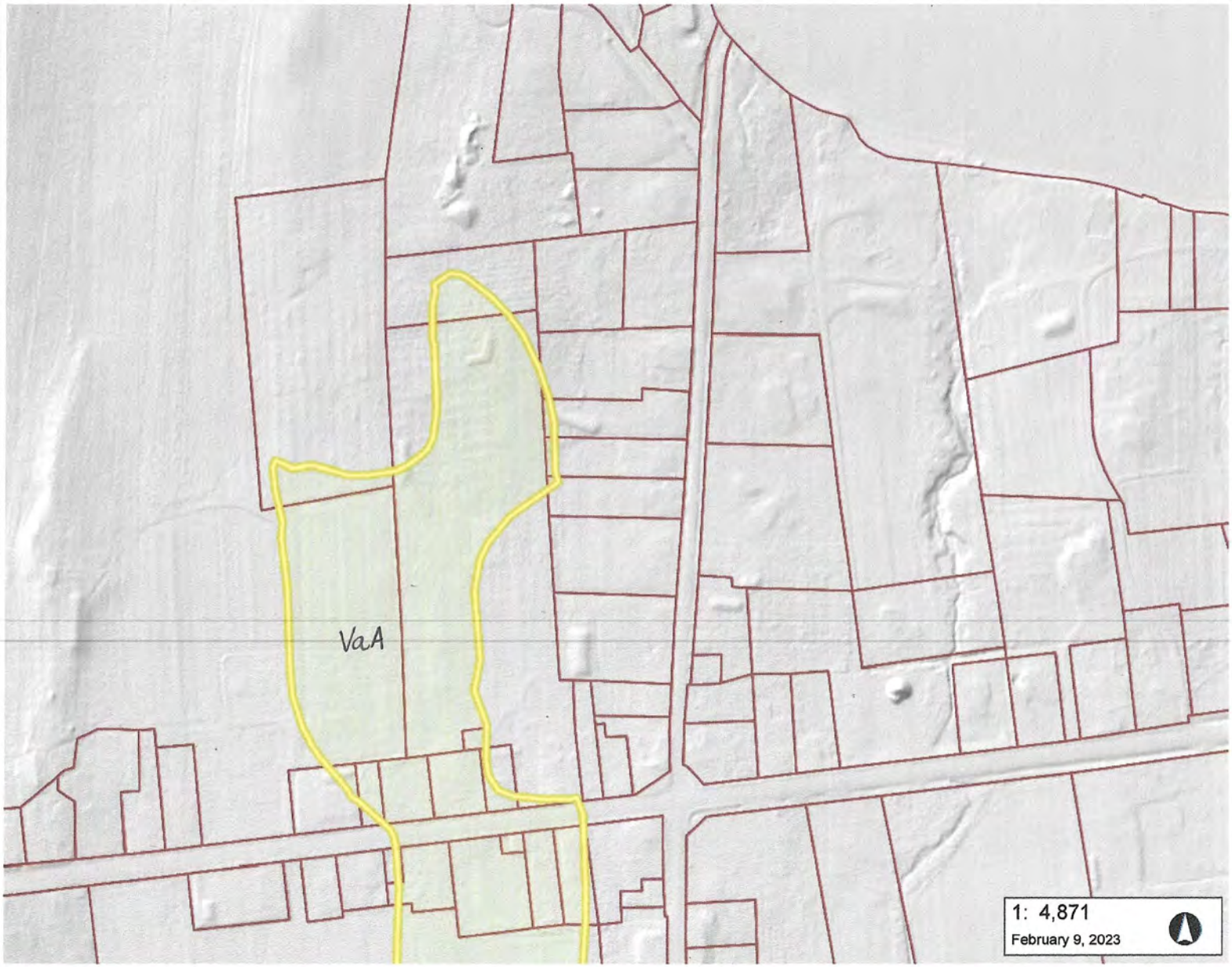
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 6
Drawing 2B

1: 4,871
February 9, 2023

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NOTES

Parcels, Lidar Hillshade

VaA, Vergennes silty clay, 0-3% slopes

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LEGEND

Soils

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

Parcels (standardized)

Roads

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- National Forest Trail
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- Proposed Roads

Town Boundary

Area 6
Drawing 3A

NOTES

Parcels, Topography, Soil Types

AaB, Amenia silt loam, 3-8% slopes

812.0 0 406.00 812.0 Feet

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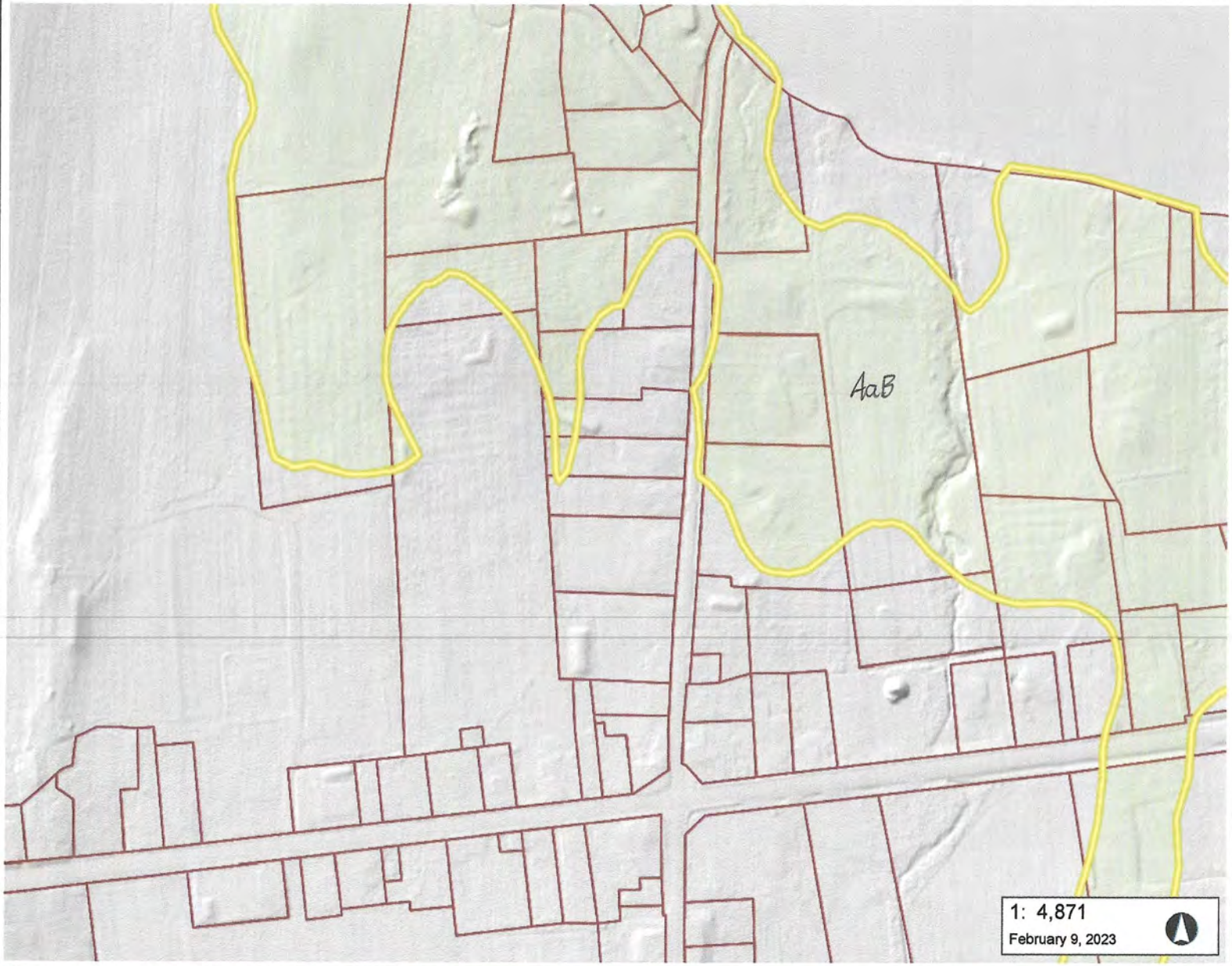
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 6
Drawing 3B

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NOTES

Parcels, Lidar Hillshade

AaB, Amenia silt loam, 3-8% slopes

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LEGEND

Soils

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Parcels (standardized)

Roads

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Town Boundary

Area 6
Drawing 4A

NOTES

Parcels, Topography, Soil Types

AaA; America silt loam, 0-3% slopes

812.0 0 406.00 812.0 Feet

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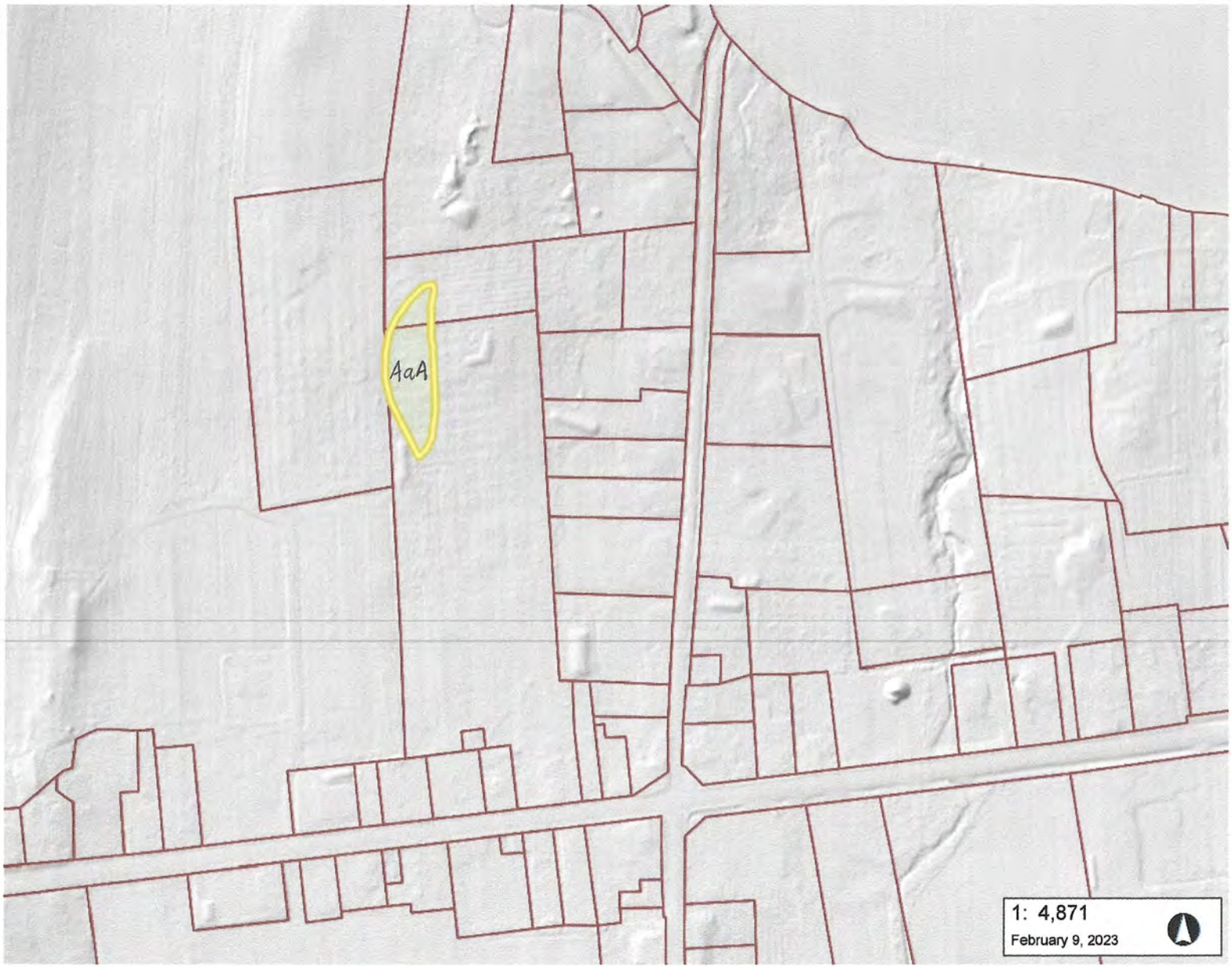
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 6
Drawing 4B

1: 4,871
February 9, 2023

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NOTES

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AaA, Amenia silt loam, 0-3% slopes

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LEGEND

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Town Boundary

Area 7
Drawing 1A

1: 4,871
February 9, 2023

812.0 0 406.00 812.0 Feet

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NOTES

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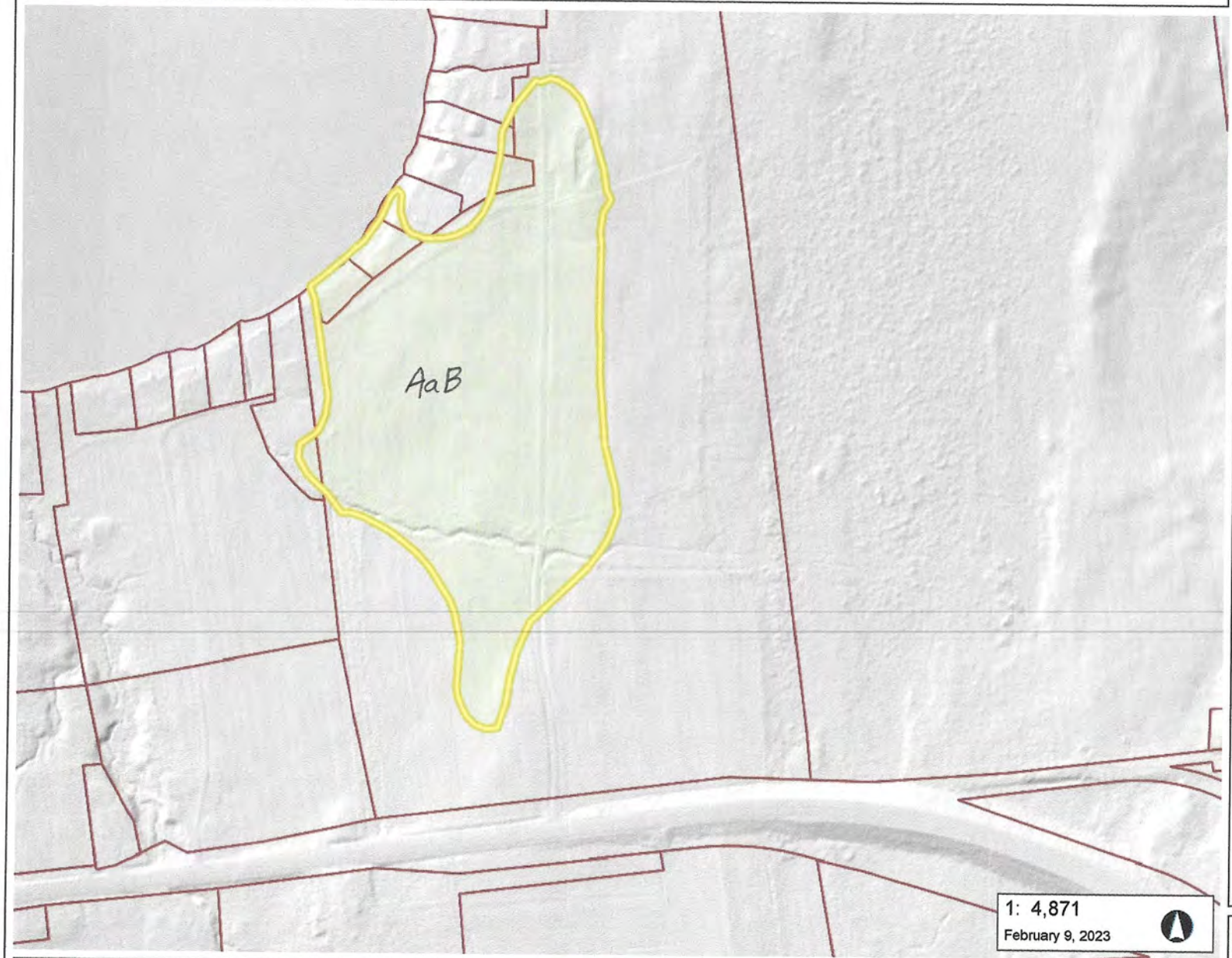
AaB, Amenia silt loam, 3-8% slopes

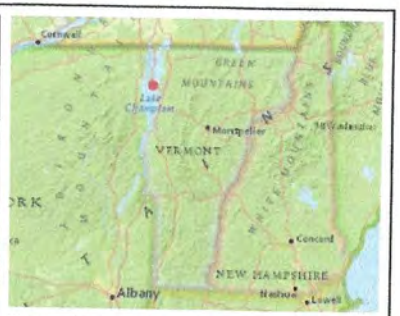
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LEGEND

- Parcels (standardized)
- Town Boundary

Area 7
Drawing 1B

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February 9, 2023

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NOTES

Parcels, Lidar Hillshade

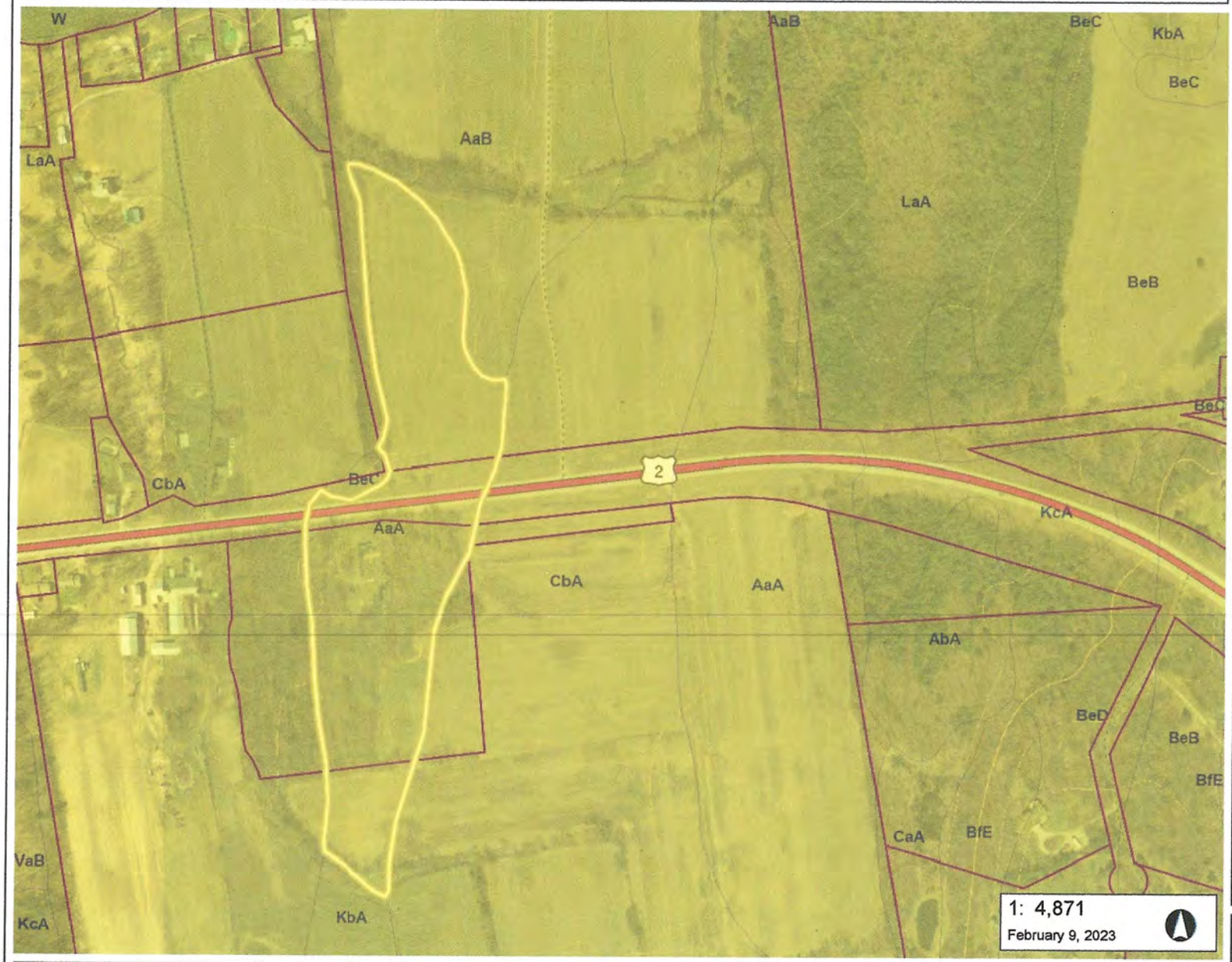
AaB, Amenia silt loam, 3-8% slopes

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LEGEND

Soils

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- <all other values>

Parcels (standardized)

Roads

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Town Boundary

Area 7
Drawing 2A

1: 4,871
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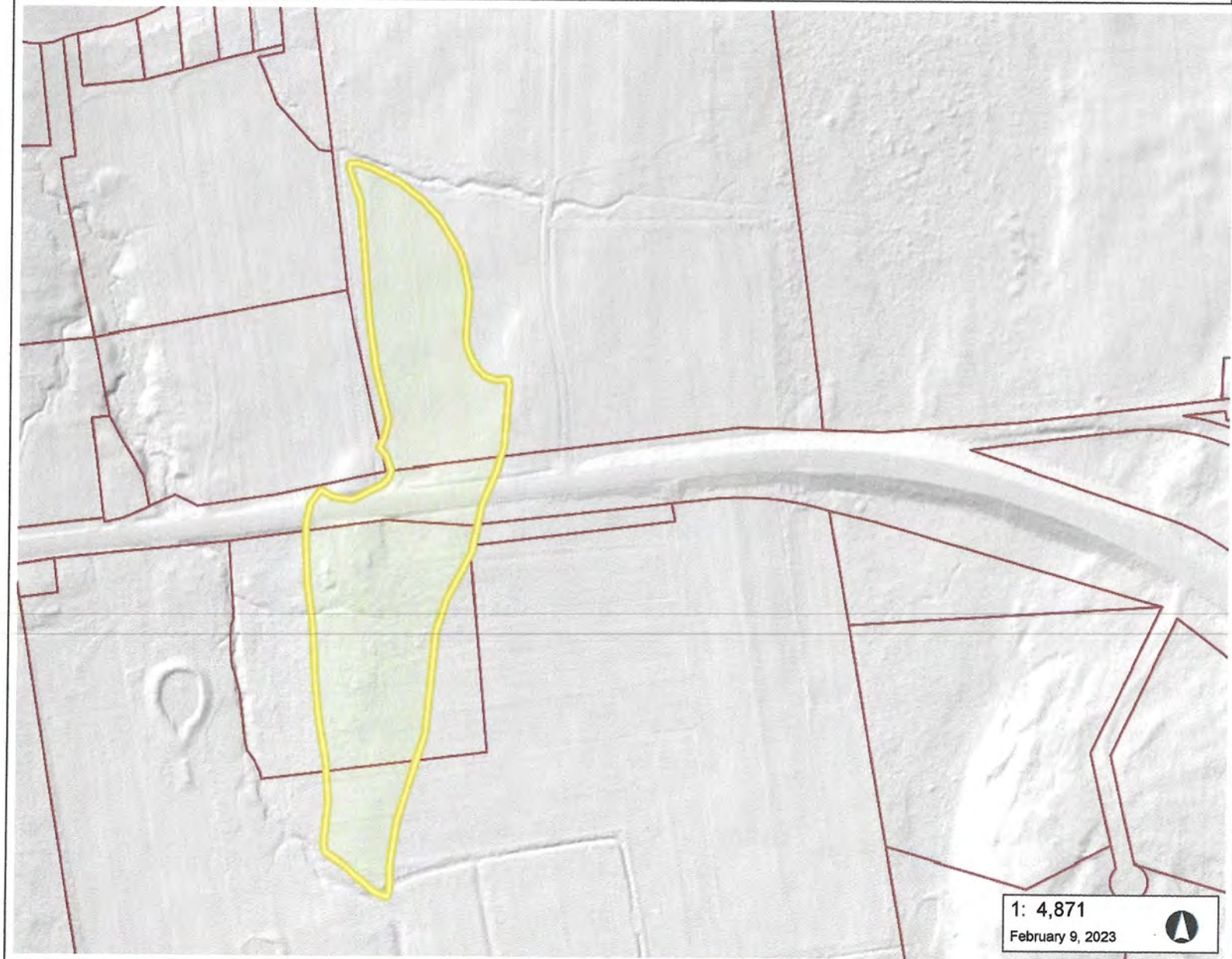
AaA, Amenia silt loam, 0-3% slopes

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LEGEND

- Parcels (standardized)
- Town Boundary

Area 7
Drawing 2B

1: 4,871
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Town Boundary

Area 7
Drawing 3A

NOTES

Parcels, Topography, Soil Types

AaA, Amenia silt loam, 0-3% slopes

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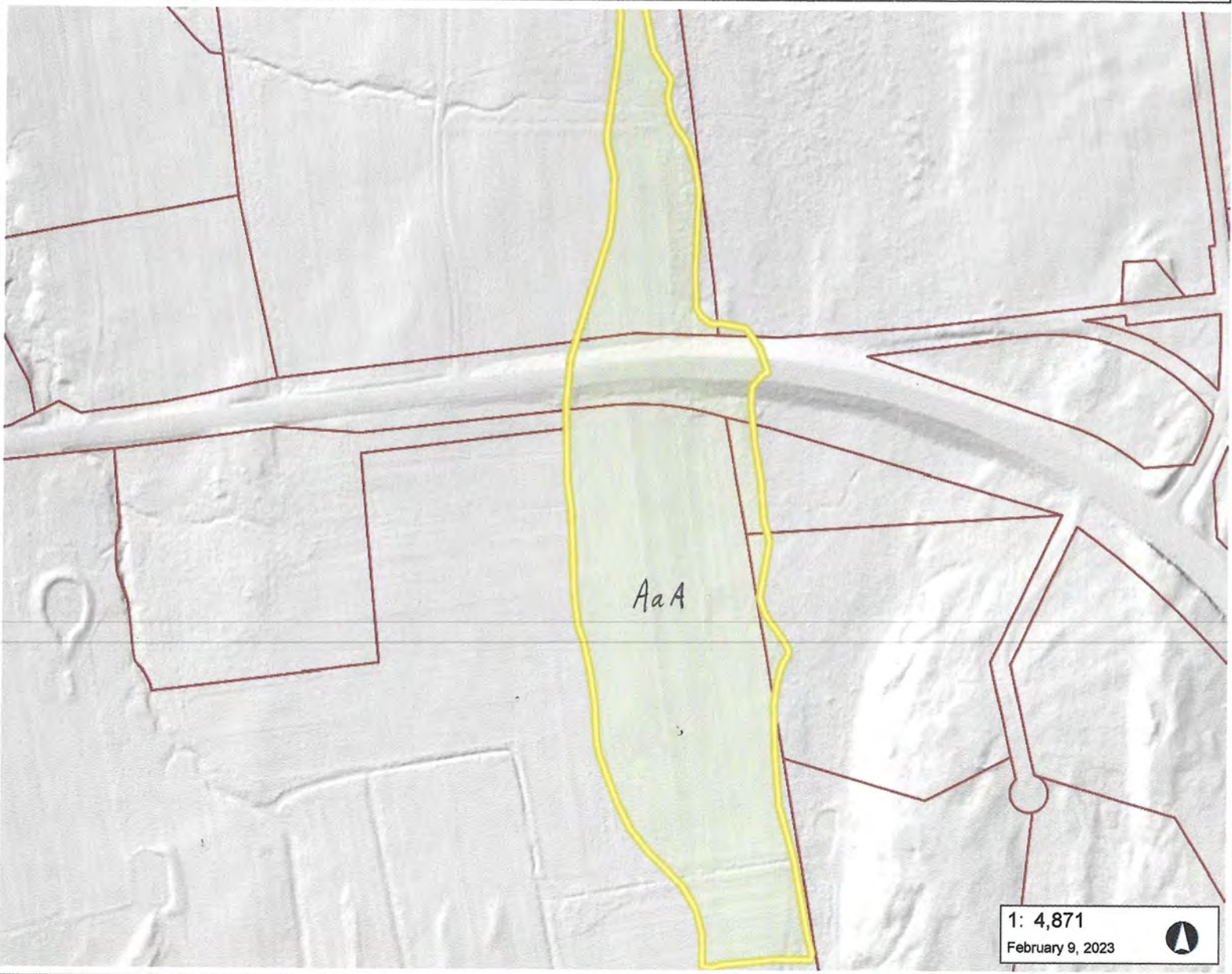
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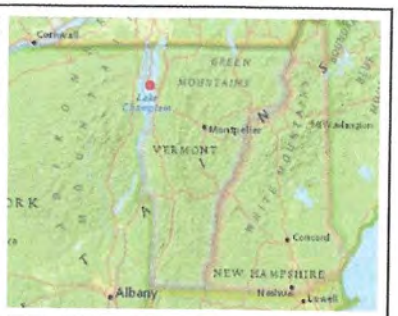
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LEGEND

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- Town Boundary

Area 7
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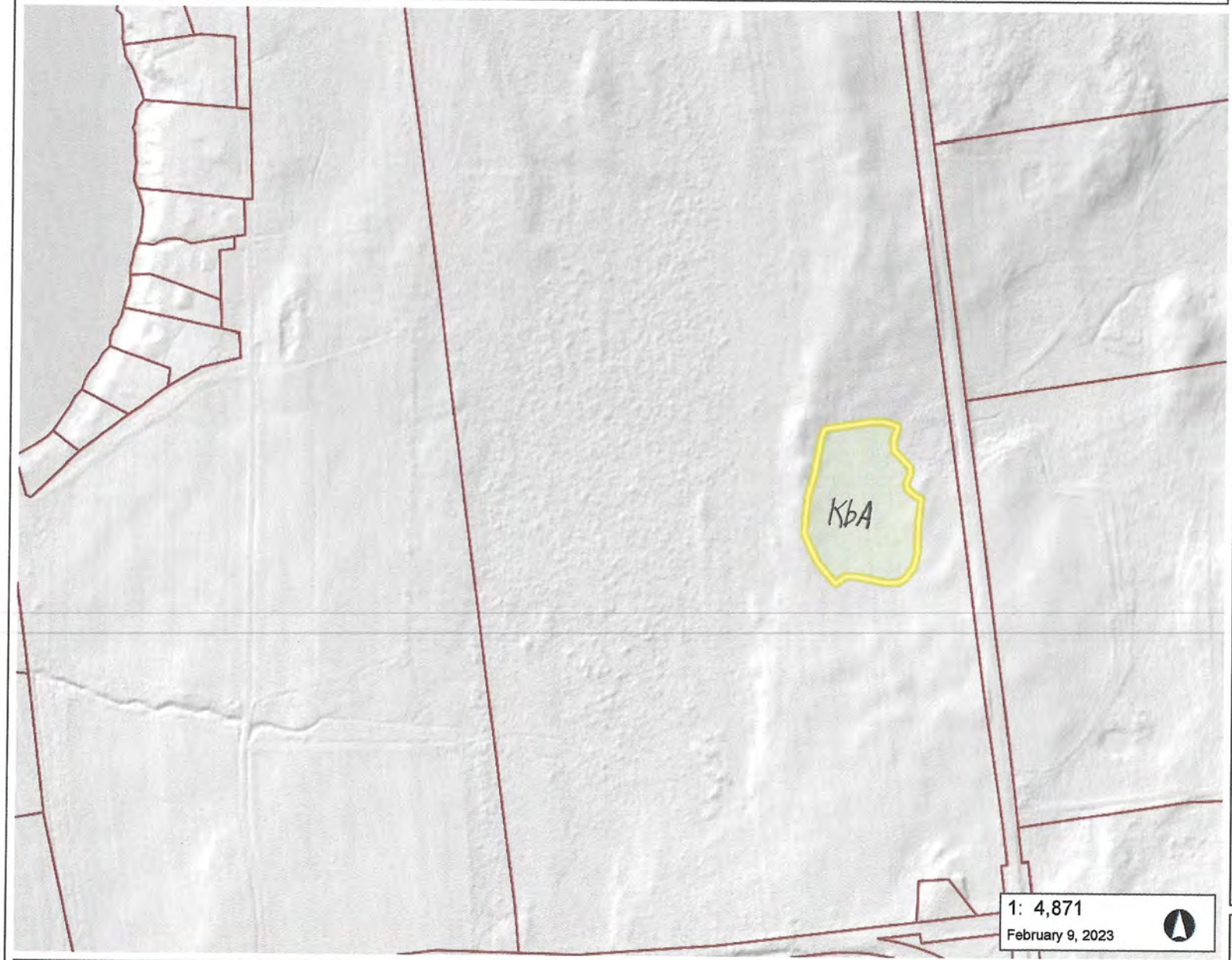
KbA, Kendaia silt loam, 0-3% slopes

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NOTES

Parcels, Lidar Hillshade

KbA, Kendaia silt loam, 0-3% slopes

APPENDIX J – SOIL TEST PIT LOGS AND MAPS

OTTER CREEK ENGINEERING

SOIL TEST PIT LOG

Project: #1127-001 Town of South Hero

Location: Camp Ta-Kum-Ta (TP-23-01, -02, & -03) and Allenholm Farm (TP-23-04 & -05), South Hero, Vermont

Date: November 29, 2023 Time: 8:30 a.m. Weather: Overcast, light breeze, 20s°F

Excavation method and Contractor: Rubber tire bucket loader and excavator, Town of South Hero Highway Department

Ground Surface Slope: 5 - 10% Logged by: Bill Norland, C.P.G., Hydrogeologist

Test Pit #	Depth interval (inches)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-23-01	0 - 7	Fine sandy loam	subangular blocky	very friable	7.5YR 4/3	-	topsoil, moist, many roots
	7 - 30	Fine to medium sandy loam	subangular blocky	friable	7.5YR 4/3	7.5YR 3/2 below 18"	moist, common roots, SHWT = 18"
	30 - 48	Gravelly medium to coarse sand, trace bivalve shells	granular	loose	10YR 3/2	-	beach, moist to wet, few roots to 36", GW seep at 42"
	48 - 92	Fine to very fine sandy loam, trace fine pebbles	subangular to angular blocky	friable to firm	7.5YR 4/2	-	moist, NBTD
TP-23-02	0 - 9	Fine sandy loam	subangular blocky	very friable	7.5YR 4/3	-	topsoil, moist, many roots
	9 - 24	Fine to medium sandy loam	subangular blocky	friable	7.5YR 4/3	7.5YR 3/2 below 20"	moist, common roots, SHWT = 20"
	24 - 46	Gravelly medium to coarse sand, trace bivalve shells	granular	loose	10YR 3/2	-	beach, moist to wet, few roots to 42", GW seep at 40"
	46 - 84	Fine to very fine sandy loam, trace fine pebbles	subangular to angular blocky	friable to firm	7.5YR 4/2	-	moist, NBTD

Test Pit #	Depth interval (inches)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-23-03	0 - 10	Clay loam	angular to subangular blocky	friable	10YR 3/3	-	wet, many roots
	10 - 16	Clay loam	angular blocky	firm	7.5YR 4/2	7.5YR 3/2 below 10"	moist, few roots, SHWT = 10"
	16 - 23	Gravelly medium to coarse sand	granular	loose	10YR 3/2	-	beach, moist to wet, GW seep at 19"
	23 - 70	Fine to very fine sandy loam, trace fine pebbles	subangular to angular blocky	friable to firm	7.5YR 4/2	-	moist, NBTD
TP-23-04	0 – 11	Fine sandy loam, some pebbles	subangular blocky	very friable	10YR 3/2	-	moist, many roots
	11 - 29	Fine sandy loam, some pebbles and gravel	subangular blocky	friable	10YR 4/3	-	moist, some roots
	29 - 76	Medium to coarse sandy loam, some pebbles and gravels	subangular blocky	friable	10YR 4/3	10YR 5/8 below 29"	moist to wet, few roots to 48", GW seep at 43" SHWT = 29"
	76 - 90	Very fine sand	blocky	friable	10YR 4/2	10YR 5/8	wet to moist, NBTD
TP-23-05	0 – 9	Fine sandy loam, some pebbles	subangular blocky	very friable	10YR 3/2	-	moist, many roots
	9 - 22	Fine sandy loam, some pebbles and gravel	subangular blocky	friable	10YR 4/3	-	moist, some roots
	22 - 50	Medium to coarse sandy loam, some pebbles and gravels	subangular blocky	friable	10YR 4/3	10YR 5/8 below 29"	moist to wet, few roots to 30", GW seep at 32" SHWT = 22"

Test Pit #	Depth interval (inches)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-23-05 (cont.)	50 - 84	Very fine sand	blocky	friable	10YR 4/2	10YR 5/8	wet to moist, NBTD

Note:
SHWT - Seasonal high water table
NBTD – No bedrock to depth
NGWTD – No groundwater to depth

APPENDIX K – ALLENHOLM MOUNDING ANALYSIS

Project Number: 1127-001
Project Name: South Hero Community Wastewater System
Date: 12/18/2023
Input by: William Norland, C.P.G.
Checked by: Robert M. Clark, P.E.

GROUNDWATER MOUNDING ANALYSIS

Darcy's Law for Movement of Water through Porous Media applied to Growundwater Mounding

Assumptions:
1. Steady State Analysis
2. Kx=Ky

1 cf=	7.481	US Liquid Gallons

Governing Equations:

$$Q=KiA=Ki(DxL)$$

Key:	
XXXXXX =	Input Cell
XXXXXX =	Output Cell
XXXXXX =	IF Statement Cell

Input Values:		
Q=	5,000	Flow Rate (gal/day)
K=	25	Hydraulic Conductivity of the Soil (ft/day)
I=	0.082	Hydraulic Gradient (ft/ft)
w=	10	Individual Trench Width (ft)
l=	500	Individual Trench Length (ft)
n=	1	# of trenches per infiltration area (#)
a=	1	# of infiltration areas (#)

Calculated Values		
L=	500	Total Length of Trenching (ft)
A=	5,000	Total Area of Trenching per area (ft^2)
WWLR =	1.00	Wastewater Loading Rate (GPD/ft^2)
WWLLR =	10.00	Wastewater Linear Loading Rate (GPD/ft)

Calculated Depth of GW Mounding		
D=	0.65	Groundwater Mounding (ft)

References:

https://dec.vermont.gov/sites/dec/files/dwgwp/rorules/pdf/GB%20Soils%20VT%20NEW%20RULES%20-%20external%20training%20v.5%20for%20printing.pdf

APPENDIX L – COLLECTION SYSTEM COST OPINIONS (IN JUNE 2025 DOLLARS)

Construction Cost Estimate
South Hero Village
STEP Low Pressure Force Main

Item	Unit Quantity		Unit Cost	Total Cost
4-Inch Sewer Force Main	4,350	LF	$200.00	$ 870,000.00
Sewer Service Connections	33	EA.	$7,500.00	$ 247,500.00
STEP Tanks	32	EA	$15,000.00	$ 480,000.00
Traffic Control	1	L.S	$100,000.00	$ 100,000.00
Allowance for Rock Removal	1	LS	$150,000.00	$ 150,000.00
General Conditions / Misc. Work	1	LS	$350,000.00	$ 350,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 2,198,000.00**

Construction Cost Estimate
South Hero Village
Grinder Pumps and Low Pressure Force Main

Item	Unit Quantity		Unit Cost		Total Cost
6-Inch Sewer Force Main	4,350	LF	$225.00	$	978,750.00
Sewer Service Connections	33	EA.	$10,000.00	$	330,000.00
Grinder Pump Stations	32	EA	$35,000.00	$	1,120,000.00
Traffic Control	1	L.S	$100,000.00	$	100,000.00
Allowance for Rock Removal	1	LS	$150,000.00	$	150,000.00
General Conditions / Misc. Work	1	LS	$500,000.00	$	500,000.00
TOTAL OPINION OF PROBABLE COST =				**$**	**3,179,000.00**

Construction Cost Estimate
Keeler Bay Village
STEP and Low Pressure Force Main

Item	Unit Quantity		Unit Cost		Total Cost
4-Inch Sewer Force Main	950	LF	$200.00	$	190,000.00
Sewer Service Connections	8	EA.	$7,500.00	$	60,000.00
STEP Tanks	8	EA	$15,000.00	$	120,000.00
Traffic Control	1	L.S	$25,000.00	$	25,000.00
Allowance for Rock Removal	1	LS	$40,000.00	$	40,000.00
General Conditions / Misc. Work	1	LS	$100,000.00	$	100,000.00
TOTAL OPINION OF PROBABLE COST =				**$**	**535,000.00**

Construction Cost Estimate
Keeler Bay Village
Grinder Pumps and Low Pressure Force Main

Item	Unit Quantity		Unit Cost		Total Cost
4-Inch Sewer Force Main	950	LF	$225.00	$	213,750.00
Sewer Service Connections	8	EA.	$10,000.00	$	80,000.00
Grinder Pump Stations	8	EA	$35,000.00	$	280,000.00
Traffic Control	1	L.S	$25,000.00	$	25,000.00
Allowance for Rock Removal	1	LS	$40,000.00	$	40,000.00
General Conditions / Misc. Work	1	LS	$125,000.00	$	125,000.00
TOTAL OPINION OF PROBABLE COST =				**$**	**764,000.00**

Construction Cost Estimate
Interconnection of Villages
STEP and Low Pressure Force Main

Item	Unit Quantity		Unit Cost		Total Cost
6-Inch Sewer Force Main	7,300	LF	$225.00	$	1,642,500.00
Sewer Service Connections	24	EA.	$7,500.00	$	180,000.00
STEP Tanks	24	EA	$15,000.00	$	360,000.00
Traffic Control	1	L.S	$100,000.00	$	100,000.00
Allowance for Rock Removal	1	LS	$150,000.00	$	150,000.00
General Conditions / Misc. Work	1	LS	$350,000.00	$	350,000.00
TOTAL OPINION OF PROBABLE COST =				**$**	**2,783,000.00**

Construction Cost Estimate
Interconnection of Villages
Grinder Pumps and Low Pressure Force Main

Item	Unit Quantity		Unit Cost	Total Cost
8-Inch Sewer Force Main	7,300	LF	$250.00	$ 1,825,000.00
Sewer Service Connections	24	EA.	$10,000.00	$ 240,000.00
Grinder Pump Station	24	EA	$35,000.00	$ 840,000.00
Traffic Control	1	L.S	$100,000.00	$ 100,000.00
Allowance for Rock Removal	1	LS	$150,000.00	$ 150,000.00
General Conditions / Misc. Work	1	LS	$350,000.00	$ 350,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 3,505,000.00**

APPENDIX M – SPRAY FIELD BASIS OF DESIGN

Otter Creek Engineering, Inc.

CONCEPTUAL SPRAYFIELD DISPOSAL SYSTEM BASIS OF DESIGN

Project No.: 1127-001 , D5
Project Name: South Hero Wastewater Evaluation
Site: Multiple
Date: December 19, 2023
Preparer: Robert M. Clark, P.E.

1. DESIGN

Maximum acceptable slope for wetted area =	30	%
Feet between wetted area of laterals =	5	ft
Gallons per day =	50,000	gallons per day
Gallons per day x 7 for weeks worth of flow =	350,000	gallons
Gallons per 8 hour period =	87,500	gallons
Gallons per minute to be sprayed =	182.29	gpm (Minimum pumping rate)

2.A. SPRAY EFFLUENT STORAGE

Min storage needed = 30 days of design flow =	1,500,000	gallons
Min storage tanks or ponds needed =	2	ponds
Min storage per tank or pond =	750,000	gallons

2.B. IF PHASING STORAGE CONSTRUCTION

Min storage 1st tank or pond = 20 days of design flow =	1,000,000	gallons
Min storage 2nd tank or pond = 10 daysof design flow =	500,000	gallons

3.A. DISINFECTION PRIOR TO SPRAYING

Contact time needed immediately prior to spraying	20	minutes
Residual needed to achieve E.Coli <= 77colonies/100ml		

3.B. DISINFECTION PRIOR TO EFFLUENT STORAGE

Contact time needed immediately prior to spraying	20	minutes
Residual needed to achieve E.Coli <= 77colonies/100ml		

4. LEVEL OF TREATMENT

Primary Treatment

Target BOD5 and TSS	30	mg/l
Application Rate (inches per week)	2	inches per week
Application Rate (inches per day)	0.29	inches per day
Equivalent gpd (per acre of wetted area)	7,758	gpd/acre
Acres of land area needed at design flow	6.44	acres
Number of fields	8	
Acres/Field	0.81	acres
Area of Field	35,091	ft2

Secondary Plus Treatment (Recirculating Sand / Textile Filter)

Target BOD5 and TSS (mg/L)	15	mg/l
Application Rate (inches per week)	3	inches per week
Equivalent gpd (per acre of wetted area)	11,638	gpd/acre

Acres of land area needed at design flow	4.30	acres
Number of fields	8	
Acres/Field	0.54	acres/field
Area of Field	23,394	ft2

Tertiary Treatment

Target BOD5 and TSS	10	mg/l
Application Rate (inches per week)	4	inches per week
Equivalent gpd (per acre of wetted area)	15,517	gpd/acre

Acres of land area needed at design flow	3.22	acres
Number of fields	8	
Acres/Field	0.40	acres/field
Area of Field	17,546	ft2

Otter Creek Engineering, Inc.

CONCEPTUAL SPRAYFIELD DISPOSAL SYSTEM BASIS OF DESIGN

Project No.: 1127-001 , D5
Project Name: South Hero Wastewater Evaluation
Site: Multiple
Date: December 19, 2023
Preparer: Robert M. Clark, P.E.

Lagoon Sizing

Min storage needed = 30 days of design flow =	1,500,000	gallons
Min storage tanks or ponds needed =	2	ponds
Min storage per tank or pond =	750,000	gallons

Storage Calculations

		750,000 gallon Lagoon Depth =		10	feet	H-h
Side Slope =	3	on	1	or	33%		
		Side length =		30	ft		
		b1 (bottom of Pond) =		20	ft		
		b2 (top of pond) =		80	ft		
		Cross Sectional Area of Pond =		500	ft2		
		Volume =		100,254	cubic feet		

Length =	201	ft

Pond Dimensions

Length	201	ft
Width (Top Surface Area)	80	ft
Depth	10	ft

APPENDIX N – PACKAGE PLANT TREATMENT COSTS (IN JUNE 2025 DOLLARS)

Construction Cost Estimate
50,000 Gallon Wastewater Treatment Facility

Item	Unit Quantity		Unit Cost	Total Cost
20,000 gallon EQ storage /headworks	1	LS	$125,000	$125,000
Algaewheel Wastewater Treatment Facility (Delivered)	1	LS	$1,550,000	$1,550,000
Algaewheel Wastewater Treatment Facility (Installed)	1	LS	$2,750,000	$2,750,000
Phosphorus Removal Equipment	1	LS	$225,000	$225,000
Chlorination / Dechlorination	1	LS	$100,000	$100,000
750,000 gallon storage ponds	2	EA	$1,250,000	$2,500,000
Standby Power System	1	EA.	$65,000	$65,000
Effluent Pump Station	1	EA	$150,000	$150,000
Spray Disposal Fields	8	EA	$85,000	$680,000
Allowance for Rock Removal	1	LS	$100,000	$100,000
General Conditions / Misc. Work	1	LS	$1,650,000	$1,650,000
TOTAL OPINION OF PROBABLE COST = $				**9,895,000**

APPENDIX O – WW PERMITS

South Hero WW Permits		
Address	**Permit Number**	**Link**
10 Carter Lane	WW-6-2361	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=153866
16 Carter Lane	WW-6-3944	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=141851
23 Carter Lane	**WW-6-0546**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66436
27 Carter Lane	**WW-6-3150**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=125382
38 Community Lane	WW-6-2361-7	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=138326
27 Heritage Drive	WW-6-2466	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69334
31 Heritage Drive	WW-6-3951	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=156073
33 Heritage Drive	WW-6-3776	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=138225
2 Hill Road	WW-6-3858	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=140347
7 Hill Road	**WW-6-2107**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68895
8 Hill Road	**WW-6-2259**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69085
12 Hill Road	WW-6-2372	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69222
15 Hill Road	**WW-6-3916**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=141434
22 Hill Road	WW-6-2189	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69000
25 Hill Road	WW-6-1367-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=134045
30 Hill Road	WW-6-3103	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=124768
6 South Street	**WW-6-0359-3**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=139546
24 South Street	WW-6-2358	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69203
32 South Street	WW-6-2300	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69131
40 South Street	WW-6-1868	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68579
41 South Street	WW-6-4068	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=145047
64 South Street	WW-6-0394	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66176
251&255 US Route 2	**WW-6-3954**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=142160
257 US Route 2	**WW-6-1651**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68297
266 US Route 2	WW-6-3541	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=141364
275 US Route 2	WW-6-2858	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=151112
280 US Route 2	WW-6-0423	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66237
295 US Route 2	**WW-6-0147-1**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=134286
301 US Route 2	PB-6-0047	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=57907
308 US Route 2	WW-6-2792-2	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=133580

316 US Route 2	WW-6-0326-3	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66047
323 US Route 2	WW-6-3114	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=124637
324&326 US Route 2	WW-6-0381	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66157
332 US Route 2	**WW-6-0117-2**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=65609
330&334 US Route 2	WW-6-0941-2	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=146584
350 US Route 2	WW-6-3437	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=132801
358 US Route 2	**WW-6-3586**	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=135114

Keeler Bay WW Permits		
Address	**Permit Number**	**Links**
1 Ferry Road	PB-6-0113-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=57956
2 Ferry Road	WW-6-0521	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=66393
3 Ferry Road	WW-6-0521-6	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=137281
8 Ferry Road	WW-6-0281-2	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=65951
15 Ferry Road	WW-6-2776-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=126635
33 Ferry Road	WW-6-1705-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68365
20 Sunrise Drive	WW-6-3145	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=125285
22 Sunrise Drive	WW-6-4045	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=144698
28 Sunrise Drive	WW-6-3463	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=133278
32 Sunrise Drive	WW-6-2118	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68908
34 Sunrise Drive	WW-6-3619	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=135625
36 Sunrise Drive	WW-6-3312	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=128567
18 Keelers Bay Road	WW-6-2516-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69409
20 Keelers Bay Road	WW-6-2645	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69560
29 Keelers Lane	WW-6-1153-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=133862
36 Cardinal Lane	WW-6-3230	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=127040
238 US Route 2	WW-6-2865	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=69807
456&466 US Route 2	WW-6-2515-6	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=144040
460 US Route 2	WW-6-3981	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=143642
488 US Route 2	WW-6-0092	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=65535
493 US Route 2	WW-6-1356-2	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=129186
500 US Route 2	WW-6-3100	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=124741
513 US Route 2	WW-6-3395	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=132127
541 US Route 2	WW-6-1916	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=68651
564 US Route 2	WW-6-0093-1	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=65537

South Hero Town Indirect Discharge Systems		
Address	**Permit Number**	**Links**
34 Hochelaga Rd	ID-9-0155	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=145685
71 US Route 2	ID-9-0154	https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=145500

APPENDIX P – DISPOSAL AND CONVEYANCE COST OPINIONS (IN JUNE 2025 DOLLARS)

Construction Cost Estimate
Cluster Wastewater Systems
Force Main Conveyance - Allen Site

Item	Unit Quantity		Unit Cost	Total Cost
4-inch Force Main	4,675	LF	$150.00	$ 701,250.00
General Conditions / Misc. Work	1	LS	$125,000.00	$ 125,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 826,000.00**

Construction Cost Estimate
Cluster Wastewater Systems
Force Main Conveyance - Lavin Site

Item	Unit Quantity		Unit Cost	Total Cost
4-inch Force Main	2,110	LF	$125.00	$ 263,750.00
General Conditions / Misc. Work	1	LS	$55,000.00	$ 55,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 319,000.00**

Construction Cost Estimate
Cluster Wastewater Systems
Force Main Conveyance - Lawrence Site

Item	Unit Quantity		Unit Cost	Total Cost
4-inch Force Main	1,550	LF	$200.00	$ 310,000.00
General Conditions / Misc. Work	1	LS	$65,000.00	$ 65,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 375,000.00**

Construction Cost Estimate
Cluster Wastewater Systems
Force Main Conveyance -Hazen Trust

Item	Unit Quantity		Unit Cost	Total Cost
4-inch Force Main	5,350	LF	$200.00	$ 1,070,000.00
General Conditions / Misc. Work	1	LS	$155,000.00	$ 155,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 1,225,000.00**

Construction Cost Estimate
Package WWTF
Force Main Conveyance -Goulet Farm

Item	Unit Quantity		Unit Cost	Total Cost
8-inch Force Main	1,750	LF	$175.00	$ 306,250.00
General Conditions / Misc. Work	1	LS	$75,000.00	$ 75,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 381,000.00**

Construction Cost Estimate
Package WWTF
Force Main Conveyance - Lawrence Site

Item	Unit Quantity		Unit Cost	Total Cost
4-inch Force Main	1,550	LF	$200.00	$ 310,000.00
General Conditions / Misc. Work	1	LS	$65,000.00	$ 65,000.00
TOTAL OPINION OF PROBABLE COST =				**$ 375,000.00**

APPENDIX Q – LIFE CYCLE ANALYSIS (IN JUNE 2025 DOLLARS)

Village of Keeler Bay
WW Feasibility Study
Do Nothing Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Replace All Septic Systems in Village (12)	$ 1,125,000		$ -	$ -	No anticipated salvage value of septic system

SUBTOTAL - CONSTRUCTION COSTS	**$ 1,125,000**	
OTHER PROJECT COSTS		
Technical Services	*$* -	Percentage based on State Fee Curve
Land Aquistion	*$* -	
Legal Admin (1%)	*$* -	
SUBTOTAL - OTHER COSTS	**$ -**	
Contingency (20%)	***$ 225,000***	
TOTAL - INITIAL CAPITAL COSTS	**$ 1,350,000**	Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	Pumping	$ 6,000	5 years	$1,102	$22,614	
2	Pump and Controls Replacement	$ 120,000	20 years	$3,918	$80,419	
3	Drainfield Maintenance	$ 120,000	25 years	$2,778	$57,021	
		Projected Annual O&M Costs		$7,798		

TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS	$	160,000
TOTAL NET PRESENT VALUE OF ALTERNATIVE	**$**	**1,510,000**

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

Village of South Hero
WW Feasibility Study
Do Nothing Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Replace All Septic Systems in Village (33)	$ 3,510,000		$ -	$ -	No anticipated salvage value of septic system

SUBTOTAL - CONSTRUCTION COSTS	**$ 3,510,000**	
OTHER PROJECT COSTS		
Technical Services	*$* -	Percentage based on State Fee Curve
Land Aquistion	*$* -	
Legal Admin (1%)	*$* -	
SUBTOTAL - OTHER COSTS	**$ -**	
Contingency (20%)	***$ 702,000***	
TOTAL - INITIAL CAPITAL COSTS	**$ 4,212,000**	Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	Pumping	$ 16,500	5 years	$3,030	$62,188	
2	Pump and Controls Replacement	$ 330,000	20 years	$10,775	$221,153	
3	Drainfield Maintenance	$ 330,000	25 years	$7,640	$156,808	
		Projected Annual O&M Costs		$21,445		

TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS	$	440,000
TOTAL NET PRESENT VALUE OF ALTERNATIVE	**$**	**4,652,000**

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

Village of South Hero
WW Feasibility Study
Phase I Cluster System Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Phase I Cluster System	$ 950,000		$ -	$ -	No anticipated salvage value of septic system
SUBTOTAL - CONSTRUCTION COSTS		**$ 950,000**				
OTHER PROJECT COSTS						
Technical Services		*$* -				Percentage based on State Fee Curve
Land Aquistion		*$* -				
Legal Admin (1%)		*$* -				
SUBTOTAL - OTHER COSTS		**$ -**				
Contingency (20%)		***$ 190,000***				
TOTAL - INITIAL CAPITAL COSTS		**$ 1,140,000**				Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	O&M	$ 20,000	1 year	$20,000	$410,490	
		Projected Annual O&M Costs		$20,000		
TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS					$ 410,000	
TOTAL NET PRESENT VALUE OF ALTERNATIVE					**$ 1,550,000**	

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

Village of South Hero
WW Feasibility Study
Phase II Cluster System Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Phase II (Full Buildout) Cluster System	$ 4,000,000		$ -	$ -	No anticipated salvage value of septic system

SUBTOTAL - CONSTRUCTION COSTS	**$ 4,000,000**	
OTHER PROJECT COSTS		
Technical Services	*$* -	Percentage based on State Fee Curve
Land Aquistion	*$* -	
Legal Admin (1%)	*$* -	
SUBTOTAL - OTHER COSTS	**$ -**	
Contingency (20%)	***$ 800,000***	
TOTAL - INITIAL CAPITAL COSTS	**$ 4,800,000**	Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	O&M	$ 30,000	1 year	$30,000	$615,735	
		Projected Annual O&M Costs		$30,000		

TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS	$	616,000
TOTAL NET PRESENT VALUE OF ALTERNATIVE	**$**	**5,416,000**

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

Village of South Hero
WW Feasibility Study
South Hero Package Wastewater Treatment Facility Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Package Wastewater Treatment Facility	$ 10,770,000		$ -	$ -	No anticipated salvage value of septic system

SUBTOTAL - CONSTRUCTION COSTS	**$ 10,770,000**	
OTHER PROJECT COSTS		
Technical Services	*$* -	Percentage based on State Fee Curve
Land Aquistion	*$* -	
Legal Admin (1%)	*$* -	
SUBTOTAL - OTHER COSTS	**$ -**	
Contingency (20%)	***$ 2,154,000***	
TOTAL - INITIAL CAPITAL COSTS	**$ 12,924,000**	Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	O&M + Employee Costs	$ 150,000	1 year	$150,000	$3,078,676	
		Projected Annual O&M Costs		$150,000		

TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS	$	3,079,000
TOTAL NET PRESENT VALUE OF ALTERNATIVE	**$**	**16,003,000**

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

Villages of South Hero and Keeler Bay
WW Feasibility Study
South Hero and Keeler Bay Phase I Cluster System Present Worth Analysis

CONSTRUCTION COSTS

Item	Description	Total Cost		Salvage Value in 50 years	Present Worth of Salvage Value	Notes
	Phase I Cluster System	$ 13,559,000		$ -	$ -	No anticipated salvage value of septic system

SUBTOTAL - CONSTRUCTION COSTS	**$ 13,559,000**	
OTHER PROJECT COSTS		
Technical Services	*$ -*	Percentage based on State Fee Curve
Land Aquistion	*$ -*	
Legal Admin (1%)	*$ -*	
SUBTOTAL - OTHER COSTS	**$ -**	
Contingency (20%)	***$ 2,711,800***	
TOTAL - INITIAL CAPITAL COSTS	**$ 16,271,000**	Construction Costs plus Other Costs plus Project Contingency

ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS

Item	Description	Total Cost and	Frequency	Annual Capitalized Cost for Period	Present Worth of Periodic Cost for 50 year Design Life	Notes
1	O&M + Employee Costs	$ 170,000	1 year	$170,000	$3,489,166	
		Projected Annual O&M Costs		$170,000		

TOTAL PRESENT WORTH OF ANNUAL/PERIODIC OPERATION AND MAINTENANCE COSTS	$ 3,489,000
TOTAL NET PRESENT VALUE OF ALTERNATIVE	**$ 19,760,000**

General Notes:

1. All Subtotals and Totals are rounded to the nearest thousand dollars.
2. Interest Rate for Present Worth is 4.27% based on current Real Interest Rate on 30-Year Treasury Notes and Bonds (March 2024) per USDA Rural Development's guidance for
3. Periodic costs are converted to an annualized capital cost for the frequency stated, and this annual cost is converted to a Present Worth based on a 50-year design life.

APPENDIX R – LAVIN MEMO

OTTER CREEK ENGINEERING

January 14, 2024

Achouak Arfaoui, Environmental Analyst
Vermont Agency of Natural Resources, Department of Environmental Conservation
Drinking Water & Groundwater Protection Division
Indirect Discharge, Wastewater System and Potable Water Supply Programs
1 National Life Dr, Davis 4, Montpelier, VT 05620-3521
achouak.arfaoui@vermont.gov
via email

Subject: Town of South Hero
Lavin Property – Summary of Potential Capacities

Dear Achouak,

At the request of the Town of South Hero, we have reviewed and conducted test pits regarding their potential purchase of the Lavin property, located off Route 2 and Lavin Lane. The property is an existing 100.67 Acre parcel of land that was subdivided into eight separate lots in 2023. Each Lot has a permitted wastewater system, all of which are located along the western most boundary line of Lot 8. A map of the existing conditions, the location of permitted wastewater disposal areas, lands to be conveyed and available natural resource mapping through the Vermont Agency of Natural Resources online interactive database are depicted on **Figure 1**. Currently, the Town has executed a Purchase and Sale Agreement with the property owner, a copy of which is included as **Attachment A**. The Town's acquisition is for the sole purpose of identifying suitable wastewater disposal capacity. Under the terms of the Purchase and Sale Agreement, the Town will acquire a wastewater disposal capacity of 2,911 Gallons Per Day (GPD), which will require the use of a pretreatment system to obtain those capacities. A copy of the permit and applicable State of Vermont Permitting Documents is included in **Attachment B**. A copy of the permitted drawings for the parcel is provided in **Attachment C**. Refer to **Table 1** for a summary of the capacities by lot.

Table 1 – Permitted Capacity of Lots

Lot	Area (acres)	Building	Building Use / Design Flow Basis	Permitted Capacity (Gallons Per Day)	
				Conveyed with Purchase	Remained with Owner or Previously Purchased
1	2.38	Proposed	3-retail stores	450	
			Reserve Design Flows	530	
2	2.54	Proposed	2-bedroom living unit, mini golf with 3-employees(no showers) and 31 patrons		449
			Reserve Design Flows	531	
3	2.36	Proposed	Senior Center with 10-patrons/staff serving 1 meal per day, commercial catering with 4-employees, office and vehicle maintenance with 9-employees		447
			Reserve Design Flows		533
4	3.79	Proposed	Rehabilitation/ care home with 12-bed spaces with 5-staff for 2-shifts		970
5	24.57	None	Reserve Design Flows	980	
6	10.27	None	Reserve Design Flows	420	
7	6.67	None	Reserve Design Flows	0	
8	48.09	None	Reserve Design Flows	0	
			Total Capacities	**2,911**	**2,399**

On December 5th, 2024, wastewater test pits were conducted by Bill Norland, Hydrogeologist of Otter Creek Engineering, with both Robert M. Clark P.E., Sr. Project Engineer of Otter Creek Engineering and yourself present at the time of the test pits. The locations of the test pits conducted on Lot 6 can be found in **Figures 2 and 3** and a copy of the test pit logs are provided in **Attachment D.**

Upon completing an initial preliminary design of the system in December, with the test pits and site information noted above, OCE scheduled and conducted additional test pits on December 30th, 2024. The test pits logs are also included in **Attachment D.**

As noted on the drawings, the limiting site condition appears to be the presence of a class II wetland, which restricts the area available for the construction and operation of the wastewater disposal system. It should be noted that this information does not appear on the Lavin Subdivision plat, however, it is mapped as such the State of Vermont Online and interactive database and we were subsequently provided a report from VHB in 2015 which confirmed delineation. Unfortunately, given the time of year, the project is beyond the established growing season to properly review wetlands and therefore a formal delineation of this area of the property cannot be conducted prior to the spring of 2025 and there is some ambiguity in the data, as the State of Vermont Online wetland inventory lists the delineation as added in 2020, with a larger, more robust boundary than the VHB Report. A copy of the VHB report is included as **Attachment E.** For the purposes of our hydraulic capacity analysis of the site, we have used the more restrictive, VSWI map on our Figures.

We prepared a conceptual layout and a preliminary basis of design for two different mound wastewater disposal systems, which are depicted graphically on **Figures 2 and 3** of this report. In both instances, the most appropriate location for the disposal system is on the southern side of Lot 6, on the knob of soil we identified. The mound basis of design is included in **Attachment F** as well as a summary of the mound design parameters presented in **Table 2** below for the two options.

Table 2 – Mound Design Parameters

Dimensions	
Bed Width (ft)	10
Bed Length (ft)	300
Total area of Bed (ft^2)	3,000
Number of Beds	1
Mound Sand added (ft)	2.50
Darcy's Law Values	
Hydraulic Conductivity of Soil (ft/day)	20
Hydraulic Gradient (ft/ft)	0.05
Design Basis	
Total Flow Rate (gpd)	3,366

Otter Creek Engineering decided to present two alternatives for the potential additional capacity of the system. Wetlands surrounding the potential location limit the size and position of the mounds.

A simplified calculation using an average of 3 slopes perpendicular along the potential mound system was used to estimate the hydraulic gradient. Considering the soil materials discovered during test pits, The hydraulic conductivity is conservatively estimated at ft/day of movement. Chapter 1 of the State of Vermont wastewater rules allow for the use of pretreatment systems to double the application rate from 1.00 Gallons per day per square foot (gpd/ft^2) up to 2.00 gpd/ft^2 when used prior to a mound wastewater disposal system. A hydrogeologic analysis of the soil conditions was conducted based on the most limiting test pit (TP-24-14), located downgradient of the wastewater disposal system and basal area of the mound. In this test pit, the limiting condition was observed 2.00 feet below ground level.

Hydraulic Conductivity, the depth to impeding conditions, and the hydraulic gradient were used with Darcy's Law to Solve for the Linear Loading Rate (LLR) of the potential site. The LLR was calculated to be 11.2 gpd/ft. Using the solved LLR, the total capacity of the system was calculated. When compared to the overall size of the potential mound the application rate could be calculated. The application rate was found to be 1.12 gpd/ft^2 and is limited due to the size of the mound and the depth to impeding conditions.

Based on these tests, we estimate that the capacity of a permittable WW disposal system in this area to be 3,366 gpd. We recommend conducting a formal wetland delineation in the Spring of 2025. The final capacity of the site will be subject to:

1. Most limiting condition found within the mound design
2. Delineated boundary of the class II wetland.

We suggest that the Town of South Hero secure written confirmation of this analysis and preliminary capacity before proceeding with full design and permitting. Additionally, we understand that this land acquisition is to be funded through the Town of South Hero ARPA grant which had been previously awarded by the State of Vermont. A summary of the Lavin Property investigations is presented in **Table 3** below.

Table 3

Disposal Capacity		
Permitted	2,911	gpd
Potential	3,366	gpd
Total	**6,277**	**gpd**

Concurrence on funding should be provided by the applicable state authority prior to closing on the property. Please contact me if you have any questions.

Sincerely,

Robert M. Clark, P.E.
Principal Engineer

OTTER CREEK ENGINEERING

Disclaimer: The purpose of this memo is to summarize the potential of the Lavin Property from a wastewater disposal capacity. Otter Creek Engineering, Inc. in no way represents a guarantee that the site can be permissible at this capacity.

US Route 2

GRID NORTH

60' EASEMENT

LOT 1

LOT 2

LOT 3

LOT 4

20' SEWER EASEMENT

LOT 5

n/f Martin & Patricia Lavin

LOT 6

LOT 7

n/f Martin & Patricia Lavin

LOT 8

180' WASTEWATER EASEMENT

MOUND 6A FOR FUTURE USE

MOUND 6 FOR FUTURE USE

LOT 3 MOUND

LOT 1 MOUND

LOT 2 MOUND

LOT 4 MOUND

MOUND 5 FOR FUTURE USE

60' EASEMENT

South Road

AaA AaB AbA AbB NaB

LEGEND

- AaB — SOIL MAP UNIT SYMBOL
- WASTEWATER SOIL RATING 2
- class II wetland
- village center
- parcel of interest
- village zoning boundary
- village center boundary
- investigation area
- conserved land
- n/f Brent Hazen Trust — landowner

OTTER CREEK ENGINEERING

FILE: 1127-001 LAVIN

TITLE: SOUTH HERO VILLAGE LAVIN SITE

FIGURE NO. 1

SCALE: 1" = 400'

GRID NORTH

160

165

170

175

180

TP24–1

TP24–2

TP24–3

TP24–4

TP24–5

TP24–6

TP24–11

TP24–12

TP24–13

TP24–14

268' TO PROPERTY LINE
(25' MIN.)

74' TO PROPERTY LINE
(25' MIN.)

n/f Martin & Patricia Lavin

LEGEND

- TP24–1 — test pit
- village center
- village zoning boundary
- village center boundary
- n/f Brent Hazen Trust — landowner
- MOUND ISOLATION ZONE
- MOUND OVERSHADOWING

OTTER CREEK ENGINEERING

FILE: 1127-001 LAVIN

TITLE:
SOUTH HERO VILLAGE
LAVIN SITE
TEST PITS

FIGURE NO.
2

SCALE: 1" = 80'

GRID NORTH

160

165

170

175

180

TP24–3

TP24–4

TP24–5

TP24–2

TP24–1

TP24–13

TP24–11

TP24–12

TP24–14

TP24–6

n/f Martin & Patricia Lavin

231' TO PROPERTY LINE
(25' MIN.)

95' TO PROPERTY LINE
(25' MIN.)

LEGEND

TP24–1	test pit
	village center
	village zoning boundary
	village center boundary
n/f Brent Hazen Trust	landowner
	MOUND ISOLATION ZONE
	MOUND OVERSHADOWING

OTTER CREEK ENGINEERING

FILE: 1127-001 LAVIN

TITLE:
SOUTH HERO VILLAGE
LAVIN SITE
DISPOSAL OPTION 2

FIGURE NO.
3

SCALE: 1" = 80'

PURCHASE AND SALE AGREEMENT

This Purchase and Sale Agreement (the "Agreement") is by and between **MARTIN LAVIN** and **PATRICIA LAVIN**, of Burlington, Vermont (together, the "Seller") and the **TOWN OF SOUTH HERO**, a Vermont municipality with a principal place of business in South Hero, Vermont ("Buyer"), and is made and entered into as of the date of execution by the last party to execute this Agreement (the "Effective Date").

Background

1. Seller is the owner Lot 1 and Lots 4-8 of an eight (8) lot subdivision located at 275 U.S. Route 2 in South Hero, Vermont (the "Property") as shown on a subdivision plat entitled: "Lavin Lots 1-8, Subdivision Plan," prepared by David H. Tudhope, L.S. dated May 23, 2023, a copy of which is attached hereto as Exhibit A (the "Subdivision Plat"). Seller previously conveyed Lot 2 and Lot 3 as shown on the Subdivision Plat. Seller will retain Lot 4 as shown on the Subdivision Plat. Lot 2, Lot 3, and Lot 4 are not included with the Property.

2. Buyer has obtained initial approval of the Vermont Department of Environmental Conservation (DEC) and the Agency of Commerce and Community Development (ACCD) for grants to purchase the Property for the purpose of developing a municipally owned community wastewater system on the Property to serve the South Hero Designated Village District and immediately surrounding area. Accordingly, included with the Property will be all of Seller's right, title and interest in and to the permitted wastewater capacity for lot 1, lots 5-8, and the "reserved design flow": associated with lot 2 (531 GPD) as further described in State of Vermont Wastewater and Potable Supply Permit No. WW-6-2858-1, together with all of Seller's existing wastewater infrastructure located on the Property.

3. Buyer wishes to purchase from Seller, and Seller wishes to sell to Buyer, the Property in accordance with the terms, conditions and requirements of this Agreement.

NOW, THEREFORE,

In consideration of the foregoing and the mutual covenants and agreements herein set forth, and in reliance on the representations and warranties contained herein, the parties hereby agree as follows:

Section 1. **Sale and Purchase**. Seller agrees to sell and convey to Buyer, and Buyer agrees to purchase from Seller the Property, which shall consist of fee title to Lot 1 and Lots 5-8 as shown on the Subdivision Plat, together with all of Seller's right, title and interest in and to the permitted wastewater capacity for lot 1, lots 5-8, and the "reserved design flow": associated with lot 2 (531 GPD) as further described in State of Vermont Wastewater and Potable Supply Permit No. WW-6-2858-1 or as otherwise available on such lands, together with all of Seller's existing wastewater infrastructure located on the Property. The Property will be conveyed subject to the existing easement rights of the Lot 2, Lot 3, and Lot 4 owners for ingress, egress, utilities and wastewater as shown on the Subdivision Plat.

Section 2. **Purchase Price**. The purchase price (the "Purchase Price") to be paid by Buyer to Seller for the Property shall be Eight Hundred Forty Thousand and 00/100 Dollars ($840,000.00). The Purchase Price shall be payable as follows:

(a) A deposit of Ten Thousand and 00/100 Dollars ($10,000.00) shall be delivered to the Escrow Agent upon execution of this Agreement (the "Deposit').

(b) A portion of the Purchase Price equal to Ninety Thousand and 00/100 Dollars ($90,000.00), shall be provided as a charitable contribution by Seller to Buyer for Buyer's municipal project ("Seller's Charitable Contribution"). Buyer shall provide a gift letter or other customary documentation or forms at Closing to memorialize Seller's Charitable Contribution to Buyer.

(c) The balance of the Purchase Price, adjusted by apportionments set forth herein, shall be paid at Closing (as hereinafter defined), by bank, cashier's or certified check jointly payable to Buyer and Seller, or by wire transfer pursuant to written instructions given by Seller to Buyer.

Section 3. **Deposit**. At the execution of this Agreement, Buyer shall make the Deposit payment, which shall be held in a non-interest bearing account by Gravel & Shea PC, the Buyer's attorney (the "Escrow Agent"). The Deposit shall be applied to the Purchase Price paid at Closing. In the event the Closing does not occur, the Deposit shall be disbursed as provided herein.

The Escrow Agent shall not be liable to any party to this Agreement in the absence of gross negligence or willful misconduct and shall be fully protected with respect to any action taken or omitted by it in good faith. Each party agrees, jointly and severally, to indemnify, defend and hold Escrow Agent harmless from any losses, liabilities, claims, damages, costs or expenses including reasonable attorneys' fees and disbursements arising out of or in connection with its acceptance and administration of the Deposit (including the costs and expenses of defending itself against any claim of liability in connection therewith), except to the extent arising as a result of the gross negligence or willful misconduct of the Escrow Agent as finally determined by a court of competent jurisdiction.

Section 4. **Buyer's Due Diligence**. Buyer may perform its due diligence relating to the Property and shall complete its due diligence period on or before the sixtieth (60th) day after the Effective Date (the "Due Diligence Date"). During the due diligence period, Buyer may inspect the Property and conduct, at Buyer's sole cost and expense, such reviews, tests and studies and take such actions as Buyer shall deem appropriate in connection with its investigation of the Property, including, but not limited to the following:

(a) Review of title to the Property (See also Section 12 below).

(b) Review of the permits and approvals for the Property and project feasibility and wastewater capacity for Buyer's intended community wastewater system project on the Property ("Buyer's Project"), including soil analysis, test pits, and review of the engineering plans for the Property.

(c) Inspection of the available utilities and wastewater systems servicing the Property, inspection and review of the access road and utility plans and construction, or any related studies deemed necessary by Buyer for its investigation of the Property for Buyer's Project.

(d) Buyer obtaining an Environmental Site Assessment of the Property.

(e) Buyer obtaining a formal resolution from the Town Selectboard to approve the purchase of the Property.

(f) Buyer reviewing the easement terms and/or covenants governing the maintenance, repair and replacement of the access road and utilities serving the lots shown on the Subdivision Plat, including any agreements or deed covenants relating to adjacent Lot 2, Lot 3, and Lot 4.

If the results of Buyer's due diligence are not acceptable to Buyer for any reason, Buyer may, in Buyer's sole discretion, on or before the Due Diligence Date elect to: (i) rescind this Agreement by providing written notice of termination to Seller, in which case all of the rights and obligations of the parties to this Agreement shall cease and terminate and the Deposit shall be refunded to Buyer; or (ii) waive the satisfaction of such conditions and proceed with the purchase contemplated by this Agreement without a reduction in the Purchase Price (the "Due Diligence Payment"). The failure of Buyer to provide its termination or extension notice on or before the Due Diligence Date shall be deemed a waiver of the satisfaction of the above conditions.

Section 5. **Buyer's Closing Conditions**. Buyer's obligation to close under this Agreement shall be conditioned upon the following ("Buyer's Closing Conditions"):

(a) Buyer obtaining final determination from DEC and ACCD that the conditions for Buyer's purchase of the Property and development of Buyer's Project are acceptable in such amounts, and with such terms and conditions as are acceptable to Buyer in Buyer's sole discretion.

(b) Seller terminating, at its own cost and expense, the existing solar lease option or related contract for a use of a portion of the Property, or alternative arrangement acceptable to Buyer in Buyer's sole discretion.

(c) Buyer obtaining, at its own cost and expense, a third-party appraisal of the Property showing an appraised value equal to or above the cash portion of the Purchase Price

(d) Seller completing, at Seller's own cost and expense, the planned access roadway with underground utilities and/or conduit as shown on the Subdivision Plat extending in a southerly direction from U.S. Route 2 to the hammerhead located along the southerly boundary of Lot 3 and Lot 4, all in accordance with the approved and permitted design standards.

(e) Seller to provide Buyer with "As Built" drawings of the constructed roadway identifying all witnesses and utility stub locations.

If Buyer's Closing Conditions are not satisfied within ninety (90) days after the Effective Date (the "Closing Condition Date"), Buyer may elect to: (i) rescind this Agreement by providing written notice of termination to Seller, in which case all of the rights and obligations of the parties to this Agreement shall cease and terminate and the Deposit shall be refunded to Buyer; or (ii) waive the satisfaction of such conditions and proceed with the purchase contemplated by this Agreement without a reduction in the Purchase Price. The failure of Buyer to provide its termination notice on or before the Closing Condition Date shall be deemed a waiver of the satisfaction of the above conditions.

Section 6. **Access/Buyer's Indemnity**. Seller agrees to cooperate with Buyer's due diligence inspection as follows:

(a) Seller hereby authorizes Buyer and Buyer's agents, employees and invitees to go on the Property for the purpose of making such inspections, tests, surveys and other studies as are reasonably necessary or appropriate for Buyer to carry out its obligations under this Agreement including, if necessary, brush hogging and maintaining access routes for machinery and equipment to perform test pits and related investigations.

(b) Buyer agrees to restore any damage to the Property resulting from the conduct of any such inspections, tests and/or studies and shall indemnify and hold Seller harmless from any and

all liability arising from its entry or the entry of Buyer's agents upon the Property for the purposes of conducting such inspections, tests and/or studies.

Section 7. **Representations and Warranties of Seller**. Seller hereby represents and warrants to Buyer, to the best of Seller's knowledge, as follows:

(a) Seller is the record owner of the Property to be conveyed hereunder and Buyer will be conveyed good, insurable, and marketable title to the Property at Closing.

(b) Seller has the full power and authority to enter into, execute, deliver, and consummate the transaction contemplated by this Agreement and any instruments and agreements contemplated herein. Seller has taken all action required by law to authorize the execution, delivery, and consummation of the transaction contemplated hereby.

(c) Seller has not: (i) made a general assignment for the benefit of creditors; (ii) filed any voluntary petition in bankruptcy or suffered the filing of an involuntary petition by Seller's creditors; or (iii) suffered the appointment of a receiver to take possession of all or substantially all of Seller's assets.

(d) Seller warrants that Seller has no personal knowledge of any litigation or claim pending or threatened against Seller which would have an adverse effect on the Property.

(e) Seller warrants that the Property has frontage on or easement access to a public road and Seller has no knowledge of any fact or condition that would terminate that access. The Property will have adequate and uninterrupted access from U.S. Route 2 over the planned access road shown on the Subdivision Plat, which shall be complete as of the date of the Closing. Included with the Property is a secondary access route from South Street over an additional 50' wide strip of land as shown on the Subdivision Plat.

(f) Seller warrants that Seller has no personal knowledge that any Hazardous Substances, wastes and/or regulated contaminants are located on the Property, and no release of hazardous substances has occurred on the Property.

For the purposes of this section "Hazardous Substances" shall mean and include, but shall not be limited to, any element substance, compound or mixture, including disease-causing agents, which after release into the environment or upon exposure, ingestion, inhalation or assimilation into any organism, either directly or indirectly, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions, including malfunctions in reproduction or physical deformations in such organisms or their offsprings, and all hazardous toxic substances, wastes or materials, any pollutants or contaminants (including, without limitation, asbestos and raw materials which include hazardous constituents), or any other similar substances, or materials which are included under or regulated by any local, state or federal law, rule or regulation pertaining to environmental regulation, contamination, clean-up or disclosure, including, without limitation, the Comprehensive Environmental Response Compensation and Liability Act of 1980, 42 U.S.C. § 9601 et. seq., as amended ("CERCLA") and all regulations adopted pursuant to such Act, the Toxic Substances Control Act of 1976, as heretofore or currently in effect ("TSCA"), the Resource Conservation and Recovery Act of 1976, as heretofore or currently in effect ("RCRA"), and the Vermont Waste Management Statute, 10 V.S.A. Chapter 159.

The warranties and representations contained in this Agreement shall not merge with the delivery of deed to the Property and shall continue to remain in full force and effect after the Closing. Buyer's remedy for a fraudulent breach of the warranties made herein shall be an action in law or equity for Buyer's

actual out-of-pocket damages, remedies, costs, penalties and expenses, including court costs and reasonable attorneys' fees.

Section 8. **Seller's Covenants**. From and after the date of this Agreement and continuing through the Closing Date, Seller agrees as follows:

(a) **Operation of the Property**. Seller shall cause the Property to be maintained in its present order and condition, reasonable wear and tear excepted and shall maintain the Property in accordance with all applicable laws, ordinances, rules and regulations affecting the Property, including maintaining and obtaining all permits, licenses, or rights necessary to operate the Property.

(b) **Liens; Title Matters**. Seller shall keep the Property free and clear of liens and encumbrances and during the term of this Agreement shall not grant any easements, rights of way, leases, licenses or other rights to all or any portion of the Property without Buyer's prior written consent.

(c) **Access Road and Utility Construction**. Seller shall continue constructing the access road and utilities extending from U. S. Route 2 to, and including, the hammerhead turnaround along the southerly boundary of Lot 3 and Lot 4, all in accordance with the permitted plans. Seller shall satisfy any and all obligations owed to the buyers of Lots 2, Lot 3 and Lot 4 for the construction of the access road and utilities and Seller shall indemnify, defend and hold Buyer harmless from any claim or liability, including damages, costs or fees (including court costs and reasonable attorneys' fees) arising from Seller's failure to adequately construct the access road and utilities or to satisfy Seller's contractual obligations to the owners of Lot 2 and Lot 3. After the Closing, the future maintenance and repair of the access road and utilities will become the obligation of the lot owners in accordance with the obligations appearing in the lot owner deeds or related covenants.

(d) **Seller to Allow Buyer Access.** Seller shall allow Buyer continued access to the property to permit Buyer to undertake reasonable activities on the property in connection with permitting and project design.

Section 9. **Closing**. The initial closing in escrow and transfer of title to the Property (the "Closing") shall take place at an agreed upon location in South Hero, Vermont within thirty (30) days after the satisfaction of Buyer's Closing Conditions (the "Closing Date"), or on such earlier date or at such other place as may be mutually agreed upon. The Property shall be delivered at Closing, free of all personal property and tenants and/or persons in possession.

Because the DEC and ACCD grants that will be used by Buyer to pay the cash portion of the Purchase Price can only be paid as a reimbursement after all closing documents are final and approved by DEC and ACCD, , Seller and Buyer agree that at the initial Closing, all of the transfer documents will be placed in escrow with the Buyer's attorney according to the following provisions: (a) all transfer documents will be held in escrow and not released for recording until the escrow conditions are satisfied and DEC and ACCD have approved the closing documents; (b) the escrow conditions shall be deemed to be satisfied upon payment of the Purchase Price to Seller; (c) upon such payment, the transfer documents may be released from escrow and recorded; provided, however, that in the event a lien or encumbrance is recorded prior to the release from escrow, Seller shall be responsible for removing such lien or encumbrance prior to the release of funds and documents; and (d) in the event that the escrow conditions are not satisfied within sixty (60) days after the Closing, the escrowed documents shall be returned to Seller and all further rights and obligations of the parties under this Agreement shall terminate. Buyer and Seller further agree to execute such reasonable modifications to the closing documents as may be required by DEC and

ACCD. Notwithstanding the foregoing, neither Buyer nor Seller shall be required to execute any amendments which modify the Purchase Price, the size and location of the Property, or any other material term or condition of this Agreement.

Section 10. **Transfer Documents**. Seller shall deliver to Buyer, at the Closing, against payment of the Purchase Price, in form satisfactory to Buyer and its counsel:

(a) A standard Vermont Warranty Deed, sufficient to convey good, insurable and marketable title to the Property.

(b) A completed Vermont Property Transfer Tax Return.

(c) In the event the sale of the Property is not exempt from Land Gains Tax, a certificate issued by the Vermont Department of Taxes certifying the amount of the Vermont Land Gains Tax due pursuant to the provisions of 32 V.S.A. §§ 10001, *et seq.* or certifying that no such tax is due on account of the transaction contemplated by this Agreement.

(d) A full discharge and/or termination statement for any existing mortgage, security interest, lease, lien or encumbrance on the Property.

(e) An assignment of Seller's right, title and interest in and to all unallocated wastewater capacity for the Property, together with Seller's interest in any permits or licenses for the Property.

(f) A bill of sale to convey and transfer all of Seller's right, title and interest in any wastewater system infrastructure or utilities on the Property that are not otherwise owned by the owners of Lot 2 or Lot 3.

(g) A termination and release of all solar leases and/or contracts encumbering the Property.

(h) Such affidavits, reports and agreements as may be required by the company issuing title insurance to Buyer and to the institution providing financing to Buyer, if any, to permit such title insurance company to issue the title insurance policy without standard exceptions for mechanic's liens or parties-in-possession.

Seller shall provide Buyer, or its attorney, with a copy of the proposed Warranty Deed and Transfer Documents no later than five (5) days before the Closing Date. Failure to make timely delivery of such copies shall not constitute a default under this Agreement, but shall entitle Buyer, at its option, to delay closing until five (5) days following actual delivery of such copies.

At Closing Buyer shall also deliver a signed statement confirming that the Seller and their agent have provide all documentation and information requested by Buyer and that there has been no interference in any way with Buyer's investigation of the Property.

Section 11. **Recording Fees and Costs of Closing**. Seller shall bear the cost of preparing the documents described in Section 10(a)-(g) hereof. Buyer shall pay the cost of the documents described in Section 10(h) and for the recording of the Warranty Deed and Transfer Tax Return delivered pursuant to Sections 10(a) and 10(b) hereof

Section 12. **Title**. Buyer shall cause title to the Property to be examined and shall notify Seller within forty-five (45) days after the Effective Date of any encumbrances or defects in the title which render the Property unmarketable ("Buyer's Title Objections"). Within ten (10) days after the date that Seller

received Buyer's Title Objections, Seller shall provide Buyer with written notice of its plan to address and/or resolve Buyer's Title Objections ("Seller's Title Plan"). If Seller's Title Plan is not acceptable to Buyer, Buyer may terminate this Agreement on or before the Due Diligence Date, as described above in Section 4, by providing Seller with its notice of termination, with a copy to the Escrow Agent, in which case the Escrow Agent shall promptly return the Deposit to Buyer, whereupon this Agreement shall be terminated and of no further force and effect. If, however, Buyer does not object to Seller's Title Plan and fails to provide notice of termination, as described above in Section 4, Seller shall deliver at Closing, and Buyer shall accept at Closing, such title as Seller is able to convey under Seller's Title Plan.

This Section shall not be construed to be a waiver of a claim against marketability by Buyer for a defect arising between the date of Buyer's Title Objections and the date of Closing, which defect(s) in that event shall be removed or corrected by Seller prior to Closing.

As used herein, marketable title shall be defined as insurable title which is free from all liens or encumbrances of record, including, without limitation, any zoning, subdivision, flood plain, Act 250, public safety, fire code, electrical code, or other land use law violations which may subject Buyer to an enforcement action or claim by any permitting authority exercising jurisdiction over the Property, or any protective covenants and/or easements which substantially impair the use of the Property for Buyer's Project.

Section 13. **Adjustments to Purchase Price**. All property taxes and other municipal charges assessed against the Property shall be apportioned at Closing. Apportionments shall be made in accordance with the then prevailing practice in the Town of South Hero, Vermont, it being expressly understood and agreed however, that the real estate taxes assessed by the Town of South Hero shall be apportioned based on the fiscal year for which such taxes are collected. Should any tax, charge or rate be undetermined on the date of the Closing, the last determined tax, charge or rate shall be used for the purposes of apportionment; provided, however, that such apportionment shall be subject to later adjustment between the parties when the actual amounts of any such tax, charge or rate is finally determined, if the cumulative adjustment exceeds Five Hundred Dollars (US $500.00).

Section 14. **Vermont Property Transfer Tax and Land Gains Tax**. Seller and Buyer shall execute and deliver such Vermont Property Transfer Tax and Vermont Land Gains Tax forms as may be required by the State of Vermont. Buyer shall pay the Vermont Property Transfer Tax, if any. Seller shall pay the Vermont Land Gains Tax, if any. Unless Seller provides a certificate complying with the provisions of 32 V.S.A. § 10007 or proof that the proposed transaction is exempt from Vermont Land Gains Tax, Buyer may withhold from the payment of the Purchase Price and shall pay the Vermont Department of Taxes an amount equal to ten percent (10%) of the Purchase Price.

Section 15. **FIRPTA Certificate**. Unless Seller provides a certificate and certificate complying with the provisions of 26 U.S.C. § 1445 (FIRPTA), Buyer may withhold from the payment of the Purchase Price and shall pay to the U.S. Internal Revenue Service an amount equal to fifteen percent (15%) of the Purchase Price.

Section 16. **Vermont Non-Resident Withholding Tax**. Unless Seller provides a certificate complying with the provisions of 32 V.S.A. § 5847, Buyer may withhold from the payment of the Purchase Price and shall pay to the Vermont Department of Taxes an amount equal to two and one-half percent (2.5%) of the Purchase Price.

Section 17. **Risk of Loss**. The risk of loss due to damage to the Property by natural disaster or environmental accident is on Seller until the Closing. Seller shall keep and maintain such casualty insurance covering the improvements on the Property as in effect on the date of this Agreement. In the event of a

casualty loss prior to the Closing, or other loss by natural disaster or environmental accident, Buyer may, in full satisfaction of Buyer's obligations hereunder, either:

(a) Elect in writing to terminate this Agreement, and upon such notification Seller shall direct the Escrow Agent to promptly return the Deposit (or the remaining portions thereof) to Buyer, and upon Buyer's receipt of the Deposit (or the remaining portions thereof), all further rights and liabilities of the parties hereto by any reason of this Agreement shall terminate; or

(b) Waive the right to terminate this Agreement and close the transaction without reduction in the Purchase Price, in which latter case, Seller shall pay to Buyer all funds received by Seller on account of any casualty loss, shall assign to Buyer all pending claims for insurance then in process and shall cooperate with Buyer to allow Buyer to collect the proceeds of the insurance.

Section 18. **Default and Termination**.

(a) If Buyer shall fail to complete this purchase for reasons other than as set forth above in Sections 4, 5, 12 or 17 or is otherwise in default, Seller's remedy shall be to terminate this Agreement and retain the Deposit as agreed or liquidated damages and/or pursue any further legal or equitable remedies provided by law, including specific performance and damages.

(b) If Seller shall fail to complete the sale of the Property as provided herein or is otherwise in default, Buyer may terminate this Agreement, receive back the Deposit (or the remaining portions thereof) and/or pursue any further legal or equitable remedies provided by law, including specific performance and damages.

(c) In the event that a legal action is instituted arising out of a breach of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees and costs.

(d) In the event Buyer shall terminate this Agreement under Sections 4, 5, 12, or 17, upon request, Buyer shall provide Seller with a written statement in recordable form stating that Buyer's right to purchase the Property is no longer operative and has been terminated by the voluntary actions of Buyer. Buyer's statement shall be provided, at the Seller's request no later than thirty (30) days after Seller's request, which document shall be prepared at the Buyer's cost. Any costs associated with recording the document shall be the sole responsibility of the Seller.

(e) In the event that Buyer shall terminate this Agreement under Sections 4, 5, 12, or 17, upon request, Buyer shall provide Seller with true copies of all engineering plans, reports, studies or investigations (the "Work Product") conducted by Buyer with respect to the Property; provided, however, that Buyer makes no representation or warranty as to the copyright/intellectual property rights with respect to such Work Product or the ability of Seller to use the Work Product for Seller's own use.

Section 19. **Commissions and Fees**. The parties hereto warrant and represent to each other that they have no knowledge of any real estate broker or agent entitled to a commission or fee in connection with the transaction contemplated by this Agreement other than Apple Island Real Estate, whose commission shall be paid by Seller. Each party agrees to indemnify and hold harmless the other for all claims or demands of any other real estate agent or broker claiming by, through or under such party. This

indemnification shall also include payment of costs and attorneys' fees incurred by a party in defense of a claim for such real estate commissions or fees.

Section 20. **Project Signage**. Any public facilities owned by the Buyer on the land will carry the Lavin Family name, in recognition of Seller's Charitable Contribution.

Section 21. **Binding Contact; Governing Law**. This Agreement shall bind and inure to the benefit of the parties hereto and their respective representatives, heirs, successors and assigns. This Agreement shall be governed by Vermont law.

Section 22. **Assignment**. This Agreement shall not be assigned by either party without the written consent of the other party.

Section 23. **Further Assurances**. The parties agree to execute, acknowledge and deliver such documents, certificates or other instruments and take such other actions as may be reasonably required from time to time to carry out the intent and purpose of this Agreement.

Section 24. **Notices**. Any notice or other communication to be given hereunder shall be in writing and mailed, certified with return receipt requested, or telecopied or sent by nationally recognized overnight courier (e.g., Federal Express) to such party at the address or number set forth below:

If to Buyer: Town of South Hero
Attn: David Carter
P.O. Box 175
South Hero, VT 05486-0175
Telephone No.: (802 372-5552)
E-mail: dcarter@usa.net

with a copy to: Robert H. Rushford, Esq.
Gravel & Shea PC
P.O. Box 369
Burlington, VT 05402-0369
Telephone No.: (802) 658-0220
Telecopier No.: (802) 658-1456
E-mail: rrushford@gravelshea.com

With a copy to: Nate Hayward
Hayward Design Build
38 Community Lane
South Hero, VT 05486
Telephone No.: (802) 578-3078
E-mail: nate@haywarddesignbuild.com

If to Seller: Mr. Martin Lavin
Ms. Patricia Lavin
350 Main Street
Burlington, VT 05401
Telephone No.: (802) 862-1313
E-mail: martylavin@aol.com

With a copy to: Jeff Sikora
Apple Island Real Estate
304 US Rt. 2, South Hero, VT 05486
South Hero, VT 05486
Telephone No.: (802) 363-4001
E-mail: jeff@appleisland.com

or to such other person, address or number as the party entitled to such notice or communication shall have specified by notice to the other party given in accordance with the provisions of this Section. Any such notice or other communication shall be deemed given: (i) if mailed, when deposited in the mail, properly addressed and with postage prepaid; (ii) if sent by telecopy, when transmitted; or (iii) if sent by overnight service, next-day after sending.

Section 25. **Survival**. All of the terms, conditions, warranties, covenants, indemnity provisions and representations of this Agreement shall survive the Closing and execution of the Warranty Deed and shall be in full effect and enforceable after the Closing.

Section 26. **Entire Agreement; Amendment**. This Agreement embodies the entire agreement and understanding between the parties relating to the subject matter hereof and there are no covenants, promises, agreements, conditions or understandings, oral or written, except as herein set forth. This Agreement may not be amended, waived or discharged except by an instrument in writing executed by the party against whom such amendment, waiver or discharge is to be enforced.

Section 27. **Counterparts**. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument.

Section 28. **Captions**. The captions and section numbers appearing in this Agreement are inserted only as a matter of convenience. They do not define, limit, construe or describe the scope or intent of such sections, nor in any way affect this Agreement or have any substantive effect.

TOWN OF SOUTH HERO

Nov 25 2024
Dated

By: _____
Duly Authorized Agent Jon. d Carter
Select Board
Chair

Nov 23, 2024
Dated

Martin Lavin
Martin Lavin

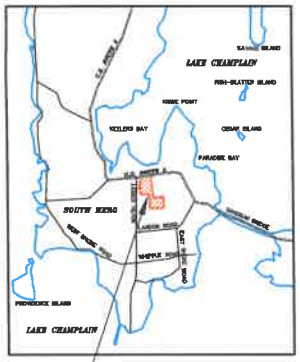
Nov 23, 2024
Dated

Patricia Lavin
Patricia Lavin

Exhibit A

SUBDIVISION PLAT

[See Attached]



SITE LOCATION

APPROVED BY RESOLUTION OF THE DEVELOPMENT REVIEW BOARD OF THE TOWN OF SOUTH HERO, VERMONT, PERMIT # _____,
ON THE _____ DAY OF _____, _____,
SUBJECT TO ALL REQUIREMENTS AND CONDITIONS OF SAID RESOLUTION.
SIGNED _____ DAY OF _____, _____,
BY: _____ CHAIRPERSON.

TOWN OF SOUTH HERO CLERK'S OFFICE
RECEIVED FOR RECORDING ON THE _____ DAY OF _____, _____,
AT _____, _____M, IN CABINET 1, ON MAP SLIDE _____
AND RECORDED IN THE SOUTH HERO, VERMONT MAP RECORDS.
ATTEST: _____, TOWN CLERK

LEGEND

- IRON PIPE FOUND
- CONC. MONUMENT FOUND
- REBAR SET OR TO BE SET (R.L.S. #538)
- REBAR FOUND
- CALCULATED POINT
- SURVEY POINT
- UTILITY POLE
- PROPERTY LINE
- ACCESS R.O.W./UTILITY EASEMENT
- CLASS 2 & 3 WETLAND BOUNDARY
- CLASS 2 WETLAND BUFFER ZONE
- BUILDING ENVELOPE
- AERIAL POWER LINES
- FORCE MAINS
- ZONING DISTRICT BOUNDARY

ZONING REQUIREMENTS

RURAL ZONING DISTRICT REQUIREMENTS ARE:
- LOT SIZE = 1.0 ACRE
- R.O.W. SETBACK = 25ft. FROM LIMIT OF R.O.W.
- PROPERTY BOUNDARY SETBACKS = 25ft.

SOUTH HERO VILLAGE ZONING DISTRICT REQUIREMENTS ARE:
- LOT SIZE = NO MINIMUM LOT SIZE
- R.O.W. SETBACK = 10ft. MIN. TO 40ft. MAX.
- PROPERTY BOUNDARY SETBACKS = 10ft. MIN. TO 40ft. MAX.

RURAL RESIDENTIAL DISTRICT
SOUTH HERO VILLAGE DISTRICT
U.S. ROUTE 2
LOT 1 2.38 ACRES
LOT 2 2.54 ACRES
LOT 3 2.36 ACRES
LOT 4 3.76 ACRES
LOT 5 24.57 ACRES
LOT 6 10.17 ACRES
LOT 7 6.67 ACRES
LOT 8 48.09 ACRES
CLASS-2 WETLAND
VERNAL POND
CLASS 2 WETLAND
SEE GENERAL NOTE 4
150' WIDE R.O.W. TO VERMONT ELECTRIC POWER CO. FOR POWER TRANSMISSION LINES. RECORDED: VOL.19, PGS.286-287
EASEMENT AREA ON LOT 8 IN FAVOR OF LOTS 1-8 FOR WASTEWATER DISPOSAL SYSTEMS
PRIMARY MOUND SEPTIC
REPLACEMENT MOUND SEPTIC
50' EASEMENT ON LOTS 1 & 3 IN FAVOR OF HSE REALTY, LLC, HATCHED
60FT. WIDE ACCESS AND UTILITY EASEMENT ON LOTS 5 & 8 FOR INGRESS/EGRESS TO LOTS 5-8, SEWER FORCE MAIN LINES, AND POWER/TELECOM. ALL IN FAVOR OF LOTS 3-8 AND POTENTIAL FORCE MAIN TO LOT OF NEDDE BURLINGTON, LLC
SCHEMATIC A-78 COMPLIANT ACCESS ROAD WITH HAMMERHEAD TURN-AROUND
20ft. WIDE EASEMENT ON LOT 5 IN FAVOR OF LOT OF NEDDE BURLINGTON, LLC FOR POTENTIAL INSTALLATION AND MAINTENANCE OF SEWER FORCE MAIN TO LOT 8
60ft. WIDE ACCESS AND/UTILITY R.O.W ON LOTS 1-4 IN FAVOR OF LOTS 1-8
TYPICAL MINIMUM PROPERTY BOUNDARY/R.O.W. SETBACK SOUTH HERO VILLAGE DISTRICT
EXISTING DRAINAGE SWALE
39" C.G.M.P. CULVERT
TYPICAL MOUND SEPTIC AREA, AS PER WASTEWATER SYSTEM & POTABLE WATER SUPPLY PERMIT #WW-6-2858
N/F RALPH W. LAWRENCE, JR. PARCEL RT253
N/F HSE REALTY, LLC 88/414-415 PARCEL RT269
N/F ROSH ASSOCIATES, LLC PARCEL RT291
N/F NEDDE BURLINGTON, LLC PARCEL RT295
N/F FALBY FAMILY REVOCABLE LIVING TRUST PARCEL SS031
N/F PETER O'VALLEY & ELIZABETH WIRSING PARCEL SS045
N/F ROBERT & SUSAN STRAIGHT 43/361 PARCEL SS087
N/F ROBERT & SUSAN TOOLIN 33/753 PARCEL SS051
N/F HOWARD & NANCY GARDNER 19/395 PARCEL SS053
N/F AVEN MANAGEMENT, LLC 91/753 PARCEL SS061
N/F TOWN OF SOUTH HERO 88/121 PARCEL SS065
N/F ARTHUR & FRANCIS ROBINSON TRUST 18/318 PARCEL SS081
N/F KENNETH & ANN SOUTIERE 58/303 PARCEL SS019
N/F DOUGLAS & BRIDGET KERR 109/175 PARCEL SS029
N/F SOUTH HERO CONGREGATIONAL CHURCH
SOUTH ST.
TRUE NORTH
16'±
1" = 200 ft.
200 0 100 200 400 800

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAT IS BASED ON INFORMATION ABSTRACTED FROM THE LAND RECORDS IN THE TOWN OF SOUTH HERO (DEEDS AND OTHER OFFICIAL RECORDS). ALSO ALL PHYSICAL EVIDENCE IN THE FIELD INCLUDING PAROLE EVIDENCE ACQUIRED FROM THE SURROUNDING LAND OWNERS.
THE BEARINGS ARE MAGNETICALLY OBSERVED WITH A SUUNTO COMPASS. THE SURVEY WAS DONE WITH A CLOSED RANDOM TRAVERSE USING A TOPCON 3B E.D.M. WITH A 1:50000 POSITIONAL TOLERANCE.
THIS SURVEY CONFORMS TO 27 VSA 1403 REQUIREMENTS.

SUBJECT PARCELS:
±100.67 ACRES (LOTS 1-8)
OWNER OF RECORD:
MARTIN LAVIN
VOL. 47, PG. 416-417
PARCEL I.D. #RT275

GENERAL NOTES:

1.) REFERENCE IS HEREIN MADE TO A PLAT OF THE SUBJECT PARCEL TITLED "BOUNDARY SURVEY", PREPARED BY KREBS & LANSING, SAMUEL J. DAVISON, L.S.#603, FILED IN THE TOWN OF SOUTH HERO LAND RECORDS 12/22/1988, MAP SLIDE 82A.
2.) ALL BEARINGS REPORTED HEREIN ARE AS MAGNETICALLY OBSERVED BY THIS OFFICE ON 11/10/2010.
3.) SUBJECT PARCEL LOCATED ENTIRELY WITHIN THE RURAL RESIDENTIAL AND SOUTH HERO VILLAGE ZONING DISTRICTS. BUILDING ENVELOPES SHOWN ON LOTS 3-8 ARE AS PER SETBACK REQUIREMENTS FOR EACH ZONING DISTRICT.
4.) DISTURBANCE OF WETLANDS OR WETLAND BUFFER ZONES MAY REQUIRE APPROVAL FROM VT. DEPT. OF ENVIRONMENTAL CONSERVATION OR THE U.S. ARMY CORP OF ENGINEERS.
2.) ALL BEARINGS REPORTED HEREIN ARE AS MAGNETICALLY OBSERVED BY THIS OFFICE

STATE OF VERMONT DAVID A. TUDHOPE NO. 538 REGISTERED LAND SURVEYOR

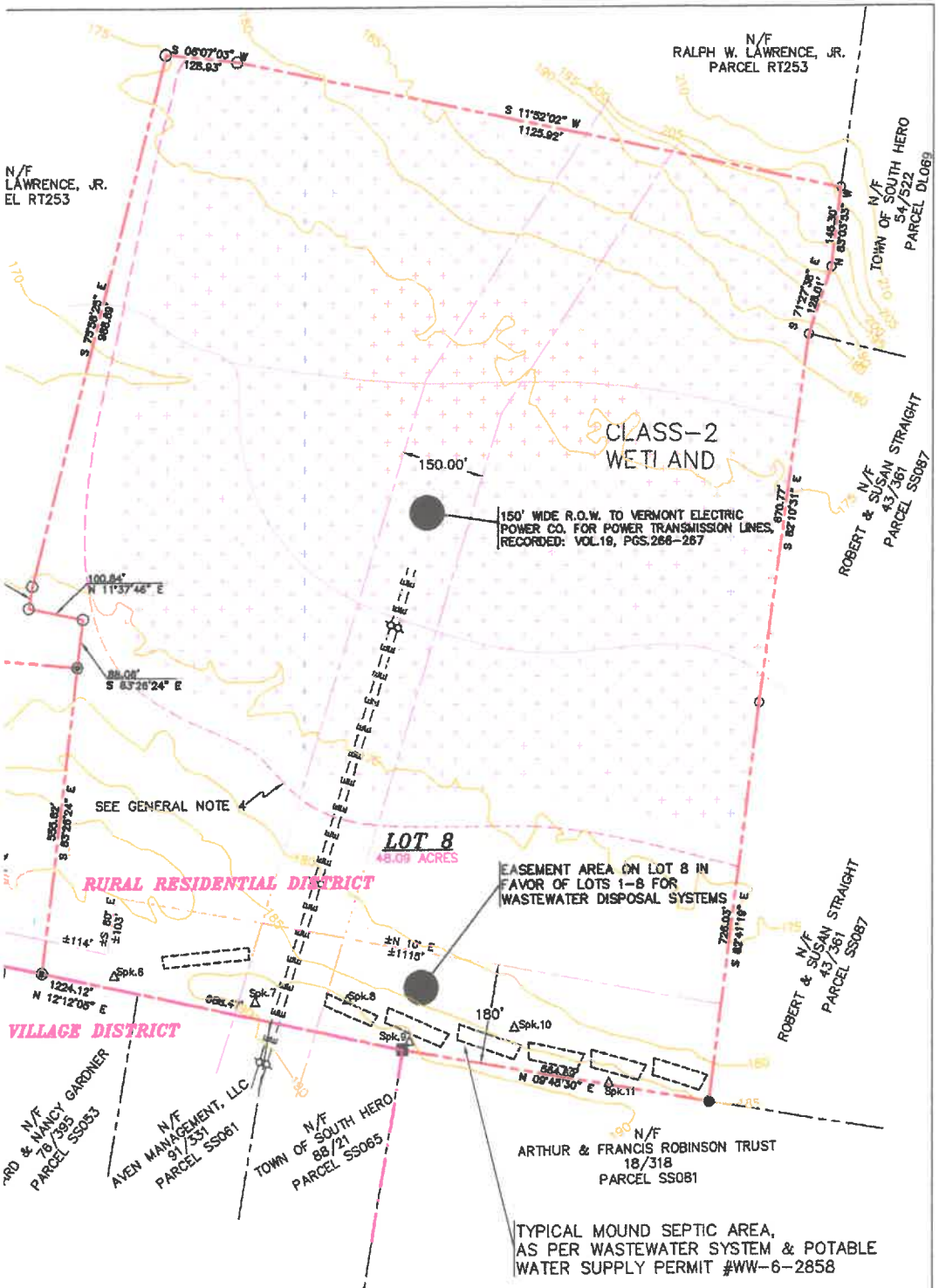
23 MAY, 2023

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VT. 05408
TELE: (802) 862-9360
dtudhope@aol.com
SITE TECH. B #230
REGISTERED LAND SURVEYOR # 538

LAVIN LOTS 1 - 8

SUBDIVISION PLAN

DRAWN D.P.C.	DATE 04/03/23	For: Martin & Patricia Lavin
APPROVED D.A.T.	DATE 05/23/23	Lavin Lane South Hero
SCALE 1" = 200'	SHEET 1A	PROJECT NO. 781-4



NOWLEDGE AND BELIEF THIS PLAT IS BASED
RACTED FROM THE LAND RECORDS IN THE TOWN OF
AND OTHER OFFICIAL RECORDS). ALSO ALL PHYSICAL
) INCLUDING PAROLE EVIDENCE ACQUIRED FROM THE
WNERS.
GNETICALLY OBSERVED WITH A SUUNTO COMPASS. THE
H A CLOSED RANDOM TRAVERSE USING A TOPCON 3B
) POSITIONAL TOLERANCE.
MS TO 27 VSA 1403 REQUIREMENTS.

SUBJECT PARCELS:
±100.67 ACRES (LOTS 1-8)
OWNER OF RECORD:
MARTIN LAVIN
VOL. 47, PG. 416-417
PARCEL I.D. #RT275

Martin Lavin
Patricia Lavin

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SETBACK
FROM
RS.
E

23 MAY, 2023

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VT. 05408
TELE: (802) 862-9360
dtudhope@aol.com
SITE TECH. B #230
REGISTERED LAND
SURVEYOR # 538

LAVIN LOTS 1 - 8

SUBDIVISION PLAN

DRAWN D.P.C.	DATE 04/03/23	For: Martin & Patricia Lavin
APPROVED D.A.T.	DATE 05/23/23	Lavin Lane South Hero
SCALE 1" = 200'	SHEET 1A	PROJECT NO. 781-4

Vermont Mandatory Flood Disclosure

Date Prepared: 11/24/24

Seller's Name(s): Martin V. Lavin Patricia A. Lavin

Property Address: 275 US Route 2, South Hero, Vermont 05486
Street City/Town

27 V.S.A. § 380 requires all Sellers of real property in Vermont to disclose the flood status of their property to the Purchaser. The FEMA search engine can be found at https://msc.fema.gov/portal/home.

Descriptions of FEMA's flood hazard areas can be found at https://www.fema.gov/glossary/flood-zones.

FEMA flood map number 5002260010B Map effective Date 6/15/1978

1	Is the real property located in a Federal Emergency Management Agency (FEMA) mapped Special Flood Hazard Area?	☐ Yes	☒ No
2	Is the real property located in a Federal Emergency Management Agency (FEMA) mapped Moderate Flood Hazard Area?	☐ Yes	☒ No
3	Has the real property been subject to flooding or flood damage while the seller possessed the property, including flood damage from inundation or from flood-related erosion or landslide damage?	☐ Yes	☒ No
3a	If yes, please describe:		
4	Does the seller maintain flood insurance on the real property?	☐ Yes	☒ No

Seller has completed this form personally, reviewed the FEMA map and associated data themselves, and has not relied upon anyone else to provide this information.

THE STATEMENTS IN THIS REPORT ARE MADE BY THE SELLER. THEY ARE NOT STATEMENTS OR REPRESENTATIONS MADE BY ANY REAL ESTATE AGENT(S).

Seller: Martin V. Lavin 11/24/24 Seller: _____
(Signature) (Date) (Signature) (Date)

Seller: Patricia A. Lavin 11/24/24 Seller: _____
(Signature) (Date) (Signature) (Date)

Purchaser acknowledges receipt of this Disclosure

Purchaser: _____ 11/25/24 Purchaser: _____
(Signature) (Date) (Signature) (Date)

Purchaser: _____ Purchaser: _____
(Signature) (Date) (Signature) (Date)

Chronology Sheet

Landowner Name: Case Number: **WW-6-2858**

Martin & Patricia Lavin
350 Main Street
Burlington VT 05401

Date	Initials	Description
6/25/2014	EC	Application Received
6/26/2014	EC	Application Logged In
7/15/14	dme	TR. Called Dave Tudhope & requested revised
		sheet 4 correcting types for Bldg 6 Unit B/C
		design conditions
7/15/14	dme	Reset. CR.
7/16/14	dme	Issued permit
8/4/14	dme	As per EPC, Dave Tudhope has to notify the correct
		landowner using Form 1 & send Form 4 here; once we
		receive Form 4, wait 7 days then send letter stating
		permit is still valid, provided affected landowner
		does not appeal permit.
8/11/14	dme	Received revised Act 145 certification Form 4, dated 8/1/14. Seven
		days have passed.
8/12/14	dme	Sent letter to landowner stating permit is still valid.

PROJECT DOCKET SHEET

Project: WW-6-2858 **PIN:** **Reviewer**: Dolores Eckert

LANDOWNER
Martin & Patricia Lavin
350 Main Street
Burlington VT 05401

APPLICANT/CROSS-REFERENCE

Towns: South Hero **Street/Road: U.S. Route 2 & South St.**

Development Name:

Project Description: construction of six multi family triplex buildings, 1 thru 5 with (2) three bedroom units and (1) one bedroom unit; Building 6 to have (3) one bedroom units

Fee Type	Gallon Lots	Fee (Gallons)	Fee (Minimum)	Refund Amount
RO3	5,320	$2,000.00	$0.00	$0.00

Deed Book	Deed Page
47	416-417

Received Date: 6/24/2014
Logged Date: 6/25/2014
Reviewed Date: / /
Response Date: / /
Final Action Date / /
Final Action Type:

Consultant: David A. Tudhope S.T.
74 Cayuga Court
Burlington VT 05408

Chad Branon
778 Elm Street
Fieldstone Land Consultants, P
Milford N. 03055

Reviewer: Dolores Eckert

VERMONT

State of Vermont
Department of Environmental Conservation
Drinking Water and Groundwater Protection Division
Essex Regional Office
111 West Street
Essex Junction, VT 05452-4695
www.septic.vt.gov

Agency of Natural Resources
[phone] 802-879-5656
[fax] 802-879-3871

August 12, 2014

Martin & Patricia Lavin
350 Main Street
Burlington VT 05401

Subject WW-6-2858
construct six triplex buildings (Buildings #1 through #5 with a maximum of two - three bedroom units and one - one bedroom unit and Building #6 with a maximum of three - one bedroom units) on a 100.62 +/- acres lot located on U.S. Route 2 & South St. in South Hero, Vermont.

Dear Landowner(s):

On August 11, 2014, this office received your revised ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program, dated August 1, 2014. This revised form corrects the name of an affected landowner for the above referenced project. Therefore Permit Number #WW-6-2858, dated July 16, 2014, remains valid.

If you have any questions, please do not hesitate to contact this office.

Sincerely,

Dolores M Eckert

Dolores M. Eckert
Assistant Regional Engineer

cc: South Hero Planning Commission
David A. Tudhope

7014 0150 0002 0460 7933

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CERTIFIED MAIL™ RECEIPT
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SOUTH HERO VT 05486

OFFICIAL USE

Postage	$ $1.40
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.70

WINOOSKI VT 05404 5330
Postmark Here
AUG 2014
08/01/2014

Sent To: Brian Baker
Street, Apt. No.; or PO Box No.: 45 South St.
City, State, ZIP+4: So Hero, VT 05486

PS Form 3800, August 2006 — See Reverse for Instructions

ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program

A person submitting an application to the Secretary for a Wastewater System and Potable Water Supply Permit where the proposed project has isolation distances (overshadowing) that extend onto property owned by persons other than the permit applicant shall submit the following certification with the application.

Note: When the property subject to the permit application is owned by more than one person, only one of the landowners must sign this certification statement even though all landowners must sign the permit application itself.

I hereby certify that the individual(s) that own property that is overshadowed by my proposed project have been sent by certified mail a copy of the required notification form and the site plan(s) that accurately depicts all isolation distances. I also certify that I attached to this certification form a copy of all certified mail receipts for notifications that were sent to the affected property owners.

Signature Patricia Lavin

Name (Printed) PATRICIA LAVIN

Property Address or Property Tax ID # (RT 275) US RTE 2 So. Hero, Vt. & South St.

Date of this certification 1 August 2014

Please list all of the property owners who were sent a notification by certified mail.

Affected Property Owner(s) – (Please provide a second sheet using this format when there are more than three affected property owners)

Name BRIAN BAKER

Address 45 South St
So. Hero, Vt. 05486

Name _____

Address _____

_____

Name _____

Address _____

_____

Received
AUG 11 2014
Drinking Water and Ground Water Protection Division

(To Comply with Act 145 and Act 117 – 8-24-12, Last Revised 9-11-12)

VERMONT

State of Vermont
Department of Environmental Conservation
Drinking Water and Groundwater Protection Division
Essex Regional Office
111 West Street
Essex Junction, VT 05452-4695
www.septic.vt.gov

Agency of Natural Resources
[phone] 802-879-5656
[fax] 802-879-3871

July 16, 2014

Martin & Patricia Lavin
350 Main Street
Burlington VT 05401

Dear Applicant:

Subject: Wastewater System and Potable Water Supply Permit #WW-6-2858 for a project located in South Hero, Vermont.

Enclosed you will find:

1. The WW-6-2858 Permit document marked "Documents For Recording".
2. The corresponding plans referenced in the permit for your records.
3. A copy of permit document for your records.

Please read your permit thoroughly and be sure you understand all the requirements. **Be aware that failure to submit any permit-required installation certifications will render your permit invalid and will cause problems during any future title searches done on this property.**

You are required to file this permit with your town clerk within 30 days of issuance of the permit. Please take the document stamped "Documents For Recording" to your town clerk. You will be required to pay a recording fee to your town clerk at that time. Failure to file the permit with your town clerk will cause problems during any future title searches done on this property.

You may either contact your consultant for additional copies of the approved plans or you may obtain a copy of them, when they become available on the internet, by accessing our website www.septic.vt.gov and using the document search option. You may print out any documents or plans that you view. Thank you for your cooperation. If you have any questions, please contact me at the above address.

Sincerely,

Dolores M Eckert

Dolores Eckert
Assistant Regional Engineer

Enclosures

WASTEWATER SYSTEM AND POTABLE WATER SUPPLY PERMIT

LAWS/REGULATIONS INVOLVED

10 V.S.A. Chapter 64, Potable Water Supply and Wastewater System Permit
Wastewater System and Potable Water Supply Rules, Effective September 29, 2007
Chapter 21, Water Supply Rules, Effective December 1, 2010

Landowner(s): **Martin & Patricia Lavin**
350 Main Street
Burlington VT 05401

Permit Number: WW-6-2858
PIN: EJ14-0268

This permit affects property identified as Town Tax Parcel ID # South Hero: RT275 referenced in a deed recorded in Book 47 Pages 416-417 of the Land Records in South Hero, Vermont.

This project, to construct six triplex buildings (Buildings #1 through #5 with a maximum of two - three bedroom units and one - one bedroom unit and Building #6 with a maximum of three – one bedroom units) on a 100.62 +/- acres lot, served by onsite water supplies and performance based filtrate wastewater systems using the Jet Model #J-1500 (Buildings #1 through #5) and #J-750 (Building #6) effluent treatment units, located on U.S. Route 2 & South Street in South Hero, Vermont, is hereby approved under the requirements of the regulations named above subject to the following conditions.

1. GENERAL

1.1 The project shall be completed as shown on the plans and/or documents prepared by David A. Tudhope and Chad E. Branon, with the stamped plans listed as follows:

Sheet Number	Title	Plan Date	Plan Revision Date
1	Overall Site Plan	3/19/2014	
2	Site Plan-Buildings	3/19/2014	
3	Buildings 1-5 Septic	3/19/2014	
4	Building 6 Septic	3/19/2014	7/15/2014
5	Buildings 1-3 Details	3/19/2014	
6	Building 4 & 5 Details	3/19/2014	
7	Unit 6A Details	3/19/2014	
8	Unit 6B & 6C Details	3/19/2014	
9	Jet J-1500 Details	3/19/2014	
10	Jet J-750 Details	3/19/2014	

1.2 This permit does not relieve the landowner from obtaining all other approvals and permits PRIOR to construction including, but not limited to, those that may be required from the Act 250 District Environmental Commission; the Drinking Water and Groundwater Protection Division; the Watershed Management Division; the Division of Fire Safety; the Vermont Department of Health; the Family Services Division; other State departments; or local officials.

1.3 The conditions of this permit shall run with the land and will be binding upon and enforceable against the landowner and all assigns and successors in interest. The landowner shall record and index this permit in the South Hero Land Records within thirty, (30) days of issuance of this permit and prior to the conveyance of any lot subject to the jurisdiction of this permit.

1.4 The landowner shall record and index all required installation certifications and other documents that are required to be filed under these Rules or under a specific permit condition in the South Hero Land Records and ensure that copies of all certifications are sent to the Secretary.

1.5 No permit issued by the Secretary shall be valid for a substantially completed potable water supply and wastewater system until the Secretary receives a signed and dated certification from a qualified Vermont Licensed Designer (or where allowed, the installer) that states:

> *"I hereby certify that, in the exercise of my reasonable professional judgment, the installation-related information submitted is true and correct and the potable water supply and wastewater system were installed in accordance with the permitted design and all the permit conditions, were inspected, were properly tested, and have successfully met those performance tests",*

or which otherwise satisfies the requirements of §1-308 and §1-911 of the referenced rules.

1.6 Each purchaser of any portion of the project shall be shown copies of the Wastewater System And Potable Water Supply Permit, the stamped plans, and **Innovative/Alternative System Approval letter #2013-02-R2 (Revised 2014 (expires 7/2/2015) for the JET™ Wastewater Treatment System Series** prior to conveyance of the lot. The Innovative/Alternative Approval contains special requirements that need to be complied with for the project to remain in compliance with this permit.

1.7 Each new owner of the property shall inform the Drinking Water and Groundwater Protection Division and vendor within 30 days of the transfer of the property and include the name and mailing address of the new owner.

1.8 This project is approved for the construction of six triplex buildings (Buildings #1 through #5 with a maximum of two - three bedroom units and one - one bedroom unit and Building #6 with a maximum of three – one bedroom units) on the lot. Construction of additional nonexempt buildings, including commercial and residential buildings, is not allowed without prior review and approval by the Drinking Water and Groundwater Protection Division and such approval will not be granted unless the proposal conforms to the applicable laws and regulations. No construction is allowed that will cause non-compliance with an existing permit.

1.9 By acceptance of this permit, the landowner agrees to allow representatives of the State of Vermont access to the property covered by the permit, at reasonable times, for the purpose of ascertaining compliance with the Vermont environmental and health statutes and regulations, and permit conditions.

1.10 Any person aggrieved by this permit may appeal to the Environmental Court within 30 days of the date of issuance of this permit in accordance with 10 V.S.A. Chapter 220 and the Vermont Rules of Environmental Court Proceedings.

2.WATER SUPPLY

2.1 The components of the potable water supply herein approved shall be routinely and reliably inspected during construction by a qualified Vermont Licensed Designer (or where allowed, the installer) who shall, upon completion and prior to occupancy of the associated building, report in writing to the Drinking Water and Groundwater Protection Division that the installation was accomplished in accordance with the referenced plans and permit conditions, as specifically directed in Condition #1.5 herein.

2.2 Each triplex is approved for a potable water supply using a drilled or percussion bedrock well (Buildings #1 through #5 each for a maximum of 980 gallons of water per day and Building #6 for a maximum of 420 gallons of water per day) provided the supply is located as shown on the stamped plans and meets or exceeds the isolation distances, construction standards, and water quality standards required in the Water Supply Rule.

2.3 The landowner shall operate the potable water supplies in a manner that keeps the supply free from contamination. The landowner shall immediately notify the Division if the water supply system fails to function properly and becomes a "failed supply".

2.4 The water source locations as shown on the stamped plans shall be accurately staked out and flagged prior to any construction on this project with the flagging being maintained until construction is complete.

2.5 Upon completion of the drilling of each well, a qualified licensed designer or well driller, shall submit to the Drinking Water and Groundwater Protection Division a copy of the water quality analysis and water quantity required by the Water Supply Rules, Appendix A, Part 11 that demonstrates the water quality meets the standards of the Rules as a potable water source and the quantity meets the demand for the water system design approved by this Permit. An amended application form, fee and complete engineering plans for such system shall be submitted for review and approval by the Drinking Water and Groundwater Protection Division should the water

quality require treatment to meet the water quality standards, or, the water quantity requires modifications to the approved water system design to meet the average day demand, maximum day demand, or peak demand.

3.WASTEWATER DISPOSAL

3.1 The components of the wastewater system herein approved shall be routinely and reliably inspected during construction by a qualified Vermont Licensed Designer who shall, upon completion and prior to occupancy of the associated building, report in writing to the Drinking Water and Groundwater Protection Division that the installation was accomplished in accordance with the referenced plans and permit conditions, as specifically directed in Condition #1.5 herein.

3.2 Buildings #1 through #5 are each approved for the disposal of wastewater in accordance with the design depicted on the stamped plans for a maximum of 980 gallons of wastewater per day. Building #6 is approved for the disposal of wastewater in accordance with the design depicted on the stamped plans for a maximum of 420 gallons of wastewater per day.

3.3 Each system shall be operated at all times in a manner that will not permit the discharge of effluent onto the surface of the ground or into the waters of the State. The landowner shall immediately notify the Division if the wastewater system fails to function properly and becomes a "failed system". Should the system fail and not qualify for the minor repair or replacement exemption, the current landowner shall engage a qualified Vermont Licensed Designer to evaluate the cause of the failure and to submit an application to this office and receive written approval prior to correcting the failure.

3.4 Each triplex is approved for the mound wastewater disposal system provided the mound is constructed in strict accordance with the following conditions:

a. The mound system is to be located and constructed as depicted on the plans that have been stamped by the Drinking Water and Groundwater Protection Division.

b. A qualified Vermont Licensed Designer shall inspect the mound system during critical stages of construction. This shall include the staking of the location of the mound, ensuring the site has been properly plowed prior to placement of the appropriate sand fill, the installation and testing of the distribution piping, final grading of the mound including side slopes, and pump station installation.

c. The construction of the mound shall adhere to the guidelines set forth in Section 1-913(f) of the above referenced rules.

3.5 The corners of the proposed primary wastewater areas shall be accurately staked out and flagged prior to construction with the flagging/staking being maintained until construction is complete.

3.6 The Operating and Maintenance manual for the Innovative/Alternative treatment unit(s) prepared by the vendor shall be provided to the landowner by the system designer at the time the system start-up.

3.7 Following placing the system into use, completion of all periodic inspections shall be pursuant to the conditions and requirements outlined in the Innovative/Alternative System Approval Letter. A written report for each inspection shall be submitted to the Division.

3.8 The wastewater systems for the project are designed using the performance base approach. The use of the performance-based wastewater systems approved in this permit requires that an annual inspection be performed by a Vermont Licensed Designer Class 1 or Class B starting when the system is placed in use and continuing for the first three years of operation. The field inspection shall:

a. be performed in April or May;

b. submit a written report by June 15th of each year to the landowner and the Drinking Water and Groundwater Protection Division; and

c. consist of a field inspection of the wastewater system and the area within 25' of the system in all directions noting any indication of failure.

3.9 The wastewater systems for this project are approved for domestic type wastewater only except as allowed for water treatment discharges. No discharge of other type process wastewater is permitted unless prior written approval is obtained from the Drinking Water and Groundwater Protection Division.

3.10 No buildings, roads, water lines, earthwork, re-grading, excavation or other construction that might interfere with the installation or operation of the wastewater systems are allowed on or near the site-specific wastewater disposal systems depicted on the stamped plans. All isolation distances that are set forth in the Wastewater System and Potable Water Supply Rules shall be adhered to and will be incorporated into the construction and installation of the wastewater disposal field.

David K. Mears, Commissioner
Department of Environmental Conservation

By Dolores M Eckert Dated July 16, 2014
Dolores M. Eckert, Assistant Regional Engineer
Essex Regional Office
Drinking Water and Groundwater Protection Division

Enclosures: **Innovative/Alternative System Approval letter #2013-02-R2 (Revised 2014 (expires 7/2/2015) for the JET™ Wastewater Treatment System Series**

cc South Hero Planning Commission
David A. Tudhope
Chad Branon
Drinking Water and Groundwater Protection Division
Innovative/Alternative Manufacturer – Jet Inc.
Watershed Management Division (Attn: Wetlands Program)
Act 250 District Environmental Commission

VERMONT

Vermont Department of Environmental Conservation *Agency of Natural Resources*
Drinking Water and Groundwater Protection Division
One National Life Drive - Main 2 [phone] 802-585-4911
Montpelier, VT 05620-3521 [in-state] 800-823-6500
www.septic.vt.gov [fax] 802-828-1541

Innovative/Alternative (I/A) System Approval For General Use

Jet™ Wastewater Treatment System Series

Original Approval Date: July 2, 2013
Approval Number: 2013-02-R2
Revision Date: March 20, 2014
Expiration Date: July 2, 2015

Vendor Information

Jet Inc.
750 Alpha Drive
Cleveland, OH 44143

General Phone: (800) 321-6960
Fax: (440) 442-9008
Website: www.JETINCORP.com

Technology Name

J-1500 Series BAT Media including J-500, J-500 PLT, J-750, J-800, J-800 PLT, J-1000, J-1250, and J-1500

Contact

Edward Schloss, National Sales Representative
Phone: (216) 402-0337
Email: eschloss@jetincorp.com

Trent Lydic, Technical Product Manager
Phone: (800) 321-6960
Email: tlydic@jetincorp.com

Technology Type

Aerobic With Fixed Media Wastewater Treatment System

I. Authority

A. In accordance with the Environmental Protection Rules, Chapter 1, Wastewater System and Potable Water Supply Rules, Effective September 29, 2007, Subchapter 10, Approval of Innovative/Alternative Systems and Products § 1-1001: Innovative/Alternative Systems and Products: General Use, the Secretary (Secretary) of the Agency of Natural Resources (Agency),Department of Environmental Conservation, Drinking Water and Groundwater Protection Division (Division) has determined that the technologies listed in this approval may be used as part of a soil based disposal system permitted under the Vermont Wastewater System and Potable Water Supply Rules (Rules), provided the conditions of this approval are met.

II. General

A. This approval contains specific requirements related to the design, installation, operation and maintenance of these technologies. The landowner where this technology is specified must agree to specific requirements for ongoing operation and maintenance of this system. The landowner should carefully read this approval letter, particularly the requirements for proper operation and maintenance.

B. The manufacturer (Vendor) of the technologies also have specific requirements for design review, training, installation oversight, annual reporting, and supporting the operation, maintenance and repairs needed to keep the system in working condition. This approval contains an expiration date and requires the vendor to submit an application for renewal of this approval.

C. The Jet™ J-1500 Series BAT Media treatment units include aerobic wastewater treatment including fixed media. The technologies listed in this approval are used to pre-treat the wastewater prior to discharge to a soil based disposal system.

III. Approval Conditions

A. The technologies listed in this approval may be used as part of a soil based disposal system permitted under the Rules provided the conditions of this approval are met. Failure by the vendor to comply with this approval is grounds for the Agency to revoke or not renew the approval.

B. This approval shall expire on the date stated above. Applications for renewal of this approval shall be submitted 45 days before the expiration date. The renewal request shall include a description of any changes to the equipment, technical specifications and drawings, installation requirements, operation and maintenance requirements, and homeowner's manuals. If new models are introduced or changes are made to the technology, the vendor shall submit detailed descriptions of any modifications to existing approved models as part of the renewal application.

C. Each Innovative/Alternative treatment unit shall be installed and operated as approved by the Agency and as required by the vendor's design, operation and maintenance manuals, and as listed on the vendor's website.

D. Treatment unit sizing shall be in accord with the vendor's technical requirements approved by the Agency. Sizing of each unit shall be based on the calculated design flow per §1-808 of the Rules.

E. The treatment unit may be used for both new and replacement wastewater systems.

F. If the Rules are revised during the term of this approval, this approval shall be revised as needed to conform to the revisions.

G. Site-specific permission for the use of this product is required in the form of a Wastewater System and Potable Water Supply Permit (WW Permit) when a project is subject to the Rules.

H. This approval is not a representation or guarantee of the effectiveness, efficiency, or operation of the treatment unit.

I. This general use approval is based on treatment of domestic wastewater of low and moderate waste strength as specified in §1-915(a)(1)(C) and (D) of the Rules except as specified in Section III(k) below.

J. This approval is based on information submitted by the vendor indicating that the specified treatment units will routinely provide effluent with no more than 30 mg/L of BOD_5 and no more than 30 mg/L of TSS. Effluent from the treatment unit shall discharge to a soil based disposal system that conforms to the requirements of §1-916 of the Rules.

K. Wastewater system designs for wastewater that exceeds moderate strength may use the models of the approved treatment unit on a project by project basis if permitted by the Secretary. The designer shall obtain agreement by the vendor for the proposed use and sizing of these units. These treatment units will be based on organic and hydraulic loading and may require more frequent maintenance as recommended by the vendor. The project-specific permit application and design shall clearly state the treatment performance goals for the treatment units. The designer shall submit information to the Secretary as to whether the unit will achieve 30 mg/L BOD_5 and TSS, or will otherwise reduce the wastewater strength to low or moderate levels. There may be instances where the treatment units are intended to reduce the wastewater strength to low or moderate standards and disperse into a fully sized soil based disposal system.

IV. Responsible Parties, Requirements and Conditions

A. Landowner

1. The landowner must comply with all conditions of their WW Permit in addition to the conditions of this approval.

2. The landowner is responsible for the treatment unit to be inspected by a Licensed Designer as part of the installation inspection and certification of the soil based disposal system.

3. The landowner shall have a valid maintenance contract with a vendor-trained and authorized licensed designer or service provider in force at all times. The contract shall include a requirement for semi-annual inspections. Commercial and community soil based wastewater disposal systems may require more frequent maintenance as recommended by the vendor. The minimum length of any contract shall be for a period of two years.

4. A copy of the initial contract and notification of each succeeding contract shall be submitted to the appropriate Regional Office of the Division and to the vendor.

5. A copy of all inspection and maintenance reports shall be submitted to the appropriate Regional Office of the Division within 60 days of the inspection. The landowner may authorize the licensed designer or the service provider to submit the contracts, notifications and reports on their behalf.

6. The landowner shall keep the system in good operating condition and report any problems to the service provider who, in turn, shall note any problems and repairs on their inspection report.

7. The landowner shall provide a copy of this approval, the WW Permit, and the operating instructions, provided by the vendor, to any person who is a prospective purchaser of a property prior to the sale of the property.

8. Within 30 days of the transfer of the property, the new landowner shall inform the appropriate Regional Office of the Division and the vendor of the change in ownership, including the WW Permit number, lot number or street address, and their name and mailing address.

9. The WW Permit that authorizes the use of this product may be revoked if the treatment unit fails to function properly or if the landowner fails to maintain a valid contract for the required maintenance and inspections of the treatment unit. In the event the WW Permit is revoked, the use of the building will need to be discontinued unless another wastewater treatment system is installed in accordance with a WW Permit issued by the Secretary.

B. Vendor

1. The vendor shall provide the Central Office of the Division (Attention Innovative/Alternative Program Manager) with the names of the Vermont distributor(s) within 60 days of this approval and within 30 days of termination and/or hiring a new firm or sole proprietorship during the term of this approval.

2. The vendor shall provide training for and maintain a list of trained designers and installers.

3. The vendor shall provide training and maintain a list of trained service providers authorized to work on the treatment units.

4. Prior to selling equipment, the vendor shall provide information to the Division regarding who is authorized to sell equipment in Vermont.

5. The vendor shall have an inventory of replacement parts available locally or available for delivery within 24 hours.

6. Prior to the start-up of the wastewater system, detailed operating instructions shall be provided in writing by the vendor to the landowner.

7. The vendor shall submit an annual report electronically to the Central Office of the Division (Attention Innovative/Alternative Program Manager) by April 1st of each year containing the following information for the 12 month period ending December 31st of the previous year:

a) Permitted systems installed in Vermont during the previous calendar year, including:

i. Assigned WW Permit number;

ii. Name of current landowner(s);

iii. Physical and mailing addresses;

iv. Name of Licensed Designer providing the installation certification;

v. Date installed;

vi. Name of the installer; and

vii. Name of the authorized service provider.

b) A summary of all known system problems, damages and/or failures, including:

i. Description of issues;

ii. Potential/known causes of problems;

iii. System operability;

iv. Recommended repair/remediation;

v. System effectiveness; and

vi. Changes in technology specifications

c) A list of names of licensed designers and installers trained by the vendor and/or the vendor's representative.

d) The names and contact information for trained and authorized service providers.

C. Licensed Designer

1. Design Preparation

a) The design of a wastewater system shall include the specific model of the treatment unit approved in this document.

b) The designer shall consult with the vendor for proper sizing of the treatment unit.

c) The designer must assess the structural needs of the treatment unit for the specific application site and include the construction requirements on the design plans.

d) The designer must determine the type of backfill required and any necessary placement specifications.

e) The designer must assess the ventilation path for the particular application and make any necessary provisions to assure proper air flow and control of odor emissions.

f) The designer must provide access to each compartment of the unit (access to grade) as well as to the control panel, any pumps, sampling ports, and any other access needed to perform routine maintenance activities.

g) The designer must address flotation issues if the seasonal high groundwater table will be above the bottom of any of the tanks. Treatment units shall be equipped with anti-flotation devices unless there is a demonstration that flotation is not a problem on a particular site or that an alternative method of stabilization is approved by the Agency.

2. Installation Inspection

a) The treatment unit shall be installed under the guidance of a representative of the vendor.

b) The treatment unit shall be inspected by a licensed designer prior to installing the treatment unit, immediately upon installation of the tanks and before backfilling, and after backfilling and grading is complete. The inspection shall include checking for an adequate structural foundation to support the unit, for levelness of the tanks, for anti-buoyancy, for potential damage during installation, and for proper assembly. The inspection shall include all piping and associated tankage for proper installation before backfilling.

c) The treatment unit and associated tankage shall be tested by the licensed designer for watertightness unless written certification is provided by the vendor at the time of installation. The test includes filling the unit or tanks with water to a point that is above all below grade openings and holding it at a constant level for 24 hours; there shall be no measurable leakage. During the test, the entire unit and the tanks shall be inspected for visible leaks. Should the unit or tanks fail the test, they may be repaired and retested. The testing and repairs shall be conducted under the direction and in the presence of the inspecting designer.

d) The licensed designer shall submit an installation certification letter to the WW permit holder, the vendor and the appropriate Regional Office of the Division within 30 days of the installation, using the language of §1-308 of the Rules, that the wastewater system was correctly installed as well as providing the results of watertightness testing. The certification letter shall identify any repairs that were completed during the installation and testing of the unit or tanks. This letter shall also be provided to the vendor.

e) The licensed designer may be required to conduct on-going inspections of the system beyond the routine maintenance provided by the service provider. See the WW permit for any special inspection and monitoring conditions.

D. Service Provider

1. Maintenance and inspections shall be performed in accordance with the manufacturer's operation and maintenance manual submitted as part of the Innovative/Alternative System application package, and as provided in trainings by the vendor.

a) Qualified Service Providers

i. Maintenance and inspections of the Innovative/Alternative treatment unit must be performed by a licensed designer or service provider trained and authorized by the vendor.

ii. Problems found with any portions of the wastewater system (including the system being failed as defined by the Rules) must be reported immediately to the landowner.

b) Maintenance and Inspection

i. The start-up, six month, and ongoing maintenance and inspections shall be performed by the authorized service provider.

ii. More frequent inspections may be required when recommended by the vendor or on a case-by-case basis by the Secretary.

iii. All reports must be submitted to the landowner in a timely manner so that they can provide the report to the appropriate Regional Office of the Division as well as the vendor within 60 days of completing a maintenance or inspection.

c) Maintenance and Inspection Reports

Maintenance and inspection reports shall include:

i. I/A Maintenance and Inspection Report Coversheet;

ii. Current landowner's name, physical and mailing address;

iii. Permit number and lot number(s) if applicable;

iv. Date of inspection;

v. I/A technology and model;

vi. Validation that the system is operational and meets vendor requirements;

vii. Comments or outstanding corrective actions and recommended due dates;

viii. Any site/system modification;

ix. Results of all effluent testing; and

x. Service Provider/Licensed Designer name, signature and date signed.

Effective Date: March 20, 2014

By: Ernest Christianson
Ernest Christianson
Regional Office Program Manager

VERMONT

State of Vermont
Department of Environmental Conservation
Drinking Water and Groundwater Protection Division
Essex Regional Office
111 West Street
Essex Junction, VT 05452-4695
www.septic.vt.gov

Agency of Natural Resources
[phone] 802-879-5656
[fax] 802-879-3871

June 26, 2014

Martin & Patricia Lavin
350 Main Street
Burlington VT 05401

RE: WW-6-4271, construction of six multi family triplex buildings, 1-5 with (2) three bedroom units and (1) one bedroom unit; Building 6 to have (3) one bedroom units located on U.S. Route 2 & South St. in South Hero, Vermont.

Dear Applicant:

We received your completed application for the above-referenced project on June 25, 2014, including a fee of $2,000.00 paid by check #422. Under the performance standards for this program, we will have a maximum of 45 days of "in-house" time to review your application. If we require further information from you to make a decision, the time until we receive it is not included in the in-house performance standards.

If you have any questions about the review process, or if you have not received a decision on your application within the 45 in-house days, please contact this office.

We have forwarded the information contained in your application to the Information Specialist for this region. A Project Review Sheet will be sent to you indicating other state agencies and departments you should contact regarding additional permits or approvals you may need under their programs. If you have not already done so, you should also check with town officials about any necessary town permits.

If you submitted your application electronically through eDEC, your consultant will need to upload any revisions and send an email to Ernestine Chevrier, James Sandberg and the reviewer notifying us that you have resubmitted information. This email should reference both the eDEC number and the WW number for the project.

For the Drinking Water and Groundwater Protection Division

Ernestine Chevrier
Regional Office Coordinator

cc: South Hero Planning Commission
David A. Tudhope
Chad Branon/Fieldstone Land Consultants, PLLC
"

WW 6.4271

ADMINISTRATIVELY COMPLETE CHECKLIST - Required for all applications
Revised October, 2012

☑ ***Affected landowners – applicant certification statement (new as of Act 145/Act 117 September 11, 2012)***

DE

☑ *Check made payable to STATE OF VERMONT for correct fee* 11/3/11

☑ *Application form (last revised 9/14/12)*

- ☐ *Part 1, Applicant (Landowner) Information*
  - ☐ *Section A, Applicant Details (Landowner is an individual) Question(s)_____*
  - ☐ *Section B, Applicant Details (Landowner is other than an individual) Question(s)_____*
  - ☐ *Section C, Primary Contact Information, Question(s)_____*
  - ☐ *Section D, Building/Business Owner Information Question(s)_____*
- ☑ *Part II, Certifying Designer Information*
  - ☐ *Section A, Certifying Designer 1, Question(s)_____*
  - ☐ *Section B, Certifying Designer 2, Question(s)_____*
- ☑ *Part III, Property Location Information*
  - ☐ *Section A, Property Parcel ID# and Location, Question(s)_____*
  - ☒ *Section B, Center of Property GPS Coordinates, Question(s)_____*
- ☑ *Part IV, Project Information*
  - ☐ *Section A, General Project Information, Question(s)_____*
  - ☐ *Section B, Project Deed Reference, Question(s)_____*
  - ☐ *Section C, Project Plan Reference, Question(s)_____*
  - ☐ *Section D, Existing Project Lot/Building Details, Question(s)_____*
  - ☐ *Section E, Proposed Project Lot/Building Details, Question(s)_____*
- ☑ *Part V, Water Supply Information*
  - ☐ *Section A, Water Supply Screening Question(s)_____*
  - ☐ *Section B, General Water Supply Question(s)_____*
  - ☐ *Section C, Individual Water Supply Details, Question(s)_____*
  - ☐ *Section D, Water Supply Design Flow Summary, Question(s)_____*
- ☑ *Part VI, Wastewater Disposal System Information*
  - ☐ *Section A, Wastewater Disposal System Screening Question(s)_____*
  - ☐ *Section B, General Wastewater Disposal System Question(s)_____*
  - ☐ *Section C, Individual Wastewater Disposal System Details, Question(s)_____*
  - ☐ *Section D, Wastewater Disposal Systems Design Flow Summary Table, Question(s)_____*
- ☑ *Part VII, Application Fees, Question(s) _____*
  - ☐ *Question 1, Fee Amount*
  - ☐ *Question 2, Fee Calculation Details*
- ☑ *Part VIII, Designer Certification & Copyright License*
  - ☐ *Section A, Certifying Designer 1 Certification & Copyright License Question(s)_____*
  - ☐ *Section B, Certifying Designer 2 Certification & Copyright License Question(s)_____*
- ☑ *Part IX, Applicant (Landowner) Signature(s)*

Received
JUN 25 2014
Drinking Water and Groundwater Protection Division

Drinking Water & Groundwater Protection Division - Permit Application

Wastewater System & Potable Water Supply

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

For Office Use Only:

Application#	PIN#	Date Complete Application Received
WW-6-4271		6.25.14

Authority:

10 V.S.A. Chapter 64, the Environmental Protection Rules, Chapter 1, Wastewater System & Potable Water Supply Rules, and Chapter 21, Water Supply Rules, Appendix A. Part 11 – Small Scale Water Systems.

General Information:

The organization and/or content of this form may not be altered, however, the form may be expanded to allow additional information to be entered. Changes in the organization and/or content of the form may result in an invalid application or permit.

In most cases a licensed designer will be required for your project and to help complete this application form. There are also line-by-line instructions available to assist with completing this form.

NOTE: We strongly suggest referring to the application instructions while completing this application form.

Part I Applicant (Landowner) Information

Section A – Applicant Details (If Landowner is an individual or individuals)

Note: There is space provided in this section for two Landowners. If there are more than two Landowners shown on the property deed, please provide a separate sheet listing each additional Landowner, their mailing address, signature and date.

1 Last Name	2 First Name
LAVIN	MARTIN

3 Mailing Address Line 1	4 Mailing Address Line 2
350 MAIN ST.	

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
BURLINGTON	VT	U.S.A.	05401

9 Email Address	10 Telephone
	(802) 238-7777

Additional Landowner (if applicable)

☑ Check if address/contact information of second Landowner is the same as above and then enter only Last Name and First Name information below. Otherwise, complete all information for the second Landowner.

11 Last Name	12 First Name
LAVIN	PATRICIA

13 Mailing Address Line 1	14 Mailing Address Line 2

15 Town/City	16 State/Province	17 Country	18 Zip/Postal Code

19 Email Address	20 Telephone

Section B – Applicant Details (if Landowner is other than an Individual or Individuals)

1 Registered Legal Entity or Organization Name	2 Telephone

3 Mailing Address Line 1	4 Mailing Address Line 2

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code

Certifying Official

The Certifying Official must be a person who has signatory authority for the legal entity or organization that is the Applicant.

9 Certifying Official Last Name	10 Certifying Official First Name

11 Certifying Official Title

12 Email Address	13 Telephone

Section C – Primary Contact Information (if other than Applicant)

1 Last Name	2 First Name		
3 Mailing Address Line 1	4 Mailing Address Line 2		
5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
9 Email Address			10 Telephone

Section D – Building/Business Owner Information

1 Last Name	2 First Name		
3 Mailing Address Line 1	4 Mailing Address Line 2		
5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
9 Email Address			10 Telephone

Part II Certifying Designer Information

Section A – Certifying Designer 1

1 Designer Last Name	2 Designer First Name		
TUDHOPE	DAVID		
3 Designer License #	4 Company Name		
230B			
5 Mailing Address Line 1	6 Mailing Address Line 2		
74 CAYUGA COURT			
7 Town/City	8 State/Province	9 Country	10 Zip/Postal Code
BURLINGTON	VT	U.S.A.	05408
11 Email Address			12 Telephone
dtudhope@aol.com			(802) 862-9360

13 Designer Role(s) (check all that apply)
- ☐ Water Supply Designer
- ☑ Wastewater Disposal System Designer

Section B – Certifying Designer 2 (If applicable)

1 Designer Last Name	2 Designer First Name		
BRANON	CHAD		
3 Designer License #	4 Company Name		
P.E. 9147	FIELDSTONE LAND CONSULTANTS, PLLC		
5 Mailing Address Line 1	6 Mailing Address Line 2		
778 ELM ST.			
7 Town/City	8 State/Province	9 Country	10 Zip/Postal Code
MILFORD	N.H.	U.S.A.	03055
11 Email Address			12 Telephone
cebranon@fieldstonelandconsultants.com			(603) 752-5456

13 Designer Role(s) (check all that apply)
- ☑ Water Supply Designer
- ☐ Wastewater Disposal System Designer

Part III Property Location Information

Section A – Property Location

1 Please provide the property Town and the property address or a brief description of the location.

(a) Town or City	(b) Street or Road Location
SOUTH HERO	U.S. RTE. 2 & SOUTH ST.

Section B – Center of Property GPS Coordinates

1 Enter the approximate center of property coordinates using GPS set for NAD83 or as derived from map (map must be based on NAD83).

(a) Latitude
(in decimal degrees to five decimal places, ex. 44.38181°)
N 44.64073°

(b) Longitude
(in decimal degrees to five decimal places, ex. 72.31392°)
W (-) 73.29538°

Part IV Project Information

Section A – General Project Information & Questions

1 Project Name (if applicable)

2 Total Acreage of Property
(±) 100.62

3 Business Name (if applicable)

4 Detailed Project Description

THE CONSTRUCTION OF SIX MULTI-FAMILY RESIDENTIAL TRI-PLEXES ON AN EXISTING UNDEVELOPED LOT.
TRIPLEX BUILDINGS #1-#5 SHALL HAVE TWO 3-BEDROOM UNITS AND ONE 1-BEDROOM UNIT. EACH BUILDING TO HAVE A SHARED WASTEWATER DISPOSAL SYSTEM AND SHARED DRILLED WELL WATER SUPPLY DESIGNED FOR A TOTAL OF SEVEN BEDROOMS.
(CONT. NEXT PAGE)

5 (a) Were all existing buildings or structures, campgrounds, and their associated potable water supplies and wastewater systems substantially completed before January 1, 2007? ☑ Yes ☐ No

(b) Were all existing improved and unimproved lots in existence before January 1, 2007? ☑ Yes ☐ No

6 Does this application include subdividing the property? ☐ Yes ☑ No

7 Has anyone from the Drinking Water & Groundwater Protection Division's Regional Office been to the property? ☑ Yes ☐ No

If the answer to question 7 is Yes, enter the staff person's name and the date of the visit:

(a) Name of Staff Person	(b) Date of Visit (m/d/yyyy)
DOLORES ECKERT, ASSIST. REG. ENGR.	10-21-2010 AND 11-3-2011

8 Will any construction occur within 50 feet of a wetland boundary, mapped or designated? ☐ Yes ☑ No

If Yes, contact the Wetlands Program of the Watershed Management Division at (802) 338-4835.

9 Will more than one acre be disturbed during the entire course of construction, including all lots and phases? ☑ Yes ☐ No

If Yes, contact the Stormwater Program of the Watershed Management Division at (802) 241-4320.

10 Will there be any stream crossings by roads, utilities, or other construction? ☐ Yes ☑ No

If Yes, contact the River Corridor Mgmt. Program of the Watershed Management Division at:

Central & Northwest Vermont ..... (802) 879-5631
Southern Vermont ..... (802) 786-5906
Northeastern Vermont ..... (802) 751-0129

Part III Property Location Information

Section A – Property Location

1 Please provide the property Town and the property address or a brief description of the location.

(a) Town or City	(b) Street or Road Location

Section B – Center of Property GPS Coordinates

1 Enter the approximate center of property coordinates using GPS set for NAD83 or as derived from map (map must be based on NAD83).

(a) **Latitude** *(in decimal degrees to five decimal places, ex. 44.38181°)*

N °

(b) **Longitude** *(in decimal degrees to five decimal places, ex. 72.31392°)*

W (-) °

Part IV Project Information

Section A – General Project Information & Questions

1 Project Name (if applicable)

2 Total Acreage of Property

3 Business Name (if applicable)

4 Detailed Project Description

(CON'T.)

TRIPLEX BUILDING #6 SHALL HAVE THREE 1-BEDROOM UNITS. ONE UNIT (#6A) SHALL BE SERVED BY AN INDIVIDUAL WASTEWATER DISPOSAL SYSTEM AND TWO UNITS (#6B & #6C) SHALL BE SERVED BY A SHARED WASTEWATER DISPOSAL SYSTEM. BUILDING #6 TO BE SERVED BY A SHARED DRILLED WELL WATER SUPPLY DESIGNED FOR THREE BEDROOMS TOTAL.

5 (a) Were all existing buildings or structures, campgrounds, and their associated potable water supplies and wastewater systems substantially completed before January 1, 2007? ☐ Yes ☐ No

(b) Were all existing improved and unimproved lots in existence before January 1, 2007? ☐ Yes ☐ No

6 Does this application include subdividing the property? ☐ Yes ☐ No

7 Has anyone from the Drinking Water & Groundwater Protection Division's Regional Office been to the property? ☐ Yes ☐ No

If the answer to question 7 is Yes, enter the staff person's name and the date of the visit:

(a) Name of Staff Person

(b) Date of Visit (m/d/yyyy)

8 Will any construction occur within 50 feet of a wetland boundary, mapped or designated? ☐ Yes ☐ No

If Yes, contact the Wetlands Program of the Watershed Management Division at (802) 338-4835.

9 Will more than one acre be disturbed during the entire course of construction, including all lots and phases? ☐ Yes ☐ No

If Yes, contact the Stormwater Program of the Watershed Management Division at (802) 241-4320.

10 Will there be any stream crossings by roads, utilities, or other construction? ☐ Yes ☐ No

If Yes, contact the River Corridor Mgmt. Program of the Watershed Management Division at:

Central & Northwest Vermont ..... (802) 879-5631
Southern Vermont ..... (802) 786-5906
Northeastern Vermont ..... (802) 751-0129

11 Is the lot or project located in a special flood hazard area as designated on the flood insurance maps prepared for a municipality by the Federal Emergency Management Agency? ☐ Yes ☑ No

If Yes, show the special flood hazard area limits on the site plan.

12 Act 250: Has the applicant/landowner subdivided any other lots of any size within a five mile radius of this subdivision, or within the environmental district within the last five years? ☐ Yes ☑ No

If the answer to question **12** is Yes, enter the town(s) and the associated number of lots in the table below:

(a) Town	(b) Number of Lots

13 Is there any prior Act 250 jurisdiction on the tract of land? ☐ Yes ☑ No

If the answer to question **13** is Yes, enter the Act 250 permit number:

(a) Act 250 Permit Number

Section B – Project Deed Reference

1 Please provide the Town, Parcel ID, Book and Page reference for the current landowner's deed(s) to this property.

(a) Town	(b) Parcel ID	(c) Book	(d) Page(s)
SOUTH HERO	RT275	47	416-417

Section C – Project Plan Reference

1 Please provide the following information for all water supply and wastewater disposal system plans being submitted.

(a) Sheet#	(b) Title	(c) Plan Date	(d) Plan Revision Date
1	OVERALL SITE PLAN	3-19-2014	
2	SITE PLAN - BUILDINGS	3-19-2014	
3	BUILDINGS 1-5 SEPTIC	3-19-2014	
4	BUILDING 6 SEPTIC	3-19-2014	
5	BUILDINGS 1-3 DETAILS	3-19-2014	
6	BUILDINGS 4 & 5 DETAILS	3-19-2014	
7	UNIT 6A DETAILS	3-19-2014	
8	UNIT 6B & 6C DETAILS	3-19-2014	
9	JET J-1500 DETAILS	3-19-2014	
10	JET J-750 DETAILS	3-19-2014	

Section D - Existing Project Lot/Building Details

Please provide the existing project details. This section is used to describe what is existing for the project. For example, if you are subdividing an undeveloped 21-acre parcel, you would list the existing parcel. If you are revising the boundary lines of two commercial lots in an industrial park, and constructing an addition to an existing building you would list the existing lot numbers, existing acres, existing buildings, existing uses, construction date(s), prior permits, and answer the compliance questions. Repeat this page as many times as necessary to describe all of the existing Lots/Buildings.

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
1	(±) 100.62	UNDEVELOPED

4 Provide the following information for each building on the lot

(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

Additional Lots/Buildings...

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot

4 Provide the following information for each building on the lot

(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot

4 Provide the following information for each building on the lot

(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot

4 Provide the following information for each building on the lot

(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No
				☐ Yes ☐ No

Section E - Proposed Project Lot/Building Details

This section is used to describe what you are proposing to do in this project. For example, if you were going to create 4 lots for construction of single family residences, you would list each lot, proposed acreage, proposed buildings, and proposed use. Repeat this page as many times as necessary to describe all of the proposed Lots/Buildings.

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
1	(±) 100.62	MULTI-FAMILY RESIDENTIAL

4 Is the lot being created as part of a subdivision? ☐ Yes ☑ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ☐ Yes ☑ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules: _____

7 Provide the following information for each building on the lot

(a) Building ID	(b) If bldg is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
BUILDING 1		☑	TRIPLEX; (2) 3 BED'RM. UNIT, (1) 1 BED'RM. UNIT
BUILDING 2		☑	"
BUILDING 3		☑	"
BUILDING 4		☑	"
BUILDING 5		☑	"

Additional Lots/Buildings...

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
1	(±) 100.62	MULTI-FAMILY RESIDENTIAL

4 Is the lot being created as part of a subdivision? ☐ Yes ☑ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ☐ Yes ☑ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules: _____

7 Provide the following information for each building on the lot

(a) Building ID	(b) If bldg is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
BUILDING 6		☑	TRIPLEX; (3) 1 BED'RM. UNITS
		☐	
		☐	
		☐	
		☐	

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot

4 Is the lot being created as part of a subdivision? ☐ Yes ☐ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ☐ Yes ☐ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules: _____

7 Provide the following information for each building on the lot

(a) Building ID	(b) If bldg is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
		☐	
		☐	
		☐	
		☐	
		☐	

Part V Water Supply Information

Section A – Water Supply Screening Questions

1	Are you proposing a new water supply or water service line or changes to a permitted but not constructed water supply or water service line for this project?	☑ Yes ☐ No
2	Are you proposing changes to an existing water supply or water service for this project (including changes to location, design flows, or operational change)?	☐ Yes ☑ No
3	Is there an existing connection to a water supply or water service line for this project?	☐ Yes ☑ No

Complete Part V if you answered Yes to any of the above questions. A project with no existing or proposed water supply may skip to Part VI.

Section B – General Water Supply Questions

1	Does this project involve a failed water supply?	☐ Yes ☑ No
2	Will any of the proposed water sources serve 25 or more people or have 15 or more service connections?	☐ Yes ☑ No

If Yes, the Applicant must contact Drinking Water & Groundwater Protection Division at (802) 241-3400 for source, construction, and an operating permit.

3	Are any of the existing or proposed water sources located within a special flood hazard area?	☐ Yes ☑ No
4	Are any of the existing or proposed water sources located within a floodway?	☐ Yes ☑ No
5	Are any of the proposed water sources located within 1 mile of a hazardous waste site as designated by the Waste Management Division and identified on the Agency mapping website?	☐ Yes ☑ No

If Yes, please submit additional information on the site. The Waste Management Division can be reached at (802) 241-3888.

6	Does your project require an approval letter from the Drinking Water & Groundwater Protection Division for the construction of a public water system, municipal water line extension over 500 feet, or hydrants or sprinkler systems?	☐ Yes ☐ No

If Yes, please submit a copy of the approval letter from the Drinking Water & Groundwater Protection Division.

7	Does the proposed or existing water supply(ies) use a water treatment device to obtain compliance with the quality requirements in the Water Supply Rule?	☐ Yes ☑ No

If Yes, please submit addition information regarding the constituent(s) that exceeds the standards and plans, details, and specifications of the treatment device.

8	Is any portion of the proposed water supply located in or near a Water Source Protection Area as designated by the Drinking Water & Groundwater Protection Division?	☐ Yes ☑ No

If in areas of known interference issues, please contact the Drinking Water & Groundwater Protection Division at (802) 241-3400.

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
BUILDING 1 WATER SUPPLY	
3 Water Source Type	**4 Type of Change to Supply**
NON-PUBLIC DRILLED BEDROCK WELL	NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Meter Based Flows
1	BUILDING 1	CONNECT. TO NEW SYS.		980	980	R-B

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier: BUILDING 2 WATER SUPPLY

2 Water Supply Owner (if not Applicant):

3 Water Source Type: NON-PUBLIC DRILLED BEDROCK WELL

4 Type of Change to Supply: NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Water Saving Flows
1	BUILDING 2	CONNECT. TO NEW SYS.		980	980	R-B

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier: BUILDING 3 WATER SUPPLY	2 Water Supply Owner (if not Applicant):
3 Water Source Type: NON-PUBLIC DRILLED BEDROCK WELL	4 Type of Change to Supply: NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Sub...	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Prior Based Flows
1	BUILDING 3	CONNECT. TO NEW SYS.		980	980	R-B

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
BUILDING 4 WATER SUPPLY	
3 Water Source Type	**4 Type of Change to Supply**
NON-PUBLIC DRILLED BEDROCK WELL	NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Table Based On
1	BUILDING 4	CONNECT. TO NEW SYS.		980	980	R-B

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier: BUILDING 5 WATER SUPPLY

2 Water Supply Owner (if not Applicant):

3 Water Source Type: NON-PUBLIC DRILLED BEDROCK WELL

4 Type of Change to Supply: NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Manual Based For
1	BUILDING 5	CONNECT. TO NEW SYS.		980	980	R-B

Section C – Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property. Many projects have only one water supply, such as a municipal water service connection or one drilled well. However, if the project in this application has more than one water supply, please repeat this Section for each water supply. For example, if the project has two drilled wells, you would need to complete a separate water supply detail sheet with the appropriate information for each well.

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
BUILDING 6 WATER SUPPLY	
3 Water Source Type	**4 Type of Change to Supply**
NON-PUBLIC DRILLED BEDROCK WELL	NEW SYSTEM

5 Lots/Buildings served by this Water Supply System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Meter Based Flows
1	BUILDING 6	CONNECT. TO NEW SYSTEM		420	420	R-B

Section D – Water Supply Design Flow Summary Table

1 If the project includes more than one water supply, please total up the systems on this page of the form and provide the grand total water supply design flows for the project. **IMPORTANT:** Please don't include systems that were identified in this Part in Section C, Line 4 as a "Replacement Supply Designation" in the summary table below.

	Design Flows (Gallons Per Day)		
(a) Water Supply Name-Identifier	(b) Existing	(c) Change	(d) Total
BUILDING 1 WATER SUPPLY		980	980
BUILDING 2 WATER SUPPLY		980	980
BUILDING 3 WATER SUPPLY		980	980
BUILDING 4 WATER SUPPLY		980	980
BUILDING 5 WATER SUPPLY		980	980
BUILDING 6 WATER SUPPLY		420	420

Part VI Wastewater Disposal System Information

Section A – Wastewater Disposal System Screening Questions

1 Are you proposing a new or replacement wastewater system, a new wastewater service line, or changes to a permitted but not constructed wastewater disposal system or wastewater service line for this project? ☑ Yes ☐ No

2 Are you proposing changes to an existing wastewater disposal system, replacement disposal wastewater system, replacement area, or wastewater service line for this project (including changes to location, design flows, or operational change)? ☐ Yes ☑ No

3 Is there an existing connection to a wastewater disposal system or wastewater service line for this project? ☐ Yes ☑ No

Complete Part VI if you answered Yes to any of the above questions. A project with no existing or proposed wastewater disposal system may skip to Part VII.

Section B – General Wastewater Disposal System(s) Questions

1 Does this project involve a failed wastewater disposal system? ☐ Yes ☑ No

2 Do any of the systems require a curtain or dewatering drain as part of the design? ☐ Yes ☑ No

3 Is a hydrogeologic study required for this project? ☑ Yes ☐ No

4 For projects using soil-based wastewater systems having a total design flow that exceeds 1,000 gpd, is this project located in a Class A Watershed? ☐ Yes ☐ No ☑ NA

If the answer to question **4** is Yes, indicate the Class A Watershed in which the system(s) is located:

(a) Class A Watershed Name

5 Are there any floor drains, existing or proposed as part of this project? ☐ Yes ☑ No

If the answer to question **5** is Yes, indicate where the floor drains will discharge:

(a) Floor Drain Discharge Point

6 If the project utilizes an Innovative/Alternative System or Product, has the applicant received a copy of the Drinking Water & Groundwater Protection Division's approval letter? ☑ Yes ☐ No ☐ NA

7 Is any portion of the proposed wastewater disposal system located in or near a Water Source Protection Area as designated by the Drinking Water & Groundwater Protection Division? ☐ Yes ☑ No

If Yes, contact the Drinking Water & Groundwater Protection Division at (802) 241-3400.

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier: BUILDING 1 DISPOSAL SYSTEM

2 Wastewater Disposal System Owner (if not Applicant):

3 Please indicate the wastewater disposal system type: MOUND

4 Type of Change to System: NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Rule or Meter Based Flows
1	BUILDING 1	CONNECT. TO NEW SYS.		980		980	R-B
	Wastewater System Design Flow Totals (GPD) →		6	7 980	8	9 980	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used: PERFORMANCE - BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type: GENERAL

18 Please specify the type of Innovative/Alternative system or product. JET INC. MODEL J-1500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier	2 Wastewater Disposal System Owner (If not Applicant)
BUILDING 2 DISPOSAL SYSTEM	
3 Please indicate the wastewater disposal system type:	**4 Type of Change to System**
MOUND	NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Information	(g) Total	(h) Rule or Water Based Flows
1	BUILDING 2	CONNECT. TO NEW SYS.		980		980	R-B
	Wastewater System Design Flow Totals (GPD) →		**6**	**7** 980	**8**	**9** 980	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used:
PERFORMANCE - BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type:
GENERAL

18 Please specify the type of Innovative/Alternative system or product.
JET INC. MODEL J-1500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier	2 Wastewater Disposal System Owner (if not Applicant)
BUILDING 3 DISPOSAL SYSTEM	
3 Please indicate the wastewater disposal system type: MOUND	**4** Type of Change to System NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to this Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Flow or Water Based Fixts
1	BUILDING 3	CONNECT. TO NEW SYS.		980		980	R-B
	Wastewater System Design Flow Totals (GPD) →		6	7 980	8	9 980	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used:
PERFORMANCE - BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type:
GENERAL

18 Please specify the type of Innovative/Alternative system or product.
JET INC. MODEL J-1500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier: BUILDING 4 DISPOSAL SYSTEM

2 Wastewater Disposal System Owner (if not Applicant):

3 Please indicate the wastewater disposal system type: MOUND

4 Type of Change to System: NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Rate or Water Supply Flows
1	BUILDING 4	CONNECT. TO NEW SYS.		980		980	R-B
	Wastewater System Design Flow Totals (GPD) →		6	7 980	8	9 980	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used: PERFORMANCE - BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type: GENERAL

18 Please specify the type of Innovative/Alternative system or product. JET INC. MODEL J-1500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier: BUILDING 5 DISPOSAL SYSTEM

2 Wastewater Disposal System Owner (If not Applicant):

3 Please indicate the wastewater disposal system type: MOUND

4 Type of Change to System: NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Information	(g) Total	(h) Type of Water Supply Proposed
1	BUILDING 5	CONNECT. TO NEW SYS.		980		980	R-B
		Wastewater System Design Flow Totals (GPD) →	6	7 980	8	9 980	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used: PERFORMANCE - BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type: GENERAL

18 Please specify the type of Innovative/Alternative system or product. JET INC. MODEL J-1500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier: UNIT 6A DISPOSAL SYSTEM	2 Wastewater Disposal System Owner (if not Applicant)
3 Please indicate the wastewater disposal system type: MOUND	4 Type of Change to System: NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Rule or Meter Based Flows
1	UNIT 6A	CONNECT. TO NEW SYS.		140		140	R-B
	Wastewater System Design Flow Totals (GPD) →		6	7 140	8	9 140	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☐ Yes ☑ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used:
PERFORMANCE-BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type:
GENERAL

18 Please specify the type of Innovative/Alternative system or product.
JET INC. MODEL J-500 WASTEWATER TREATMENT SYSTEM

Section C – Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property. Many projects have only one wastewater disposal system, such as a municipal sewer service connection. However, if the project in this application has more than one wastewater disposal system, please repeat this Section for each wastewater disposal system. For example, if the project has a primary and a replacement area, you would need to complete a separate wastewater disposal system detail sheet with the appropriate information for each wastewater disposal system.

1 Wastewater Disposal System Name/Identifier: UNIT 6B & 6C DISPOSAL SYSTEM

2 Wastewater Disposal System Owner (if not Applicant):

3 Please indicate the wastewater disposal system type: MOUND

4 Type of Change to System: NEW SYSTEM

5 Lots/Buildings served by this Wastewater Disposal System:

(a) Lot#	(b) Building ID	(c) Type of Change to the Building s System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Rule or Meter Based Flows
1	UNITS 6B & 6C	CONNECT. TO NEW SYS.		280		280	R-B
	Wastewater System Design Flow Totals (GPD) →		6	7 280	8	9 280	

10 Is system located off-lot? ☐ Yes ☑ No

11 Is the system shared? ☑ Yes ☐ No

If the system is located off-lot and/or shared, please submit copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ☐ Yes ☑ No

If Yes, please submit additional details related to the variance request.

13 If the wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number:

14 If the wastewater disposal system type is a connection to a municipal system, please indicate the town:

15 If this is a soil-based system, please indicate the design approach used: PERFORMANCE-BASED DESIGN

16 For soil-based systems, please check all that apply: ☐ Storage and Dose ☑ Filtrate ☐ Constructed Wetlands

17 For Innovative/Alternative soil-based systems, please indicate the system use type: GENERAL

18 Please specify the type of Innovative/Alternative system or product. JET INC. MODEL J-500 WASTEWATER TREATMENT SYSTEM

Section D – Wastewater Disposal Systems Design Flow Summary Table

1 If the project includes more than one wastewater disposal system, please total up the systems on this page of the form and provide the grand total wastewater disposal system design flows for the project. **IMPORTANT:** Please don't include systems that were identified in this Part in Section C, Line 4 as a "Replacement Area Designation" in the summary table below.

	Design Flows (Gallons Per Day)			
(a) Wastewater Disposal System Name Identifier	(b) Existing	(c) Change	(d) Infiltration	(e) Total
BUILDING 1 DISPOSAL SYSTEM		980		980
BUILDING 2 DISPOSAL SYSTEM		980		980
BUILDING 3 DISPOSAL SYSTEM		980		980
BUILDING 4 DISPOSAL SYSTEM		980		980
BUILDING 5 DISPOSAL SYSTEM		980		980
UNIT 6A DISPOSAL SYSTEM		140		140
UNIT 6B & 6C DISPOSAL SYSTEM		280		280

Part VII Application Fees

1 Fee Amount

$ 2000.00/100

2 Fee Calculation Details

PROJECT DESIGN FLOW = 5320 G.P.D. ≤ 6500 G.P.D.

Part VIII Designer Certification & Copyright License

Section A – Certifying Designer 1 Certification & Copyright License

"I hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section A, Line 13.

- ☐ Water Supply Designer
- ☒ Wastewater Disposal System Designer

2 Print Designer Name	3 Designer Signature	4 Signature Date
David A. Tudhope	David A Tudhope	6-21-2014

Section B – Certifying Designer 2 Certification & Copyright License

"I hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section B, Line 13.

- ☒ Water Supply Designer
- ☐ Wastewater Disposal System Designer

2 Print Designer Name	3 Designer Signature	4 Signature Date
CHAD BRANON		6-13-2014

Part IX Applicant(s) Signature & Acknowledgements

In order to insure compliance with the requirements of the regulations administered by the Department of Environmental Conservation, Drinking Water & Groundwater Protection Division, it may be necessary to visit the property. As this would involve a Department employee entering private property, we request your approval to do so.

1 If we do visit your property, do you have any special instructions?

the ground is still soft in spots. Please be careful where you drive to avoid ruts. Thank you

"As landowner of the property for which I am requesting a permit from the Department of Environmental Conservation, I understand that by signing this application I am granting permission for the Department employees to enter the property, during normal working hours, to insure compliance of the property with the applicable rules of the Department.

I also understand that I am not allowed to commence any site work or construction on this project without written approval from the Department of Environmental Conservation.

If my project utilizes an Innovative/Alternative System or Product, I have received a copy of the Drinking Water & Groundwater Protection Division's approval letter and agree to abide by the conditions of the approval.

I also certify that to the best of my knowledge and belief the information submitted above is true, accurate and complete."

2 Print Applicant Name	3 Applicant Signature	4 Signature Date
Martin V. Lavin	Martin Lavin	6-12-14
Patricia A. Lavin	Patricia A. Lavin	6-12-14

ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program

A person submitting an application to the Secretary for a Wastewater System and Potable Water Supply Permit where the proposed project has isolation distances (overshadowing) that extend onto property owned by persons other than the permit applicant shall submit the following certification with the application.

Note: When the property subject to the permit application is owned by more than one person, only one of the landowners must sign this certification statement even though all landowners must sign the permit application itself.

I hereby certify that the individual(s) that own property that is overshadowed by my proposed project have been sent by certified mail a copy of the required notification form and the site plan(s) that accurately depicts all isolation distances. I also certify that I attached to this certification form a copy of all certified mail receipts for notifications that were sent to the affected property owners.

Signature Martin Lavin Patricia Lavin

Name (Printed) Martin V. Lavin Patricia Lavin

Property Address or Property Tax ID # RT275

Date of this certification June 12, 2014 / 6-12-14

Please list all of the property owners who were sent a notification by certified mail.

Affected Property Owner(s) – (Please provide a second sheet using this format when there are more than three affected property owners)

Name Sharen Chadwick

Address 47 South Street
So. Hero, Vt 05486

Name Town of South Hero

Address P.O. Box 175
So. Hero Vt 05486

Name Aven Management, LLC

Address 61 South Street
So. Hero, Vt 05486

(To Comply with Act 145 and Act 117 – 8-24-12, Last Revised 9-11-12)

ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program

A person submitting an application to the Secretary for a Wastewater System and Potable Water Supply Permit where the proposed project has isolation distances (overshadowing) that extend onto property owned by persons other than the permit applicant shall submit the following certification with the application.

Note: When the property subject to the permit application is owned by more than one person, only one of the landowners must sign this certification statement even though all landowners must sign the permit application itself.

I hereby certify that the individual(s) that own property that is overshadowed by my proposed project have been sent by certified mail a copy of the required notification form and the site plan(s) that accurately depicts all isolation distances. I also certify that I attached to this certification form a copy of all certified mail receipts for notifications that were sent to the affected property owners.

Signature Martin Lavin Patricia Lavin

Name (Printed) Martin V. Lavin Patricia Lavin

Property Address or Property Tax ID # RT 275

Date of this certification June 12, 2014 / 6-12-14

Please list all of the property owners who were sent a notification by certified mail.

Affected Property Owner(s) – (Please provide a second sheet using this format when there are more than three affected property owners)

Name Arthur + Francis Robinson

Address 81 South Street
So. Hero, Vt 05486

Name Edward + Una Gardner

Address 12 Keeler Bay Rd.
So. Hero, Vt 05486

Name Robert + Susan Straight

Address 87 South Street
So. Hero, Vt 05486

(To Comply with Act 145 and Act 117 – 8-24-12, Last Revised 9-11-12)

ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program

A person submitting an application to the Secretary for a Wastewater System and Potable Water Supply Permit where the proposed project has isolation distances (overshadowing) that extend onto property owned by persons other than the permit applicant shall submit the following certification with the application.

Note: When the property subject to the permit application is owned by more than one person, only one of the landowners must sign this certification statement even though all landowners must sign the permit application itself.

I hereby certify that the individual(s) that own property that is overshadowed by my proposed project have been sent by certified mail a copy of the required notification form and the site plan(s) that accurately depicts all isolation distances. I also certify that I attached to this certification form a copy of all certified mail receipts for notifications that were sent to the affected property owners.

Signature Martin Lavin Patricia Lavin

Name (Printed) Martin V. Lavin, Patricia Lavin

Property Address or Property Tax ID # RT 275

Date of this certification June 12, 2014 / 672-14

Please list all of the property owners who were sent a notification by certified mail.

Affected Property Owner(s) – (Please provide a second sheet using this format when there are more than three affected property owners)

Name Howard + Shirley Gardner

Address 53 South Street

So. Hero, Vt 05486

Name _____

Address _____

_____

Name _____

Address _____

_____

(To Comply with Act 145 and Act 117 – 8-24-12, Last Revised 9-11-12)

7013 1710 0000 8407 0043

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SOUTH HERO VT 05486 OFFICIAL USE

Postage	$ $1.40
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.70

0530 03 Postmark Here JUN 13 2014 USPS 06/13/2014

Sent To Vermont Gas Sys.
Street, Apt. No.; or PO Box No. PO Box 435
City, State, ZIP+4 So Hero, VT 05486

PS Form 3800, August 2006 See Reverse for Instructions

7013 1710 0000 8407 0050

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SOUTH HERO VT 05486 OFFICIAL USE

Postage	$ $1.40
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.70

0530 03 Postmark Here JUN 13 2014 USPS 06/13/2014

Sent To Sharon Chadwick
Street, Apt. No.; or PO Box No. 47 South St.
City, State, ZIP+4 So Hero 05486

PS Form 3800, August 2006 See Reverse for Instructions

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SOUTH HERO VT 05486 OFFICIAL USE

Postage	$ $1.40
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.70

0530 03 Postmark Here JUN 13 2014 USPS 06/13/2014

Sent To Arthur & Francis Robenson
Street, Apt. No.; or PO Box No. 61 South St
City, State, ZIP+4 So Hero 05486

PS Form 3800, August 2006 See Reverse for Instructions

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PS Form 3800, August 2006 See Reverse for Instructions

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Postage	$ $3.30
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JUN 13 2014
06/13/2014

Sent To: Edward + Una Gardner
Street, Apt. No.; or PO Box No.: 12 Keeler Bay Rd.
City, State, ZIP+4: South Hero, Vt 05486

PS Form 3800, August 2006 — See Reverse for Instructions

7007 0220 0001 7028 3634

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Postage	$ $1.40
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$0.00
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.70

Postmark Here
JUN 13 2014
06/13/2014

Sent To: Howard + Shirley Gardner
Street, Apt. No.; or PO Box No.: 53 South Street
City, State, ZIP+4: So. Hero, Vt 05486

PS Form 3800, August 2006 — See Reverse for Instructions

7007 0220 0001 7028 3610

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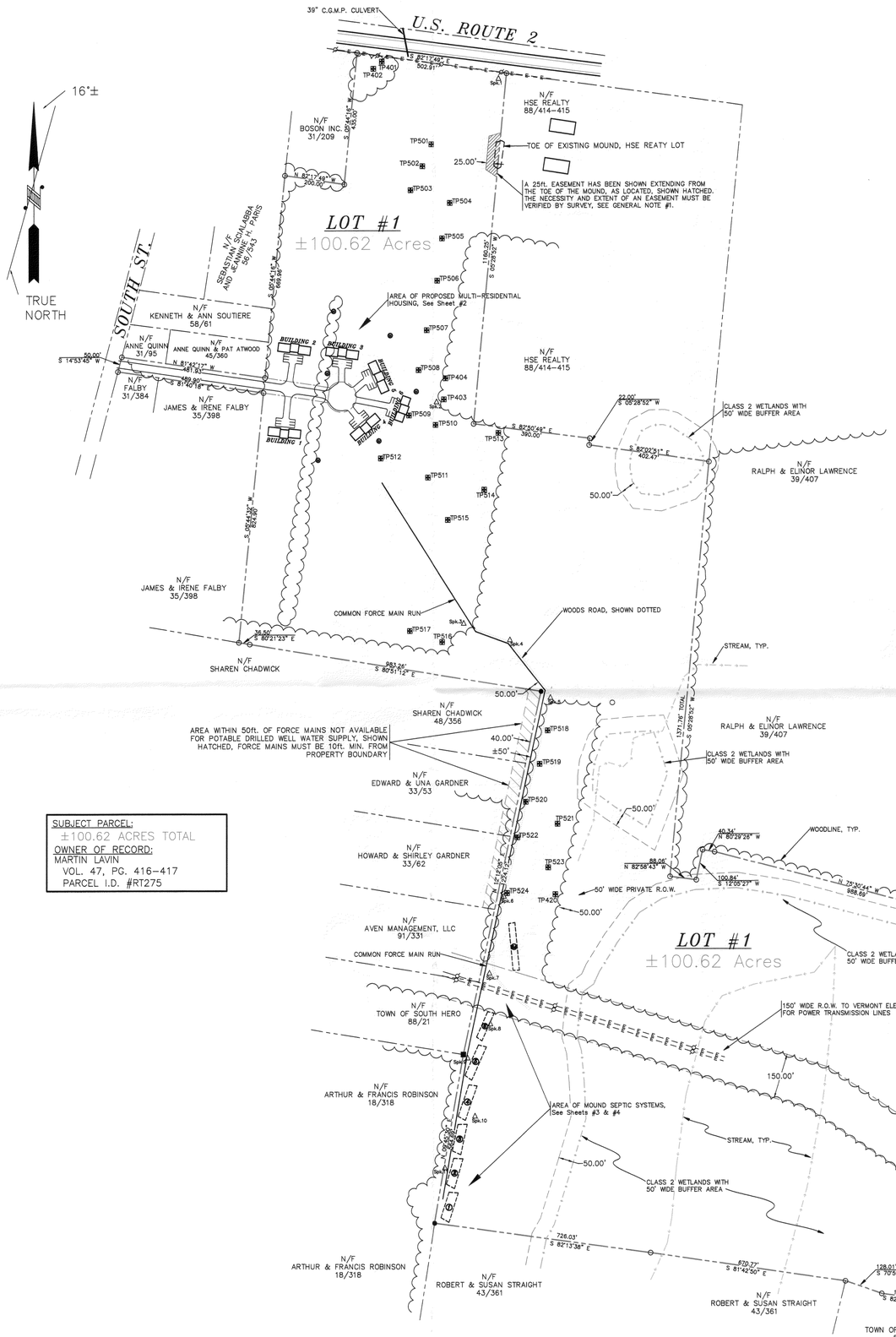
Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here
JUN 13 2014

Sent To: Robert + Susan Straight
Street, Apt. No.; or PO Box No.: 87 South St
City, State, ZIP+4: South Hero, Vt 05486

PS Form 3800, August 2006 — See Reverse for Instructions

ATTACHMENT C – LAVIN PERMIT DRAWINGS



SUBJECT PARCEL:
±100.62 ACRES TOTAL
OWNER OF RECORD:
MARTIN LAVIN
VOL. 47, PG. 416-417
PARCEL I.D. #RT275

TEST PITS 501-524
DUG 21 OCTOBER, 2010
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC, EXCAVATOR

TP 501
0-8" DRK. BRN. SILTY CLAY LOAM DENSE.
8"-32" LIGHT BRN. CLAY LOAM VERY DENSE REDOX.
SHWT 8", DENSE MATERIAL - NO GOOD

TP 502
0-8" DRK. BRN. SILTY CLAY LOAM DENSE.
8"-43" LIGHT BRN. CLAY LOAM VERY DENSE REDOX.
SHWT 8", SEEPS @ 42", DENSE MATERIAL - NO GOOD

TP 503
0-8" DRK. BRN. SILTY CLAY LOAM DENSE.
8"-53" LIGHT BRN. CLAY LOAM VERY DENSE REDOX.
SHWT 8", SEEPS @ 41", DENSE MATERIAL - NO GOOD

TP 504
0-9" BRN. SILT LOAM MED. LOOSE.
9"-12" YELLOW-BRN. LOAM MED. LOOSE.
12"-49" BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 46"

TP 505
0-12" BRN. SILT LOAM DENSE REDOX. FEATURES @ 9".
12"-42" LIGHT BRN. CLAY LOAM VERY DENSE REDOX.
SHWT 9", SEEPS @ 12"

TP 506
0-10" BRN. SILT LOAM FIRM.
10"-22" LIGHT BRN. SILTY CLAY LOAM DENSE REDOX.
22"-50" BRN. CLAY VERY DENSE REDOX.
SHWT 10", SEEPS @ 43"

TP 507
0-12" BRN. FINE SANDY LOAM LOOSE.
12"-22" YELLOW-BRN. SANDY LOAM MED. LOOSE REDOX.
22"-49" BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 38"

TP 508
0-13" DRK. BRN. SILT LOAM LOOSE.
13"-21" YELLOW-BRN. SANDY LOAM LOOSE REDOX.
21"-48" BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 38"

TP 509
0-8" BLK. CLAY LOAM DENSE.
8"-36" LIGHT BRN. CLAY VERY DENSE REDOX.
SHWT 8", SEEPS @ 28", STANDING WATER @ 34"

TP 510
0-8" DRK. BRN. LOAM MED. LOOSE.
8"-13" YELLOW-BRN. SANDY LOAM MED. LOOSE REDOX.
13"-39" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 13"

TP 511
0-10" DRK. BRN. LOAM MED. LOOSE.
10"-14" YELLOW-BRN. LOAM MED. LOOSE FAINT REDOX.
14"-36" BRN. CLAY VERY DENSE REDOX.
SHWT 10", SEEPS 29", STANDING WATER @ 35" AND RISING

TP 512
0-10" DRK. BRN. CLAY LOAM DENSE.
10"-35" BRN. CLAY VERY DENSE REDOX.
SHWT 10", SEEPS 14", STANDING WATER @ 33" AND RISING

TP 513
0-9" DRK. BRN. SILT LOAM MED. LOOSE.
9"-13" YELLOW-BRN. SANDY LOAM MED. LOOSE REDOX.
13"-48" BRN. CLAY VERY DENSE REDOX.
SHWT 9", SEEPS 38", STANDING WATER @ 46" AND RISING

TP 514
0-10" DRK. BRN. SILT LOAM MED. LOOSE.
10"-17" YELLOW-BRN. SANDY CLAY LOAM FIRM REDOX.
17"-40" BRN. CLAY VERY DENSE REDOX.
SHWT 10", SEEPS 25", STANDING WATER @ 40" AND RISING

TP 515
0-8" DRK. BRN. SILT LOAM DENSE.
8"-34" BRN. CLAY LOAM VERY DENSE REDOX.
SHWT 8", SEEPS 8", DENSE MATERIAL - NO GOOD

TP 516
0-13" DRK. BRN. SILT LOAM MED. LOOSE.
13"-22" YELLOW-BRN. SANDY SILT LOAM MED. LOOSE REDOX.
22"-50" BRN. CLAY VERY DENSE REDOX.
SHWT 13", SEEPS 40", STANDING WATER @ 48"

TP 517
0-8" DRK. BRN. SILT LOAM MED. LOOSE.
8"-17" YELLOW-BRN. SILT LOAM MED. LOOSE REDOX.
17"-44" BRN. CLAY VERY DENSE REDOX.
SHWT 8", SEEPS 24", STANDING WATER @ 39" AND RISING

TP 518
0-6" DRK. BRN. SILT LOAM MED. LOOSE.
6"-12" YELLOW-BRN. SILT LOAM MED. LOOSE.
12"-36" BRN. SILT LOAM FIRM REDOX.
36"-50" BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS 36"

TP 519
0-8" DRK. BRN. SILT LOAM MED. LOOSE.
8"-27" GREY-BRN. SILT LOAM FIRM REDOX.
27"-54" BRN. CLAY VERY DENSE REDOX.
SHWT 8", SEEPS ±25", STANDING WATER @ 50" AND RISING

TP 520
0-12" BRN. SILT LOAM LOOSE.
12"-24" YELLOW-BRN. SANDY SILT LOAM FIRM REDOX.
24"-44" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS 22", STANDING WATER @ 43"

TP 521
0-11" DRK. BRN. SILT LOAM LOOSE.
11"-24" BRN. SILT LOAM MED. LOOSE REDOX.
24"-46" BRN. CLAY VERY DENSE REDOX.
SHWT 11", SEEPS 27"

TP 522
0-12" DRK. BRN. SILT LOAM LOOSE.
12"-24" REDDISH-BRN. SILT LOAM MED. LOOSE REDOX.
24"-49" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS 18", STANDING WATER @ 43" AND RISING

TP 523
0-12" DRK. BRN. SILT LOAM MED. LOOSE.
12"-24" YELLOW-BRN. SILT LOAM MED. LOOSE REDOX.
24"-48" BRN. CLAY VERY DENSE REDOX.
SHWT 12"

TP 524
0-12" DRK. BRN. SILT LOAM TO SILTY CLAY LOAM MED. LOOSE.
12"-24" YELLOWISH-BRN. SILTY CLAY LOAM MED. LOOSE REDOX.
24"-30" BRN. COARSE SAND LOOSE.
30"-50" BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS 18", STANDINF WATER @ 40" AND RISING

TEST PITS 401-404 & 420
DUG 3 NOVEMBER, 2011
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC EXCAVATION, SKIP DIO, OPERATOR

TP 401
NO GOOD, DISTURBED SOILS

TP 402
NO GOOD, DISTURBED SOILS

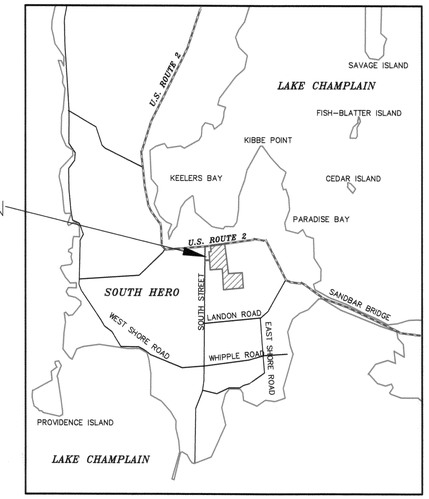
TP 403
0-9" DRK. BRN. SILT LOAM LOOSE.
9"-24" DRK. YELLOW-BRN. SILT LOAM FIRM REDOX.
24"-36" GREY-BRN. SANDY CLAY LOAM DENSE REDOX.
SHWT 9", SEEPS @ 28"

TP 404
0-11" DRK. BRN. SILT LOAM LOOSE.
11"-19" DRK. YELLOW-BRN. SILT LOAM FIRM REDOX.
19"-32" GREY-BRN. SANDY CLAY LOAM DENSE REDOX.
SHWT 11"

TP 420
0-4" DRK. BRN. SILT LOAM LOOSE.
4"-12" BRN. SILT LOAM MED. LOOSE.
12"-28" BRN. SILT LOAM FIRM REDOX.
28"-42" HARDPAN.
SHWT 12", SEEPS 28"

LEGEND

- IRON PIPE FOUND
- CONC. MONUMENT FOUND
- DRILLED WELL
- SOIL TEST PIT
- CALCULATED POINT
- SURVEY POINT
- UTILITY POLE
- PROPERTY LINE
- EASEMENT/R.O.W.
- SEPTIC SYSTEM COMPONENT SHIELD
- MAPPED WETLAND BOUNDARY
- WETLAND BUFFER LIMIT
- AERIAL POWER LINES



GENERAL NOTES:

1.) THIS IS NOT A SURVEY. REFERENCE IS HEREIN MADE TO A SURVEY OF THE SUBJECT PARCEL ENTITLED "FINAL PLAT OF LANDS OF MARTIN LAVIN", DATED: 03-1988 AND LAST REVISED: 9-14-1988, PREPARED BY KREBS & LANSING CONSULTING ENGINEERS, INC., SAMUEL J. DAVISON, L.S.#603. THE BEARINGS REPORTED ON THIS PLAN ARE AS PER MAGNETIC OBSERVATION BY THIS OFFICE ON 11-10-2010. NO ATTEMPT HAS BEEN MADE BY THIS OFFICE TO RECONCILE DISTANCES, BEARINGS, OR ACREAGES REPORTED ON THE REFERENCED SURVEY WITH FIELD DATA OBTAINED BY THIS OFFICE OR WITH OTHER PLATS OF THE SUBJECT PROPERTY ON FILE IN THE TOWN OF SOUTH HERO LAND RECORDS.

2.) CLASS 2 WETLAND BOUNDARIES AND STREAM COURSES SHOWN ON THIS PLAN HAVE BEEN TAKEN FROM A SCALED PLAN OF THE VERMONT AGENCY OF NATURAL RESOURCES "NATURAL RESOURCES ATLAS". NO PORTION OF THE PROPOSED DEVELOPEMENT OF THE SUBJECT PARCEL SHALL INFRINGE ON THESE FEATURES, AS SHOWN.

SCANNED

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

" I hereby certify that the design-related information submitted with this application is true and correct, and that, in the exercise of my reasonable professional judgement, the design included in this application for a permit complies with Vermont Wastewater system and Potable Water Supply Rules and the Vermont Water Supply Rules."

ww-6-2858
Drinking Water and Groundwater Protection Division

THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: ww-6-2858
Dated: 7/16/2014

STATE OF VERMONT
DAVID A. TUDHOPE
NO 230
CERTIFIED
SITE TECHNICIAN TYPE B

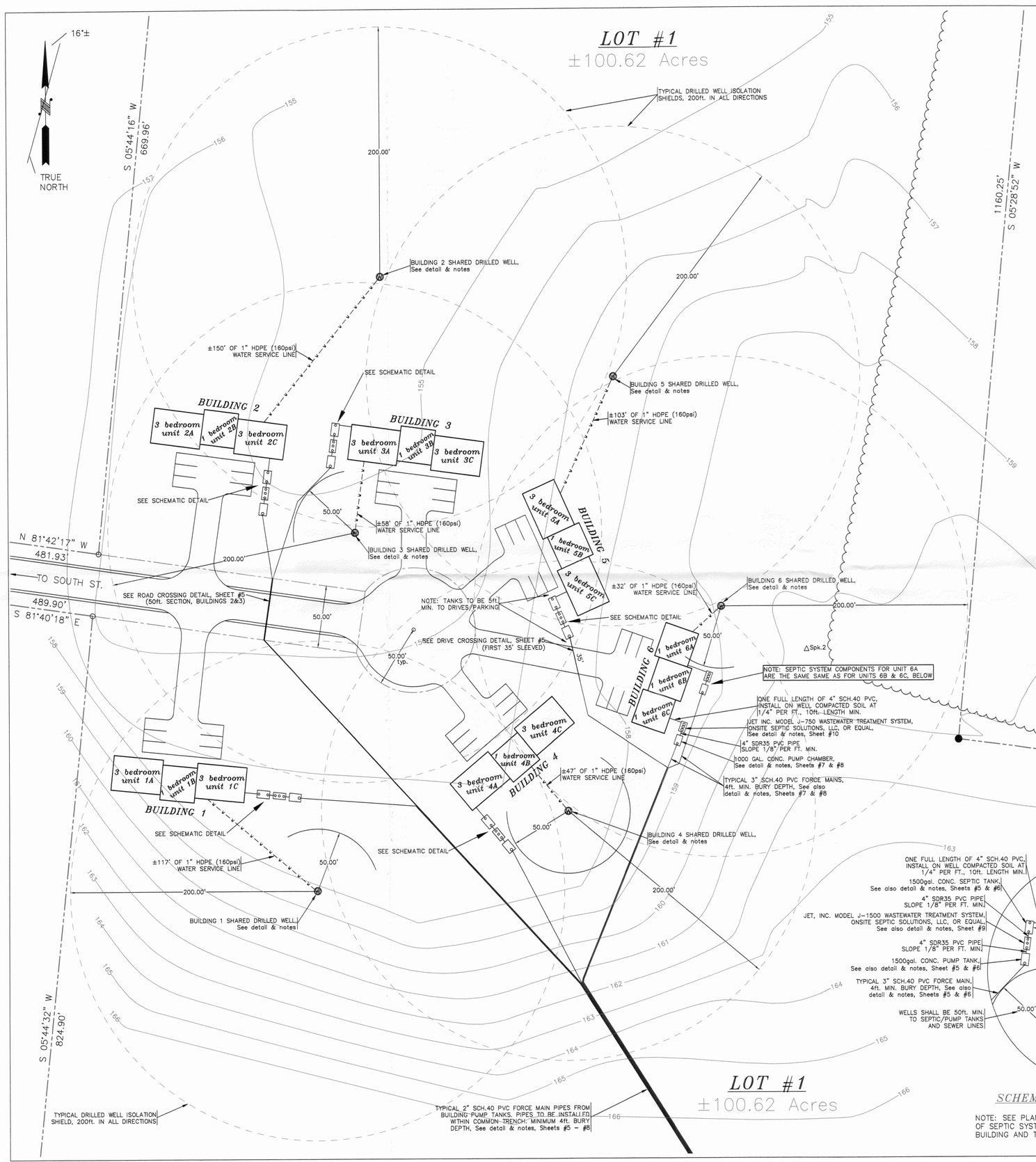
19 JUNE, 2014

200 0 100 200 400 800

DAVID A. TUDHOPE
74 CAYUGA COURT
BURLINGTON, VERMONT 05408
TELE.: (802) 862-9360
dtudhope@aol.com
REGISTERED LAND SURVEYOR 538
SITE TECHNICIAN B # 230

OVERALL SITE PLAN

DRAWN D.P.C.	DATE 03/19/14	For: Martin & Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St. South Hero, Vermont
SCALE 1" = 200'	SHEET 1	PROJECT NO. 781



SCHEMATIC DETAIL: BUILDINGS 1-5

N.T.S.

NOTE: SEE PLAN @ LEFT FOR PROPOSED LOCATION AND ORIENTATION OF SEPTIC SYSTEM COMPONENTS DETAILED HERE RELATIVE TO EACH BUILDING AND TO ANY DRILLED WELLS WITHIN THE AREA.

LEGEND

- ■ CONC. MONUMENT FOUND
- ⊠ SOIL TEST PIT
- ⊕ PERCOLATION TEST
- ○ CALCULATED POINT
- △ SURVEY POINT
- ⌀ UTILITY POLE
- PROPERTY LINE
- EASEMENT/R.O.W.
- SEPTIC ISOLATION SHIELD
- MAPPED WETLAND BOUNDARY
- WETLAND BUFFER LIMIT

BUILDINGS 1-5 WATER SUPPLY:

WATER SUPPLY RULE 11.2.0

DESIGN FOR MULTI-RESIDENTIAL, SEVEN (7) BEDROOMS TOTAL.
DAILY DESIGN FLOW = 980gpd.

BASIS OF DESIGN STATEMENT

A. AVERAGE DAY DEMAND=980 GAL./DAY.
B. MAXIMUM DAY DEMAND=980gpd/720min./day=1.36gal./min.
C. INSTANTANEOUS PEAK DEMAND = 15.0gpm.
D. SOURCE CAPACITY SHOULD BE DETERMINED BY A LICENSED WELL CONTRACTOR UNDER THE VERMONT WELL CONTRACTORS RULES AND STANDARDS.
E. STORAGE CAPACITY- REQUIRED PER SECTION 11.8.2
F. PUMP CAPACITY- MUST BE DETERMINED USING STANDARD ENGINEERING PRINCIPLES WHEN ALL DESIGN FACTORS HAVE BEEN DETERMINED, see note #4 above.
G. OPERATING PRESSURE RANGE - MIN OPERATING PRESSURE = 30-50 p.s.i. OR 40-60 p.s.i.
H. REFERENCE TO FLOOD PLAIN- SEE INFO. PER SEWAGE DISPOSAL SYSTEM

DESIGN PLANS & SPECIFICATIONS PER SECTION 11.2.3

THE DESIGN OF THE WATER SYSTEM SHALL BE IN ACCORD WITH PART 12 OF THE WATER SUPPLY RULE CHAPTER 21, AND THE STATE PLUMBING CODE.

BUILDING 6 WATER SUPPLY:

WATER SUPPLY RULE 11.2.0

DESIGN FOR MULTI-RESIDENTIAL, THREE (3) BEDROOMS TOTAL.
DAILY DESIGN FLOW = 420gpd.

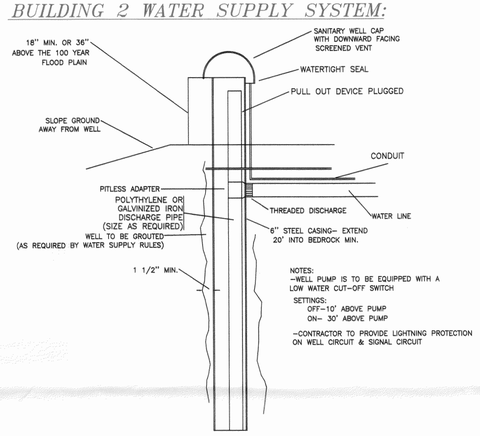
BASIS OF DESIGN STATEMENT

A. AVERAGE DAY DEMAND=420 GAL./DAY.
B. MAXIMUM DAY DEMAND=420gpd/720min./day=0.58gal./min.
C. INSTANTANEOUS PEAK DEMAND = 15.0gpm.
D. SOURCE CAPACITY SHOULD BE DETERMINED BY A LICENSED WELL CONTRACTOR UNDER THE VERMONT WELL CONTRACTORS RULES AND STANDARDS.
E. STORAGE CAPACITY- REQUIRED PER SECTION 11.8.2
F. PUMP CAPACITY- MUST BE DETERMINED USING STANDARD ENGINEERING PRINCIPLES WHEN ALL DESIGN FACTORS HAVE BEEN DETERMINED, see note #4 above.
G. OPERATING PRESSURE RANGE - MIN OPERATING PRESSURE = 30-50 p.s.i. OR 40-60 p.s.i.
H. REFERENCE TO FLOOD PLAIN- SEE INFO. PER SEWAGE DISPOSAL SYSTEM

DESIGN PLANS & SPECIFICATIONS PER SECTION 11.2.3

THE DESIGN OF THE WATER SYSTEM SHALL BE IN ACCORD WITH PART 12 OF THE WATER SUPPLY RULE CHAPTER 21, AND THE STATE PLUMBING CODE.

BUILDING 2 WATER SUPPLY SYSTEM:



DRILLED BEDROCK WELL

SUBJECT TO MIN. CONSTRUCTION STANDARDS AS SET FORTH IN THE VERMONT WATER SUPPLY RULES
CHAPTER 21 PART 12 (EFFECTIVE 9/24/92)
REVISED 8/1/99
REVISED 25 APRIL 2005
REVISED 1 DECEMBER 2010

WELL CONSTRUCTION SPECIFICATIONS:

1. DRILLED BEDROCK WELL TO BE DRILLED, CONSTRUCTED, AND DISINFECTED IN ACCORDANCE WITH VERMONT WATER SUPPLY RULE.
2. MINIMUM PEAK WELL YIELD SHALL EQUAL THE INSTANTANEOUS PEAK DEMAND, See Basis of Design Statement, C., (AS DETERMINED BY A 3 HOUR BLOW TEST) , OR CALCULATIONS AND STORAGE REQUIRED.
3. UPON COMPLETION OF THE WELL THERE WILL BE A11-5 AND A11-7 TESTING FOR WATER QUALITY.
4. WELL WILL REQUIRE A PUMP WHICH WILL SUPPLY A FLOW EQUAL TO THE INSTANTANEOUS PEAK DEMAND, See Basis of Design Statement, C.

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

SCANNED

" I hereby certify that the design-related information submittted with this application is true and correct, and that, in the exercise of my reasonable professional judgement, the design included in this application for a permit complies with Vermont Wastewater system and Potable Water Supply Rules and the Vermont Water Supply Rules."

STATE OF VERMONT — GORD E. BRANCH — No. 9147 CIVIL — LICENSED PROFESSIONAL ENGINEER

STATE OF VERMONT — DAVID A. TUDHOPE — NO 230 — CERTIFIED SITE TECHNICIAN TYPE B

19 JUNE, 2014

ww-6-2858

Drinking Water and Groundwater Protection Division
JUNE 25, 2014

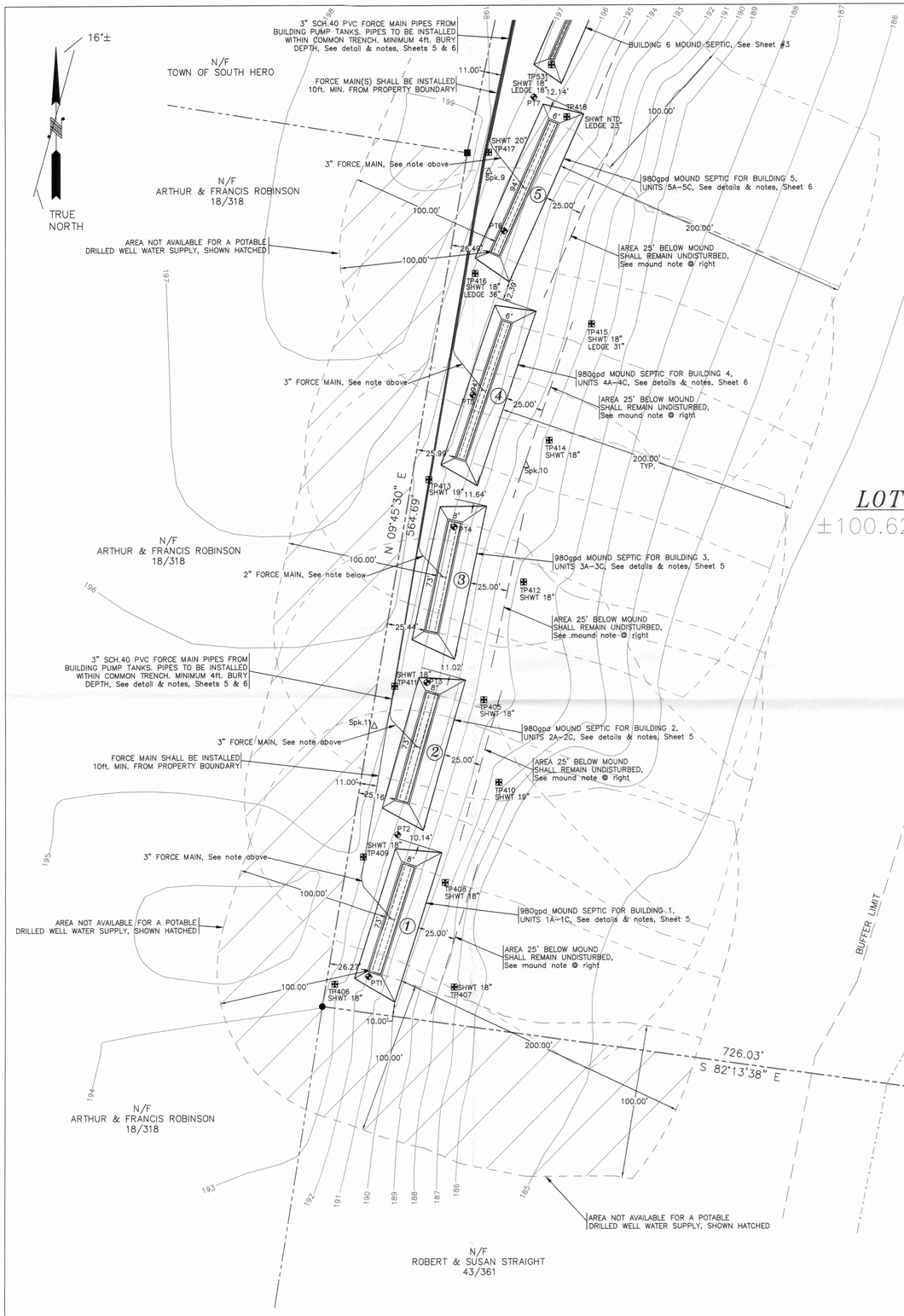
THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: WW-6-2858
Dated: 7/14/2014

40 0 20 40 80 160

DAVID A. TUDHOPE
74 CAYUGA COURT
BURLINGTON, VERMONT 05408
TELE.: (802) 862-9360
dtudhope@aol.com
REGISTERED LAND SURVEYOR 538
SITE TECHNICIAN B # 230

SITE PLAN - BUILDINGS

DRAWN D.P.C.	DATE 03/19/14	Prepared for: Martin & Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St. South Hero, Vermont
SCALE 1" = 40'	SHEET 2	PROJECT NO. 781



50ft. WIDE CONTINUOUS BUFFER STRIP FOR CLASS 2 WETLAND, NO CONSTRUCTION OR CONSTRUCTION DISTURBANCES ARE PERMITTED WITHIN WETLAND OR BUFFER AREAS

TEST PITS 405-420
DUG 3 NOVEMBER, 2011
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC, EXCAVATOR

TP 405
0-5" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
5"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-42" BRN. LOAMY SAND MED. FIRM-IN-PLACE REDOX. FEATURES.
ESTIMATED SEASONAL HIGH WATER TABLE (SHWT) 18"

TP 406
0-5" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
5"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-40" BRN. LOAMY SAND MED. FIRM-IN-PLACE REDOX.
SHWT 18", SEEPS @ 21"

TP 407
0-6" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
6"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-43" GREY-BRN. LOAMY SAND FIRM-IN-PLACE REDOX.
SHWT 18"

TP 408
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-42" GREY-BRN. LOAMY SAND FIRM-IN-PLACE REDOX.
SHWT 18"

TP 409
0-8" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
8"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-39" GREY-BRN. LOAMY SAND MED. FIRM-IN-PLACE REDOX.
SHWT 18", SEEPS @ 29"

TP 410
0-9" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
9"-19" YELLOW-BRN. FINE SANDY LOAM LOOSE.
19"-40" GREY-BRN. LOAMY SAND FIRM-IN-PLACE REDOX.
SHWT 19"

TP 411
0-6" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
6"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-39" GREY-BRN. SANDY LOAM FIRM REDOX.
SHWT 19"

TP 412
0-8" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
8"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-39" GREY-BRN. SANDY LOAM FIRM REDOX.
SHWT 18", SEEPS @ 28"

TP 413
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-19" YELLOW-BRN. FINE SANDY LOAM LOOSE.
19"-38" GREY-BRN. SANDY LOAM FIRM REDOX.
SHWT 19"

TP 414
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-18" YELLOW-BRN. FINE SANDY LOAM LOOSE.
18"-40" GREY-BRN. SANDY LOAM MED. FIRM-IN-PLACE REDOX.
SHWT 18"

TP 415
0-8" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
8"-18" RED-BRN. FINE SANDY LOAM LOOSE.
18"-31" GREY HARDPAN REDOX.
SHWT 18", LEDGE @ 31"

TP 416
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-18" RED-BRN. FINE SANDY LOAM LOOSE.
18"-36" GREY-BRN. LOAMY SAND MED. FIRM-IN-PLACE REDOX.
SHWT 18", LEDGE & SEEPS @ 36"

TP 417
0-9" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
9"-20" YELLOW-BRN. FINE SANDY LOAM LOOSE.
20"-40" GREY-BRN. LOAMY SAND FIRM-IN-PLACE REDOX.
SHWT 20"

TP 418
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-23" RED-BRN. FINE SANDY LOAM LOOSE.
SHWT NOT DISCOVERED TO DEPTH, LEDGE @ 23"

TEST PIT 531
DUG 21 OCTOBER, 2010
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC, EXCAVATOR

TP 531
0-8" DRK. BRN. FINE SANDY LOAM LOOSE.
8"-18" REDDISH-BRN. FINE SANDY LOAM LOOSE.
SHWT NTD, FRACTURED LEDGE @ 18"

BUILDINGS 1, 2, & 3 MOUND DESIGN:

BASIS OF DESIGN:
PROPOSED MULTI-FAMILY RESIDENCES TWO 3-BED'RM. UNITS. AND ONE 1-BED'RM. UNIT
140 g.p.d./bedrm. X 7 bed'rm.(total) = 980gpd.
EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED.

DESIGN CONDITIONS:
±8.3% GRADE, SHWT @ 18", SOIL TEXTURE= FINE SANDY LOAM, LLR factor = 13.5, MAX. MOUNDING (h) = 12".
L.L.R.= (12/12)' X 13.5 = 13.5gpd/lf.
980gpd/13.5gpd/lf = 73lf, MINIMUM.
980gpd/2.0gpd/sf = 490sf OF ABSORPTION AREA REQUIRED.
USE MOUND BED 8' X 73' = 584sf.
584sf AVAILABLE => 490sf REQUIRED.
73 lf SPEC'D. => 73 lf, REQUIRED

MOUND SAND CALCULATIONS:
gpd/ACTUAL LENTH = ACTUAL LLR
980gpd/73 lf = 13.424gpd/lf
ACTUAL LLR/LLR FACTOR = ACTUAL MOUNDING(h)
13.424/13.5 = 0.994' OR ±12"
6" (TO MOUNDING) + 12" FILL = 18" FROM BOTTOM OF BED TO MOUNDING.
18" (TO SHWT) + 12" FILL = 30" FROM BOTTOM OF BED TO SHWT.
USE 12" MIN. MOUND SAND FILL BELOW BED.

BUILDINGS 4 & 5 MOUND DESIGN:

BASIS OF DESIGN:
PROPOSED MULTI-FAMILY RESIDENCES TWO 3-BED'RM. UNITS. AND ONE 1-BED'RM. UNIT
140 g.p.d./bedrm. X 7 bed'rm.(total) = 980gpd.
EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED.

DESIGN CONDITIONS:
±6.25% GRADE, SHWT @ 18", SOIL TEXTURE= FINE SANDY LOAM, LLR factor = 10.5, MAX. MOUNDING (h) = 12".
L.L.R.= (12/12)' X 10.5 = 10.5gpd/lf.
980gpd/10.5gpd/lf = 94lf, MINIMUM.
980gpd/2.0gpd/sf = 490sf OF ABSORPTION AREA REQUIRED.
USE MOUND BED 6' X 94' = 564sf.
564sf AVAILABLE => 490sf REQUIRED.
94 lf SPEC'D. => 94 lf, REQUIRED

MOUND SAND CALCULATIONS:
gpd/ACTUAL LENTH = ACTUAL LLR
980gpd/94 lf = 10.43gpd/lf
ACTUAL LLR/LLR FACTOR = ACTUAL MOUNDING(h)
10.43/10.5 = 0.993' OR ±12"
6" (TO MOUNDING) + 12" FILL = 18" FROM BOTTOM OF BED TO MOUNDING.
18" (TO SHWT) + 12" FILL = 30" FROM BOTTOM OF BED TO SHWT.
18" (TO LEDGE) + 12" FILL = 30" FROM BOTTOM OF BED TO LEDGE.
USE 12" MIN. MOUND SAND FILL BELOW BED.

MOUND NOTE:
THE LAND AREA DOWNGRADIENT OF THE ELEVATED SAND MOUND IS THE EFFLUENT DISPERSAL AREA AND THE SOIL IN THIS AREA MAY NOT BE REMOVED OR DISTURBED. DO NOT DISTURB SOILS WITHIN 10ft. OF ALL OTHER TOES.

LEGEND

- ■ CONC. MONUMENT FOUND
- ⊞ SOIL TEST PIT
- ⊕ PERCOLATION TEST
- ○ CALCULATED POINT
- △ SURVEY POINT
- ⌀ UTILITY POLE
- PROPERTY LINE
- EASEMENT/R.O.W.
- MAX. EXTENT OF SEPTIC ISOLATION SHIELD
- INTERIOR SEPTIC ISOLATION SHIELD
- MAPPED WETLAND BOUNDARY
- WETLAND BUFFER LIMIT

SCANNED

" I hereby certify that the design-related information submittted with this application is true and correct, and that, in the exercise of my reasonable professional judgement, the design included in this application for a permit complies with Vermont Wastewater system and Potable Water Supply Rules and the Vermont Water Supply Rules."

Received
JUN 25 2014
Drinking Water and Groundwater Protection Division

ww-6-2858

Drinking Water and Groundwater Protection Division
THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: WW-6-2858
Dated: 7/16/2014

STATE OF VERMONT — DAVID A. TUDHOPE — NO 230 — CERTIFIED SITE TECHNICIAN TYPE B

19 JUNE, 2014

40 0 20 40 80 160

BUILDINGS 1-5 SEPTIC PLAN
SCALE----------1" = 40'

DAVID A. TUDHOPE
74 CAYUGA COURT
BURLINGTON, VERMONT 05408
TELE.: (802) 862-9360
dtudhope@aol.com
REGISTERED LAND SURVEYOR 538
SITE TECHNICIAN B # 230

BUILDINGS 1-5 SEPTIC		
DRAWN D.P.C.	*DATE* 03/19/14	*For: Martin & Patricia Lavin*
APPROVED	*DATE*	*U.S. Rte. 2 /South St. South Hero, Vermont*
SCALE 1" = 40'	*SHEET* 3	*PROJECT NO.* 781



TEST PITS 405-420
DUG 3 NOVEMBER, 2011
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC, EXCAVATOR

TP 418
0-7" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
7"-23" RED-BRN. FINE SANDY LOAM LOOSE.
SHWT NOT DISCOVERED TO DEPTH, LEDGE @ 23"

TP 419
0-6" DRK. BRN. VERY FINE SANDY LOAM LOOSE.
6"-13" BRN. FINE SANDY LOAM LOOSE.
13"-31" DRK. BRN. COARSE LOAMY SAND FIRM-IN-PLACE REDOX.
SHWT 13", BOULDERS/LEDGE @ 31"

TEST PITS 524-532
DUG 21 OCTOBER, 2010
DOLORES ECKERT, ASSIST. REG. ENGR.
DAVID A. TUDHOPE, SITE TECH B & R.L.S.#538
DOUGLAS CORNEILLE, ASSISTANT
MARTIN LAVIN, OWNER
JOHN BEAULAC, EXCAVATOR

TP 525
0-12" DRK. BRN. SILT LOAM MED. LOOSE.
12"-21" REDDISH-BRN. SILT LOAM DENSE REDOX.
21"-45" GREY CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 24"

TP 526
0-12" DRK. BRN. SILT LOAM LOOSE.
12"-24" REDDISH-BRN. SILT LOAM MED. LOOSE REDOX.
24"-46" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 32"

TP 527
0-12" BRN. SILT LOAM LOOSE.
12"-30" REDDISH-BRN. LOAM & BLK. COARSE SAND LOOSE REDOX.
30"-54" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 20"

TP 528
0-12" LIGHT BRN. SILT LOAM MED. LOOSE.
12"-24" REDDISH-BRN. SILT LOAM MED. LOOSE REDOX.
24"-46" BLK. COARSE SAND LOOSE COBBLES REDOX.
SHWT 12", SEEPS @ 27", STANDING WATER 40"

TP 529
0-12" BRN. SILT LOAM LOOSE.
12"-24" DRK. YELLOW-BRN. SILT LOAM MED. LOOSE REDOX.
24"-46" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 12", SEEPS @ 27", STANDING WATER 40"

TP 530
0-6" LIGHT BRN. SILT LOAM LOOSE.
6"-18" REDDISH-BRN. SILT LOAM LOOSE.
18"-33" FRACTURED LEDGE.
SHWT NOT DISCOVERED TO DEPTH (NTD)

TP 531
0-8" DRK. BRN. FINE SANDY LOAM LOOSE.
8"-18" REDDISH-BRN. FINE SANDY LOAM LOOSE.
SHWT NTD, FRACTURED LEDGE @ 18"

TP 532
0-16" DRK. BRN. SILT LOAM LOOSE.
16"-26" REDDISH-BRN. SILT LOAM LOOSE FAINT REDOX.
26"-40" GREY-BRN. CLAY VERY DENSE REDOX.
SHWT 16", SEEPS @ 26", STANDING WATER @ 38"

BUILDING 6, UNIT 6A MOUND DESIGN:

BASIS OF DESIGN:
PROPOSED MULTI-FAMILY RESIDENCE ONE 1-BED'RM. UNIT.
140 g.p.d./bedrm. X 1 bed'rm. = 140gpd.
EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED.

DESIGN CONDITIONS:
±2.5% GRADE, SHWT @ 12", SOIL TEXTURE= SILT LOAM
LLR factor = 2.2, MAX. MOUNDING (h) = 6".
L.L.R.= (6/12)' X 2.2 = 1.1gpd/lf.
140gpd/1.1gpd/lf = 128lf, MINIMUM.
140gpd/2.0gpd/sf = 70sf OF ABSORPTION AREA REQUIRED.
USE MOUND BED 2' X 137' = 274sf.
274sf AVAILABLE => 70sf REQUIRED.
137 lf SPEC'D. => 128 lf, REQUIRED

MOUND SAND CALCULATIONS:
gpd/ACTUAL LENTH = ACTUAL LLR
140gpd/137 lf = 1.021gpd/lf
ACTUAL LLR/LLR FACTOR = ACTUAL MOUNDING(h)
1.021/2.2 = 0.464' OR ±6"
6" (TO MOUNDING) + 12" FILL = 18" FROM BOTTOM OF BED TO MOUNDING.
12" (TO SHWT) + 12" FILL = 24" FROM BOTTOM OF BED TO SHWT.
USE 12" MIN. MOUND SAND FILL BELOW BED.

BUILDING 6, UNITS 6B & 6C MOUND DESIGN:

BASIS OF DESIGN:
PROPOSED MULTI-FAMILY RESIDENCES TWO 1-BED'RM. UNITS.
140 g.p.d./bedrm. X 2 bed'rm.(total) = 280gpd.
EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED.

DESIGN CONDITIONS:
±5.0% GRADE, SHWT @ 18", SOIL TEXTURE= SILT LOAM
LLR factor = 3.7, MAX. MOUNDING (h) = 12".
L.L.R.= (12/12)' X 3.7 = 3.7gpd/lf.
280gpd/3.7gpd/lf = 76lf, MINIMUM.
280gpd/2.0gpd/sf = 140sf OF ABSORPTION AREA REQUIRED.
USE MOUND TRENCH 2' X 76' = 152sf.
152sf AVAILABLE => 140sf REQUIRED.
76 lf SPEC'D. => 76 lf, REQUIRED

MOUND SAND CALCULATIONS:
gpd/ACTUAL LENTH = ACTUAL LLR
280gpd/76 lf = 3.68gpd/lf
ACTUAL LLR/LLR FACTOR = ACTUAL MOUNDING(h)
3.68/3.7 = 0.996' OR ±12"
6" (TO MOUNDING) + 12" FILL = 18" FROM BOTTOM OF BED TO MOUNDING.
18" (TO SHWT) + 12" FILL = 30" FROM BOTTOM OF BED TO SHWT.
18" (TO LEDGE) + 12" FILL = 30" FROM BOTTOM OF BED TO LEDGE.
USE 12" MIN. MOUND SAND FILL BELOW BED.

MOUND NOTE:
THE LAND AREA DOWNGRADIENT OF THE ELEVATED SAND MOUND IS THE EFFLUENT DISPERSAL AREA AND THE SOIL IN THIS AREA MAY NOT BE REMOVED OR DISTURBED. DO NOT DISTURB SOILS WITHIN 10ft. OF ALL OTHER TOES.

LEGEND

- CONC. MONUMENT FOUND
- SOIL TEST PIT
- PERCOLATION TEST
- CALCULATED POINT
- SURVEY POINT
- UTILITY POLE
- PROPERTY LINE
- EASEMENT/R.O.W.
- MAX. EXTENT OF SEPTIC ISOLATION SHIELD
- INTERIOR SEPTIC ISOLATION SHIELD
- MAPPED WETLAND BOUNDARY
- WETLAND BUFFER LIMIT

Received
JUL 15 2014
Drinking Water and Ground Water Protection Division

" I hereby certify that the design-related information submitted with this application is true and correct, and that, in the exercise of my reasonable professional judgement, the design included in this application for a permit complies with Vermont Wastewater system and Potable Water Supply Rules and the Vermont Water Supply Rules."

STATE OF VERMONT · DAVID A. TUDHOPE NO 230 · CERTIFIED SITE TECHNICIAN IV B

W-6-2858

Drinking Water and Groundwater Protection Division

THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: WW-6-3858
Dated: 7/16/2014

15 JULY, 2014

REVISIONS:
REVISION 1, DATED 07-15-2014. REVISED AS PER TELEPHONE COMMUNICATION STATE DRINKING WATER & GROUNDWATER PROTECTION DIV., RE: TECH. REVIEW;
ITEM #1 - REVISED MOUND DESIGN NOTES FOR BUILDING 6, UNITS 6B & 6C TO CORRECT THE SQUARE FOOTAGE OF ABSORPTION AREA AVAILABLE.

40 0 20 40 80 160

BUILDING 6 SEPTIC PLAN
SCALE----------1" = 40'

DAVID A. TUDHOPE
74 CAYUGA COURT
BURLINGTON, VERMONT 05408
TELE.: (802) 862-9360
dtudhope@aol.com
REGISTERED LAND SURVEYOR 538
SITE TECHNICIAN B # 230

BUILDING 6 SEPTIC		
DRAWN D.P.C.	DATE 03/19/14	For: Martin & Patricia Lavin
APPROVED	DATE	U.S. Rte. 2 /South St. South Hero, Vermont
SCALE 1" = 40'	SHEET 4	PROJECT NO. 781

BUILDINGS 1–3 WASTEWATER SYSTEMS DESIGN:

NOTE: THE COMPONENTS AND MOUND DESIGN ARE THE SAME FOR EACH OF THE THREE TRIPLEXES.

Design Flow: Proposed residential triplex with TWO (2) three bedrooms/units and ONE (1) one bedroom unit.
= 2(140gpd/bed'rm. X 3 bed'rm.) + (140gpd/bed'rm. X 1 bed'rm.) = 980 gal./day

Pre–treatment System to be employed

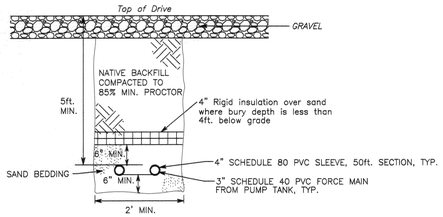
Pre–treatment System: Jet, Inc. model J–1500 wastewater treatment system, or equal. System to be installed as per manufacturers' instructions. See Drawing #9, "Jet J–1500 Details".

Pump Station: 1500 gal. concrete tank, see detail this sheet. Tank should be pumped every 2 to 3 years. Camp Precast Concrete Products, Inc., or equal.

Wastewater Disposal Field: Use mound–type disposal field with seepage bed design.
Maximum application rate = 2.0 gpd/sf.
Use 8' x 73' bed = 584 sq.ft. bed bottom (absorption) area.

Basal Area Check:

Required basal area = 980gpd / (0.74 gpd/sf) = 1325sf, required.
Available basal area = 73' X (8' + 14.5') = 1642sf, provided.



FORCE MAIN/DRIVE CROSSING DETAIL
N.T.S.

NOTE: THIS DETAIL IS FOR BUILDINGS 2 & 3 FORCE MAIN CROSSING TO BE INSTALLED IN THE SAME TRENCH. EACH SECTION OF SLEEVED PIPE SHALL BE 50ft. LONG.

Pump Selection for a Pressurized System
Input Parameters for BUILDING #1

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	48"
Number of Laterals per Cell	4
Lateral Length	36.5 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	4.0 feet
Manifold Line Size	2.00 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	42 feet
Transport Length	2925 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add–on' Friction Losses	0.0 feet

Calculations

Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	36
Total Actual Flow Rate	27.2 gpm
Number of Lines per Zone	4
% Flow Differential 1st and Last Orifice	0.6 %
Lift to Manifold	42 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.0 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	5.6 feet
Head Loss Through Discharge	1.5 feet
Head Loss Through Flow Meter	0.0 feet
'Add–on' Friction Losses	0.0 feet
Total Flow Rate	27.2 gpm
TDH	52.1 feet

Pump Selection for a Pressurized System
Input Parameters for BUILDING #2

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	48"
Number of Laterals per Cell	4
Lateral Length	36.5 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	4.0 feet
Manifold Line Size	2.00 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	47.5 feet
Transport Length	3000 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add–on' Friction Losses	0.0 feet

Calculations

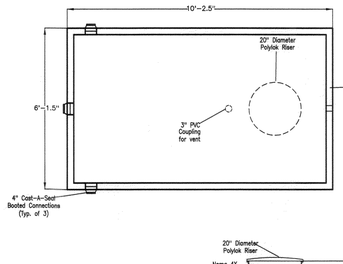
Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	36
Total Actual Flow Rate	27.2 gpm
Number of Lines per Zone	4
% Flow Differential 1st and Last Orifice	0.6 %
Lift to Manifold	47.5 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.0 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	5.7 feet
Head Loss Through Discharge	1.5 feet
Head Loss Through Flow Meter	0.0 feet
'Add–on' Friction Losses	0.0 feet
Total Flow Rate	27.2 gpm
TDH	57.8 feet

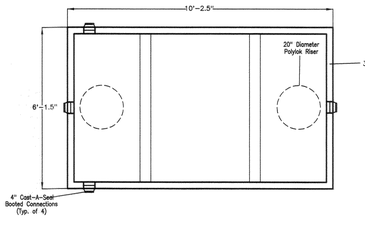
Pump Selection for a Pressurized System
Input Parameters for BUILDING #3

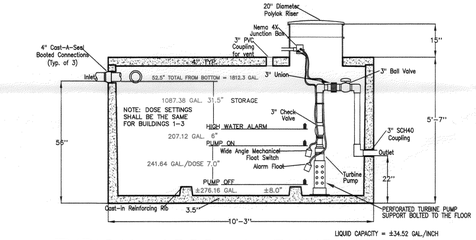
Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	48"
Number of Laterals per Cell	4
Lateral Length	36.5 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	4.0 feet
Manifold Line Size	2.00 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	47 feet
Transport Length	2940 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add–on' Friction Losses	0.0 feet

Calculations

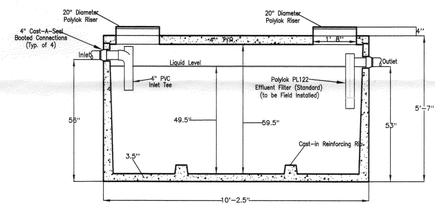
Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	36
Total Actual Flow Rate	27.2 gpm
Number of Lines per Zone	4
% Flow Differential 1st and Last Orifice	0.6 %
Lift to Manifold	47 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.0 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	5.6 feet
Head Loss Through Discharge	1.5 feet
Head Loss Through Flow Meter	0.0 feet
'Add–on' Friction Losses	0.0 feet
Total Flow Rate	27.2 gpm
TDH	57.2 feet







TYPICAL 1500gal. PUMP STATION
NOT TO SCALE

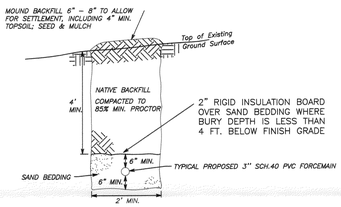


TYPICAL 1500gal. SEPTIC TANK
NOT TO SCALE

BUILDING #1 TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3SE015132 @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
27.2 GAL/MIN @ 55.1 FT OF TOTAL DYNAMIC HEAD.
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED,
CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.

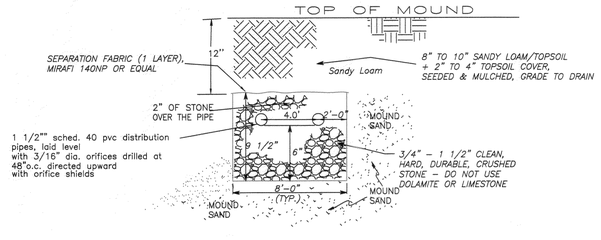
BUILDING #2 TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3SE015132 @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
27.2 GAL/MIN @ 57.8 FT OF TOTAL DYNAMIC HEAD.
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED,
CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.

BUILDING #3 TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3SE015132 @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
27.2 GAL/MIN @ 57.2 FT OF TOTAL DYNAMIC HEAD.
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED,
CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.

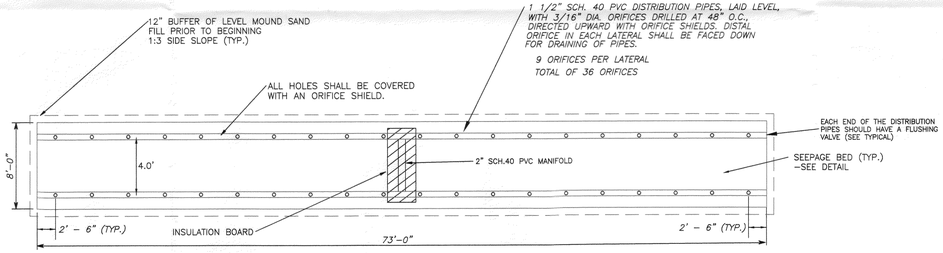


FORCEMAIN TRENCH SECTION
N.T.S.

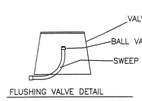
NOTE:
1.) IF THE PRESENCE AND DEPTH OF LEDGE ON SITE WILL NOT ALLOW FOR BURY DEPTH OF OVER 4ft. BELOW GRADE SAND BEDDING AND RIGID INSULATION SHALL BE REQUIRED.
2.) A MINIMUN SOIL COVER OVER THE INSULATION OF 2ft. IS REQUIRED AND MAY BE NATURALLY OCCURING OR BERMED FILL WITH TOPSOIL LAYER FOR VEGETATIVE COVER.



ABSORPTION BED SECTION
N.T.S.



ABSORPTION BED PLAN
N.T.S.



FLUSHING VALVE DETAIL
TYPICAL

CONSTRUCTION PROCEDURES FOR MOUND–TYPE DISPOSAL FIELDS:

Prior to the start of construction the Contractor shall notify Dig–Safe (888) 344–7233, and schedule the system staking and preconstruction meeting with the Designer. The Contractor shall provide the CONSULTANT with a recent sieve analysis of the proposed mound sand, demonstrating the conformance of the proposed sand with the required specifications.

To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal areas. However, after placement of a minimum of six (6) inches of sand fill over the plowed areas, construction equipment may be driven over the protected surfaces to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.

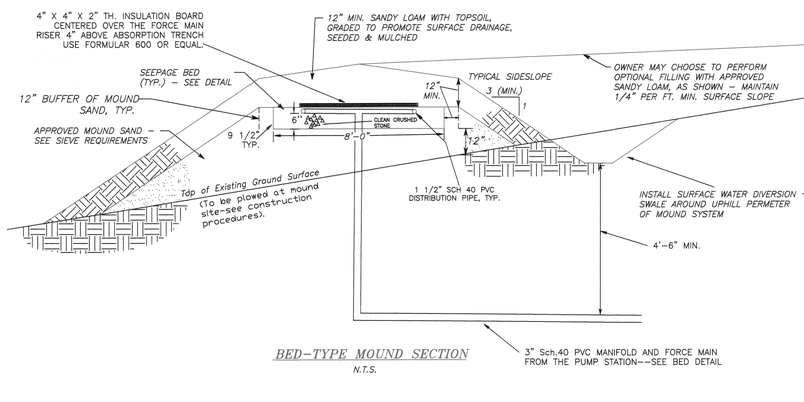
After the preconstruction meeting, above–ground vegetation shall be closely cut and removed from the ground surface throughout the areas to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line (force mains) from the pump stations or siphon chambers to the point of connection with the distribution piping headers shall be installed. The areas shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound areas is completed, the areas should be fenced to prevent vehicles and equipment from entering the plowed areas, unless the fill material is going to be in place within 24 hours of the plowing. If the sites cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the sites by creating furrows that are parallel to the ground contour.

The area surrounding the mounds shall be graded to provide diversion of surface run–off waters.

Construction should be initiated immediately after preparation of the soil interfaces by placing all of the sand fill needed for the mounds to a minimum depth of twenty–one (30) inches above the plowed surfaces (or more, as specified on the applicable construction details). This depth will permit excavation of trenches or bed to accommodate the crushed stone (6") necessary for the distribution piping. After hand leveling of the absorption areas (bottom of trenches/bed), the stone shall be placed in the trenches/bed, hand leveled, and the distribution piping installed.

The septic tanks, pump stations, siphon chambers, sewer piping, and/or any other appurtenances shall be installed. The Design CONSULTANT shall be contacted to observe the completed system components, and to observe the testing of the systems by the Contractor.

Upon completion of the satisfactory inspection and testing of the systems, place the separation fabric over the absorption trenches/bed, and cover the mounds with sandy loam and topsoil. Grade the mounds and diversion swales to promote surface water runoff. All disturbed areas shall be seeded with conservation mix between April 15 and October 15, and mulched. On sites where construction is completed between October 15 and April 15 the site shall be immediately seeded with annual rye and mulched, and then reseeded with conservation mix within the dates referenced above.



BED–TYPE MOUND SECTION
N.T.S.

APPROVED MOUND SAND SHALL CONFORM WITH ANY ONE OF THE FOLLOWING THREE SIEVE ANALYSES:

	SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
a)	10	2.000	85 – 100
	40	0.420	25 – 75
	60	0.240	0 – 30
	100	0.149	0 – 10
	200	0.074	0 – 5
b)	SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
	4	4.750	95 – 100
	8	2.380	80 – 100
	16	1.190	50 – 85
	30	0.590	25 – 60
	50	0.297	10 – 30
	100	0.149	2 – 10
c)	SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
	10	2.000	85 – 100
	40	0.420	30 – 50
	200	0.074	0 – 10

SCANNED

Drinking Water and Groundwater Protection Division

THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: WW-6-2858
Dated: 7/16/2014

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

"I HEREBY CERTIFY THAT THE DESIGN RELATED INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT,AND THAT, IN THE EXERCISE OF MY REASONABLE PROFESSIONAL JUDGEMENT, THE DESIGN INCLUDED IN THIS APPLICATION FOR A PERMIT COMPLIES WITH VERMONT WASTEWATER SYSTEM AND POTABLE WATER SUPPLY RULES AND THE VERMONT WATER SUPPLY RULES."

WW-6-2858

STATE OF VERMONT
DAVID A. TUDHOPE NO 230
CERTIFIED SITE TECHNICIAN TYPE B

19 JUNE, 2014

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VERMONT
05408
TELE. (802) 862–9360
SITE TECH B #230
RLS 538
dtudhope@aol.com

BUILDINGS 1–3 DETAILS

DRAWN	DATE	For: Martin &
D.P.C.	03/19/14	Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St.
		South Hero, Vermont
SCALE	SHEET	PROJECT NO.
N.T.S.	5	781

BUILDINGS 4 & 5 WASTEWATER SYSTEMS DESIGN:

NOTE: THE COMPONENTS AND MOUND DESIGN ARE THE SAME FOR EACH OF THE TWO TRIPLEXES.

Design Flow: Proposed residential triplex with TWO (2) three bedrooms/units and ONE (1) one bedroom unit.
= 2(140gpd/bed'rm. X 3 bed'rm.) + (140gpd/bed'rm. X 1 bed'rm.) = 980 gal./day

Pre-treatment System to be employed

Pre-treatment System: Jet, Inc. model J-1500 wastewater treatment system, or equal. System to be installed as per manufacturers' instructions. See Drawing #9, "Jet J-1500 Details".

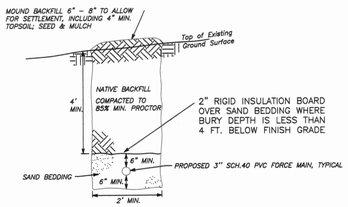
Pump Station: 1500 gal. concrete tank, see detail this sheet. Tank should be pumped every 2 to 3 years. Camp Precast Concrete Products, Inc., or equal.

Wastewater Disposal Field: Use mound-type disposal field with seepage bed design.

Maximum application rate = 2.0 gpd/sf.
Use 6' x 94' bed = 564 sq.ft. bed bottom (absorption) area.

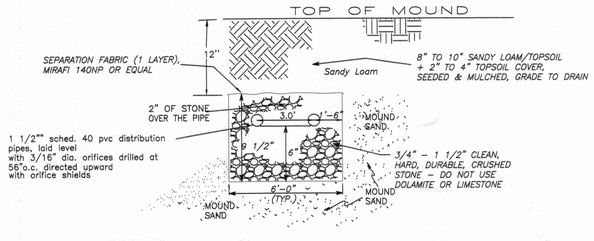
Basal Area Check:

Required basal area = 980gpd / (0.74 gpd/sf) = 1325sf, required.
Available basal area = 94' X (6' + 13') = 1786sf, provided.

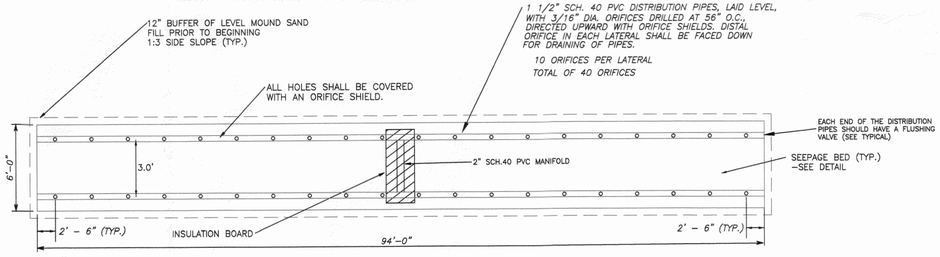


TYPICAL FORCE MAIN TRENCH SECTION
N.T.S.

NOTE:
1.) IF THE PRESENCE AND DEPTH OF LEDGE ON SITE WILL NOT ALLOW FOR BURY DEPTH OF OVER 4ft. BELOW GRADE SAND BEDDING AND RIGID INSULATION SHALL BE REQUIRED.
2.) A MINIMUN SOIL COVER OVER THE INSULATION OF 2ft. IS REQUIRED AND MAY BE NATURALLY OCCURING OR BERMED FILL WITH TOPSOIL LAYER FOR VEGETATIVE COVER.

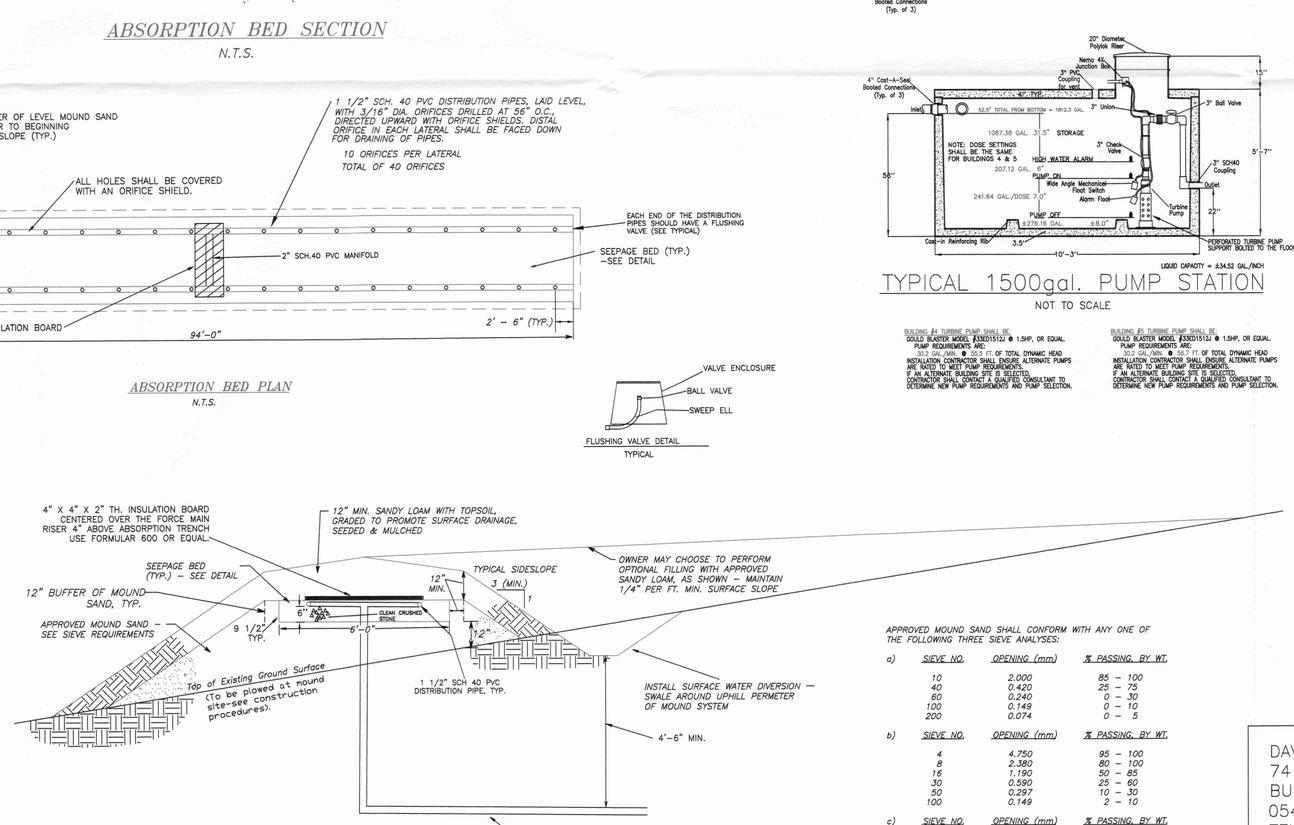


ABSORPTION BED SECTION
N.T.S.



ABSORPTION BED PLAN
N.T.S.

FLUSHING VALVE DETAIL
TYPICAL



BED-TYPE MOUND SECTION
N.T.S.

CONSTRUCTION PROCEDURES FOR MOUND-TYPE DISPOSAL FIELDS:

Prior to the start of construction the Contractor shall notify Dig-Safe (888) 344-7233, and schedule the system staking and preconstruction meeting with the Designer. The Contractor shall provide the CONSULTANT with a recent sieve analysis of the proposed mound sand, demonstrating the conformance of the proposed sand with the required specifications.

To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal areas. However, after placement of a minimum of six (6) inches of sand fill over the plowed areas, construction equipment may be driven over the protected surfaces to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.

After the preconstruction meeting, above-ground vegetation shall be closely cut and removed from the ground surface throughout the areas to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line (force mains) from the pump stations or siphon chambers to the point of connection with the distribution piping headers shall be installed. The areas shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound areas is completed, the areas should be fenced to prevent vehicles and equipment from entering the plowed areas, unless the fill material is going to be in place within 24 hours of the plowing. If the sites cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the sites by creating furrows that are parallel to the ground contour.

The area surrounding the mounds shall be graded to provide diversion of surface run-off waters.

Construction should be initiated immediately after preparation of the soil interfaces by placing all of the sand fill needed for the mounds to a minimum depth of twenty-one (30) inches above the plowed surfaces (or more, as specified on the applicable construction details). This depth will permit excavation of trenches or bed to accommodate the crushed stone (6") necessary for the distribution piping. After hand leveling of the absorption areas (bottom of trenches/bed), the stone shall be placed in the trenches/bed, hand leveled, and the distribution piping installed.

The septic tanks, pump stations, siphon chambers, sewer piping, and/or any other appurtenances shall be installed. The Design CONSULTANT shall be contacted to observe the completed system components, and to observe the testing of the systems by the Contractor.

Upon completion of the satisfactory inspection and testing of the systems, place the separation fabric over the absorption trenches/bed, and cover the mounds with sandy loam and topsoil. Grade the mounds and diversion swales to promote surface water runoff. All disturbed areas shall be seeded with conservation mix between April 15 and October 15, and mulched. On sites where construction is completed between October 15 and April 15 the site shall be immediately seeded with annual rye and mulched, and then reseeded with conservation mix within the dates referenced above.

Pump Selection for a Pressurized System
Input Parameters for BUILDING #4

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	56"
Number of Laterals per Cell	4
Lateral Length	47 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	3.0 feet
Manifold Line Size	2.00 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	45 feet
Transport Length	2410 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add-on' Friction Losses	0.0 feet

Calculations

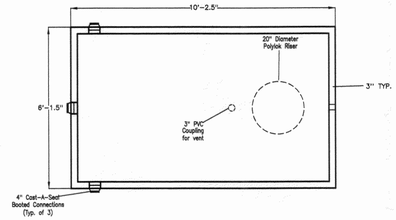
Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	40
Total Actual Flow Rate	30.2 gpm
Number of Lines per Zone	4
% Flow Differential 1st and Last Orifice	1.0 %
Lift to Manifold	45 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.1 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	5.8 feet
Head Loss Through Discharge	1.8 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	0.0 feet
Total Flow Rate	30.2 gpm
TDH	55.5 feet

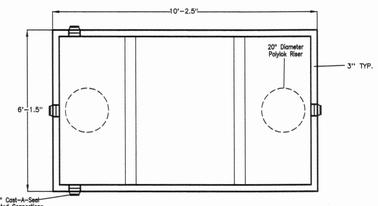
Pump Selection for a Pressurized System
Input Parameters for BUILDING #5

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	56"
Number of Laterals per Cell	4
Lateral Length	47 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	3.0 feet
Manifold Line Size	2.00 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	46 feet
Transport Length	2480 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add-on' Friction Losses	0.0 feet

Calculations

Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	40
Total Actual Flow Rate	30.2 gpm
Number of Lines per Zone	4
% Flow Differential 1st and Last Orifice	1.0 %
Lift to Manifold	46 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.1 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	5.8 feet
Head Loss Through Discharge	1.8 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	0.0 feet
Total Flow Rate	30.2 gpm
TDH	56.7 feet

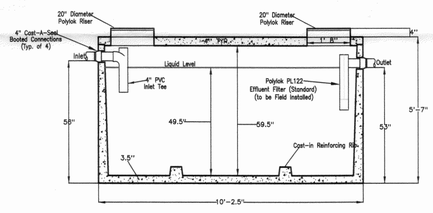




TYPICAL 1500gal. PUMP STATION
NOT TO SCALE

BUILDING #4 TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3XD1512J @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
30.2 GAL./MIN. @ 55.5 FT. OF TOTAL DYNAMIC HEAD
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED, CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.

BUILDING #5 TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3XD1512J @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
30.2 GAL./MIN. @ 56.7 FT. OF TOTAL DYNAMIC HEAD
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED, CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.



TYPICAL 1500gal. SEPTIC TANK
NOT TO SCALE

Drinking Water and Groundwater Protection Division

THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT

Permit Number: WW-4-2858

Dated: 7/16/2014

SCANNED

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

"I HEREBY CERTIFY THAT THE DESIGN RELATED INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT,AND THAT, IN THE EXERCISE OF MY REASONABLE PROFESSIONAL JUDGEMENT, THE DESIGN INCLUDED IN THIS APPLICATION FOR A PERMIT COMPLIES WITH VERMONT WASTEWATER SYSTEM AND POTABLE WATER SUPPLY RULES AND THE VERMONT WATER SUPPLY RULES."

WW-4-2858

STATE OF VERMONT
DAVID A. TUDHOPE
NO 230
CERTIFIED
SITE TECHNICIAN TYPE B

19 JUNE, 2014

APPROVED MOUND SAND SHALL CONFORM WITH ANY ONE OF THE FOLLOWING THREE SIEVE ANALYSES:

a)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	25 - 75
60	0.240	0 - 30
100	0.149	0 - 10
200	0.074	0 - 5

b)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
4	4.750	95 - 100
8	2.380	80 - 100
16	1.190	50 - 85
30	0.590	25 - 60
50	0.297	10 - 30
100	0.149	2 - 10

c)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	30 - 50
200	0.074	0 - 10

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VERMONT
05408
TELE. (802) 862-9360
SITE TECH B #230
RLS 538
dtudhope@aol.com

BUILDINGS 4&5 DETAILS		
DRAWN D.P.C.	DATE 03/19/14	For: Martin & Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St. South Hero, Vermont
SCALE N.T.S.	SHEET 6	PROJECT NO. 781

BUILDING 6, UNIT 6A WASTEWATER SYSTEM DESIGN:

Design Flow: Proposed residential triplex unit with ONE (1) one bedroom.
= 140gpd/bed'rm. X 1 bed'rm. = 140 gal./day
Pre-treatment System to be employed

Pre-treatment System: Jet, Inc. model J-750 wastewater treatment system, or equal.
System to be installed as per manufacturers' instructions.
See Drawing #10, "Jet J-750 Details".

Pump Station: 1000 gal. concrete tank, see detail this sheet.
Tank should be pumped every 2 to 3 years.
OnSite Septic Solutions, LLC, or equal.

Wastewater Disposal Field: Use mound-type disposal field with single trench design.
Maximum application rate = 2.0 gpd/sf.
Use 2' x 137' bed = 274 sq.ft. trench bottom (absorption) area.

Basal Area Check:

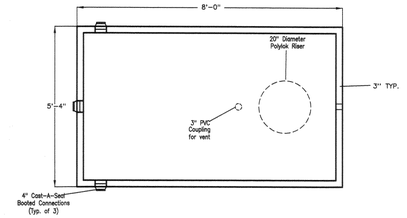
Required basal area = 140gpd / (0.74 gpd/sf) = 190sf, required.
Available basal area = 137' X (2' + 10.5') = 1712sf, provided.

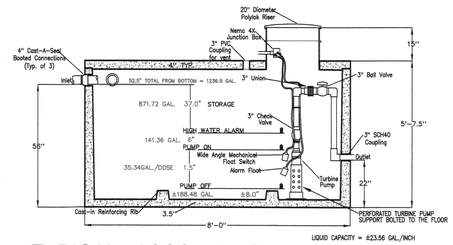
Pump Selection for a Pressurized System
Input Parameters for BUILDING #6, UNIT 6A

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	68"
Number of Laterals per Cell	2
Lateral Length	68.5 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	---
Manifold Line Size	---
Manifold Pipe Class/Schedule	---
Lift to Manifold	44 feet
Transport Length	2040 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add-on' Friction Losses	0.0 feet

Calculations

Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	24
Total Actual Flow Rate	18.2 gpm
Number of Lines per Zone	2
% Flow Differential 1st and Last Orifice	2.0 %
Lift to Manifold	44 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.2 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	1.9 feet
Head Loss Through Discharge	0.7 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	0.0 feet
Total Flow Rate	18.2 gpm
TDH	49.7 feet

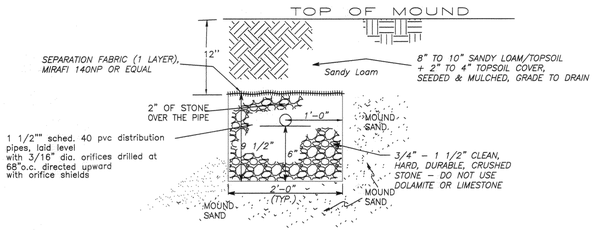




TYPICAL 1000gal. PUMP STATION

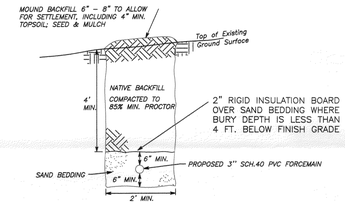
NOT TO SCALE

BUILDING #6,UNIT 6A TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #3XED15122 @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
18.2 GAL/MIN. @ 49.7 FT. OF TOTAL DYNAMIC HEAD
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED, CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.



MOUND TRENCH SECTION

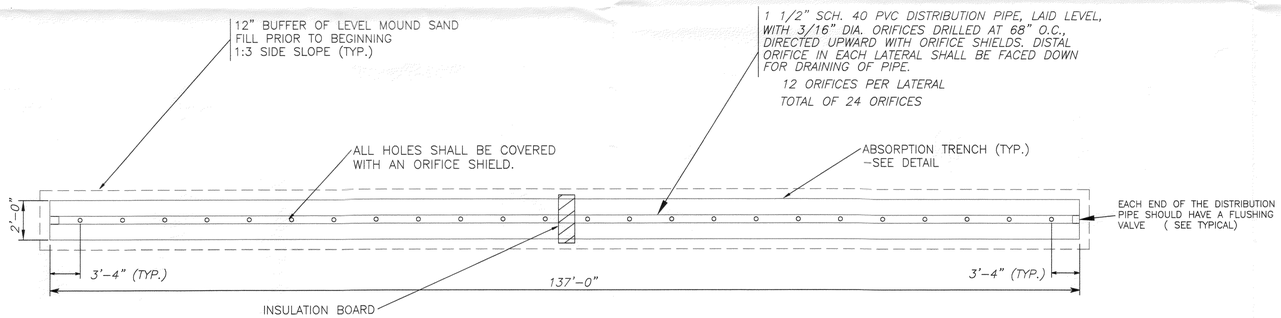
N.T.S.



FORCEMAIN TRENCH SECTION

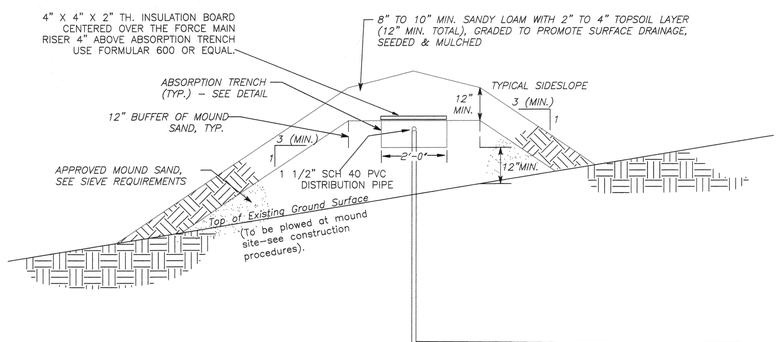
N.T.S.

NOTE:
1.) IF THE PRESENCE AND DEPTH OF LEDGE ON SITE WILL NOT ALLOW FOR BURY DEPTH OF OVER 4ft. BELOW GRADE SAND BEDDING AND RIGID INSULATION SHALL BE REQUIRED.
2.) A MINIMUN SOIL COVER OVER THE INSULATION OF 2ft. IS REQUIRED AND MAY BE NATURALLY OCCURING OR BERMED FILL WITH TOPSOIL LAYER FOR VEGETATIVE COVER.



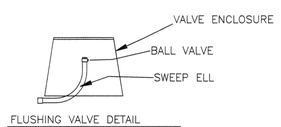
ABSORPTION TRENCH PLAN

N.T.S.



TRENCH-TYPE MOUND SECTION

N.T.S.



FLUSHING VALVE DETAIL

TYPICAL

APPROVED MOUND SAND SHALL CONFORM WITH ANY ONE OF THE FOLLOWING THREE SIEVE ANALYSES:

a)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	25 - 75
60	0.240	0 - 30
100	0.149	0 - 10
200	0.074	0 - 5

b)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
4	4.750	95 - 100
8	2.380	80 - 100
16	1.190	50 - 85
30	0.590	25 - 60
50	0.297	10 - 30
100	0.149	2 - 10

c)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	30 - 50
200	0.074	0 - 10

CONSTRUCTION PROCEDURES FOR MOUND-TYPE DISPOSAL FIELD

Prior to the start of construction the Contractor shall notify Dig-Safe (888) 344-7233, and schedule the system staking and preconstruction meeting with the Designer. The Contractor shall provide the CONSULTANT with a recent sieve analysis of the proposed mound sand, demonstrating the conformance of the proposed sand with the required specifications.

To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal area. However, after placement of a minimum of six (6) inches of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.

After the preconstruction meeting, above-ground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line (force main) from the pump station or siphon chamber to the point of connection with the distribution piping header shall be installed. The area shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound area is completed, the area should be fenced to prevent vehicles and equipment from entering the plowed area, unless the fill material is going to be in place within 24 hours of the plowing. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the site by creating furrows that are parallel to the ground contour.

The area surrounding the mound shall be graded to provide diversion of surface run-off waters.

Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill needed for the mound to a minimum depth of thirty (30) inches above the plowed surface (or more, as specified on the applicable construction details). This depth will permit excavation of trench or bed to accommodate the crushed stone (6") necessary for the distribution piping. After hand leveling of the absorption area (bottom of trenches/bed), the stone shall be placed in the trenches/bed, hand leveled, and the distribution piping installed.

The septic tank, pump station, siphon chamber, sewer piping, and/or any other appurtenances shall be installed. The Design CONSULTANT shall be contacted to observe the completed system components, and to observe the testing of the system by the Contractor.

Upon completion of the satisfactory inspection and testing of the system, place the separation fabric over the absorption trenches/bed, and cover the mound with sandy loam and topsoil. Grade the mound and diversion swale to promote surface water runoff. All disturbed areas shall be seeded with conservation mix between April 15 and October 15, and mulched. On sites where construction is completed between October 15 and April 15 the site shall be immediately seeded with annual rye and mulched, and then reseeded with conservation mix within the dates referenced above.



SCANNED

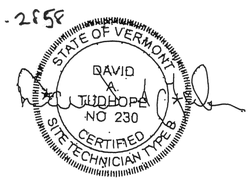
Drinking Water and Groundwater Protection Division

THIS IS SUBJECT TO PROVISIONS OR CONDITIONS LISTED IN PERMIT
Permit Number: ww-4-2858
Dated: 7/10/2014

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

"I HEREBY CERTIFY THAT THE DESIGN RELATED INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT,AND THAT, IN THE EXERCISE OF MY REASONABLE PROFESSIONAL JUDGEMENT, THE DESIGN INCLUDED IN THIS APPLICATION FOR A PERMIT COMPLIES WITH VERMONT WASTEWATER SYSTEM AND POTABLE WATER SUPPLY RULES AND THE VERMONT WATER SUPPLY RULES."

ww-4-2858



19 JUNE, 2014

DAVID A. TUDHOPE
74 CAYUGA CT.
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05408
TELE. (802) 862-9360
SITE TECH B #230
RLS 538
dtudhope@aol.com

UNIT 6A DETAILS		
DRAWN	DATE	For : Martin &
D.P.C.	03/19/14	Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St.
		South Hero, Vermont
SCALE	SHEET	PROJECT NO.
N.T.S.	7	781

BUILDING 6, UNITS 6B & 6C WASTEWATER SYSTEM DESIGN:

Design Flow: Proposed residential triplex units with ONE (1) one bedroom/unit.
= 2(140gpd/bed'rm. X 1 bed'rm.) = 280 gal./day
Pre-treatment System to be employed

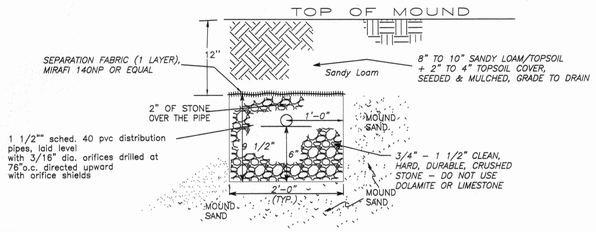
Pre-treatment System: Jet, Inc. model J-750 wastewater treatment system, or equal.
System to be installed as per manufacturers' instructions.
See Drawing #10, "Jet J-750 Details".

Pump Station: 1000 gal. concrete tank, see detail this sheet.
Tank should be pumped every 2 to 3 years.
OnSite Septic Solutions, LLC, or equal.

Wastewater Disposal Field: Use mound-type disposal field with single trench design.
Maximum application rate = 2.0 gpd/sf.
Use 2' x 76' bed = 152 sq.ft. trench bottom (absorption) area.

Basal Area Check:

Required basal area = 280gpd / (0.74 gpd/sf) = 379sf, required.
Available basal area = 76' X (2' + 11.25') = 1007sf, provided.



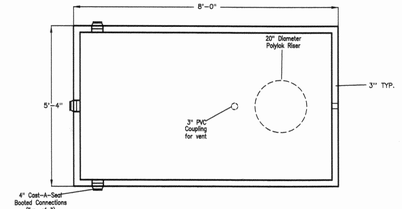
MOUND TRENCH SECTION
N.T.S.

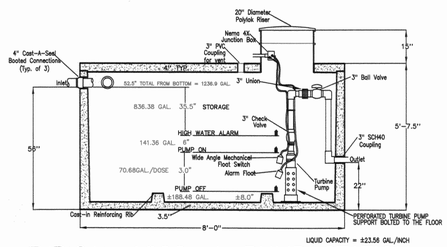
Pump Selection for a Pressurized System
Input Parameters for BUILDING #6, UNIT 6B & 6C

Orifice Size	3/16 inches
Residual Head at Last Orifice	3.0 feet
Orifice Spacing	76"
Number of Laterals per Cell	2
Lateral Length	38.0 feet
Lateral Line Size	1.50 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	none
Manifold Length	---
Manifold Line Size	---
Manifold Pipe Class/Schedule	---
Lift to Manifold	46 feet
Transport Length	2240 feet
Transport Line Size	3.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	none inches
'Add-on' Friction Losses	0.0 feet

Calculations

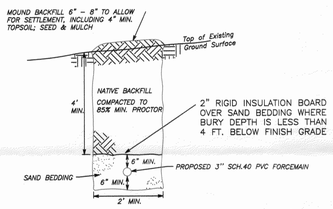
Minimum Flow Rate per Orifice	0.76 gpm
Number of Orifices per Zone	12
Total Actual Flow Rate	9.1 gpm
Number of Lines per Zone	2
% Flow Differential 1st and Last Orifice	0.3 %
Lift to Manifold	46 feet
Residual Head at Last Orifice	3.0 feet
Head Loss in Lateral	0.0 feet
Head Loss Through Distributing Valve	0.0 feet
Head Loss in Manifold	0.0 feet
Head Loss in Transport Pipe	0.6 feet
Head Loss Through Discharge	0.2 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	0.0 feet
Total Flow Rate	9.1 gpm
TDH	49.8 feet





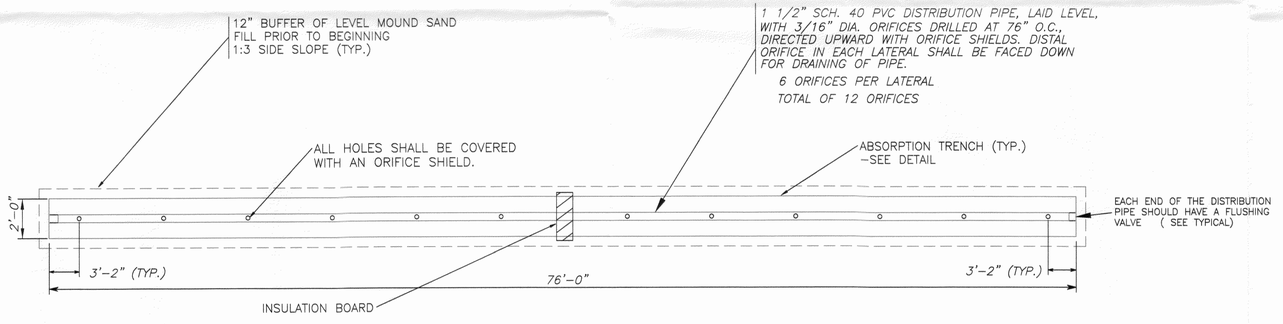
TYPICAL 1000gal. PUMP STATION
NOT TO SCALE

BUILDING #6,UNIT 6B & 6C TURBINE PUMP SHALL BE:
GOULD BLASTER MODEL #33SD1512J @ 1.5HP, OR EQUAL.
PUMP REQUIREMENTS ARE:
9.1 GAL./MIN. @ 49.8 FT. OF TOTAL DYNAMIC HEAD
INSTALLATION CONTRACTOR SHALL ENSURE ALTERNATE PUMPS ARE RATED TO MEET PUMP REQUIREMENTS.
IF AN ALTERNATE BUILDING SITE IS SELECTED, CONTRACTOR SHALL CONTACT A QUALIFIED CONSULTANT TO DETERMINE NEW PUMP REQUIREMENTS AND PUMP SELECTION.

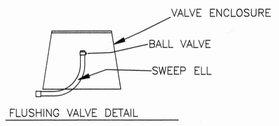


FORCEMAIN TRENCH SECTION
N.T.S.

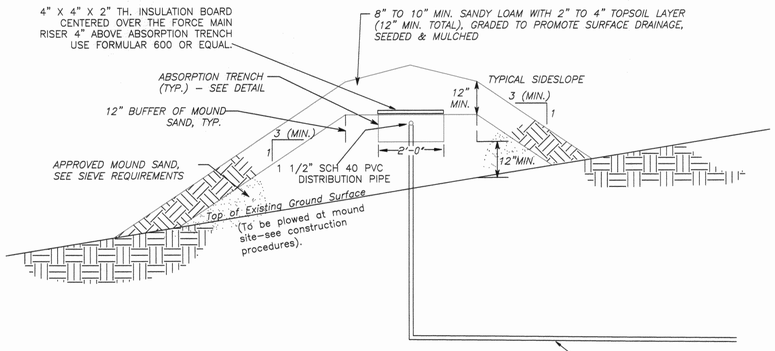
NOTE:
1.) IF THE PRESENCE AND DEPTH OF LEDGE ON SITE WILL NOT ALLOW FOR BURY DEPTH OF OVER 4ft. BELOW GRADE SAND BEDDING AND RIGID INSULATION SHALL BE REQUIRED.
2.) A MINIMUN SOIL COVER OVER THE INSULATION OF 2ft. IS REQUIRED AND MAY BE NATURALLY OCCURING OR BERMED FILL WITH TOPSOIL LAYER FOR VEGETATIVE COVER.



ABSORPTION TRENCH PLAN
N.T.S.



FLUSHING VALVE DETAIL
TYPICAL



TRENCH-TYPE MOUND SECTION
N.T.S.

APPROVED MOUND SAND SHALL CONFORM WITH ANY ONE OF THE FOLLOWING THREE SIEVE ANALYSES:

a)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	25 - 75
60	0.240	0 - 30
100	0.149	0 - 10
200	0.074	0 - 5

b)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
4	4.750	95 - 100
8	2.380	80 - 100
16	1.190	50 - 85
30	0.590	25 - 60
50	0.297	10 - 30
100	0.149	2 - 10

c)

SIEVE NO.	OPENING (mm)	% PASSING, BY WT.
10	2.000	85 - 100
40	0.420	30 - 50
200	0.074	0 - 10

CONSTRUCTION PROCEDURES FOR MOUND-TYPE DISPOSAL FIELD

Prior to the start of construction the Contractor shall notify Dig-Safe (888) 344-7233, and schedule the system staking and preconstruction meeting with the Designer. The Contractor shall provide the CONSULTANT with a recent sieve analysis of the proposed mound sand, demonstrating the conformance of the proposed sand with the required specifications.

To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal area. However, after placement of a minimum of six (6) inches of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.

After the preconstruction meeting, above-ground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line (force main) from the pump station or siphon chamber to the point of connection with the distribution piping header shall be installed. The area shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound area is completed, the area should be fenced to prevent vehicles and equipment from entering the plowed area, unless the fill material is going to be in place within 24 hours of the plowing. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the site by creating furrows that are parallel to the ground contour.

The area surrounding the mound shall be graded to provide diversion of surface run-off waters.

Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill needed for the mound to a minimum depth of thirty (30) inches above the plowed surface (or more, as specified on the applicable construction details). This depth will permit excavation of trench or bed to accommodate the crushed stone (6") necessary for the distribution piping. After hand leveling of the absorption area (bottom of trenches/bed), the stone shall be placed in the trenches/bed, hand leveled, and the distribution piping installed.

The septic tank, pump station, siphon chamber, sewer piping, and/or any other appurtenances shall be installed. The Design CONSULTANT shall be contacted to observe the completed system components, and to observe the testing of the system by the Contractor.

Upon completion of the satisfactory inspection and testing of the system, place the separation fabric over the absorption trenches/bed, and cover the mound with sandy loam and topsoil. Grade the mound and diversion swale to promote surface water runoff. All disturbed areas shall be seeded with conservation mix between April 15 and October 15, and mulched. On sites where construction is completed between October 15 and April 15 the site shall be immediately seeded with annual rye and mulched, and then reseeded with conservation mix within the dates referenced above.

INCHES

SCANNED

Drinking Water and Groundwater Protection Division

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Permit Number: 6W-6-2858
Dated: 7/10/2014

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JUN 25 2014
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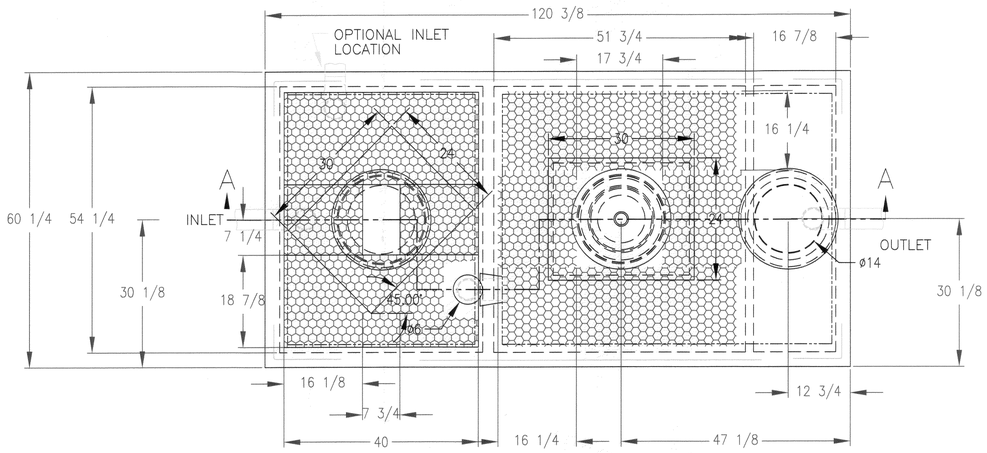
6W-6-2858

STATE OF VERMONT
DAVID A. TUDHOPE
NO 230
CERTIFIED
SITE TECHNICIAN TYPE B

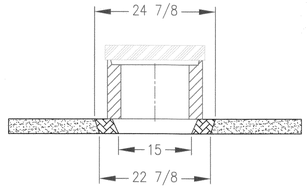
19 JUNE, 2014

DAVID A. TUDHOPE
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BURLINGTON VERMONT
05408
TELE. (802) 862-9360
SITE TECH B #230
RLS 538
dtudhope@aol.com

UNIT 6B & 6C DETAILS		
DRAWN D.P.C.	DATE 03/19/14	For: Martin & Patricia Lavin
APPROVED	DATE	U.S. Rte. 2/South St. South Hero, Vermont
SCALE N.T.S.	SHEET 8	PROJECT NO. 781



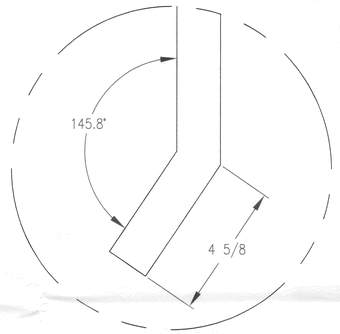
PLAN



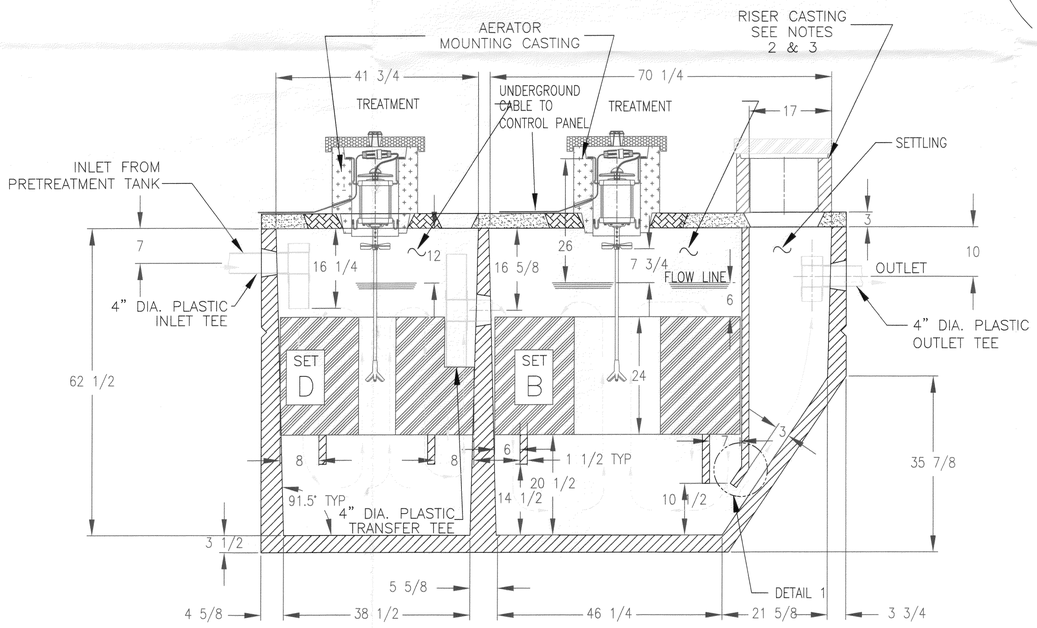
LID ASSEMBLY

NOTES:

1.) AERATOR MODEL 700LL MUST BE USED IN CONTINUOUS OPERATION.
2.) IF AERATOR MOUNTING CASTING HAS NO RISER, RISERS ARE NOT REQUIRED HERE. REMOVABLE CONCRETE COVERS, OR PLASTIC COVERS SECURED WITH TAMPER RESISTANT FASTENERS ARE REQUIRED.
3.) IF AERATOR MOUNTING CASTING HAS A RISER(S), COVERED RISERS ARE REQUIRED HERE. RISERS SHOULD BE DEVELOPED TO GRADE OR TO 6"–12" BELOW GRADE.
4.) 1000 GALLON MINIMUM PRETREATMENT TANK MUST PRECEDE THE J1500.



DETAIL 1



SECTION A–A

NOTE: THIS IS THE SAME EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED BY BUILDINGS 1–5.

AVAILABLE FROM OnSite SEPTIC SOLUTIONS,LLC
CONTACT: PAUL BEAUREGARD
P.O. BOX 183
CAMBRIDGE, VERMONT
TELE: (802) 644-5500
ON-LINE: paul@onsitesepticsolutions.biz

JET INC.

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CLEVELAND, OHIO

SCANNED

Received
JUN 25 2014
Drinking Water and Ground Water Protection Division

WW-6-2858

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STATE OF VERMONT · DAVID A. TUDHOPE · NO 230 · CERTIFIED SITE TECHNICIAN TYPE B

19 JUNE, 2014

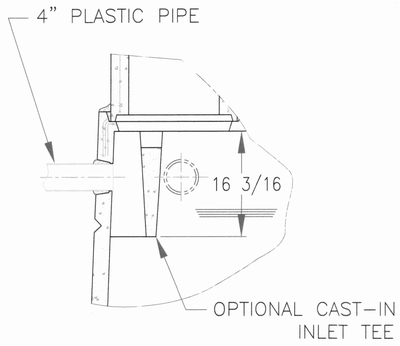
Drinking Water and Groundwater Protection Division

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Dated: 7/10/2014

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VERMONT
05408
TELE. (802) 862-9360
SITE TECH B #230
R.L.S. #538

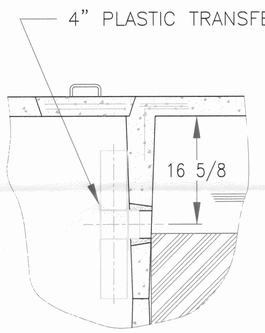
JET J-1500 DETAILS		
DRAWN	*DATE* 03/19/14	*For: Martin & Patricia Lavin*
APPROVED	*DATE*	*U.S. Rte. 2/South St. South Hero, Vermont*
SCALE N.T.S.	*SHEET* 9	*PROJECT NO.* 781

DETAIL 1



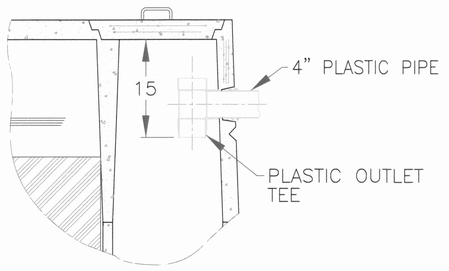
OPTIONAL INLET TEE

DETAIL 2

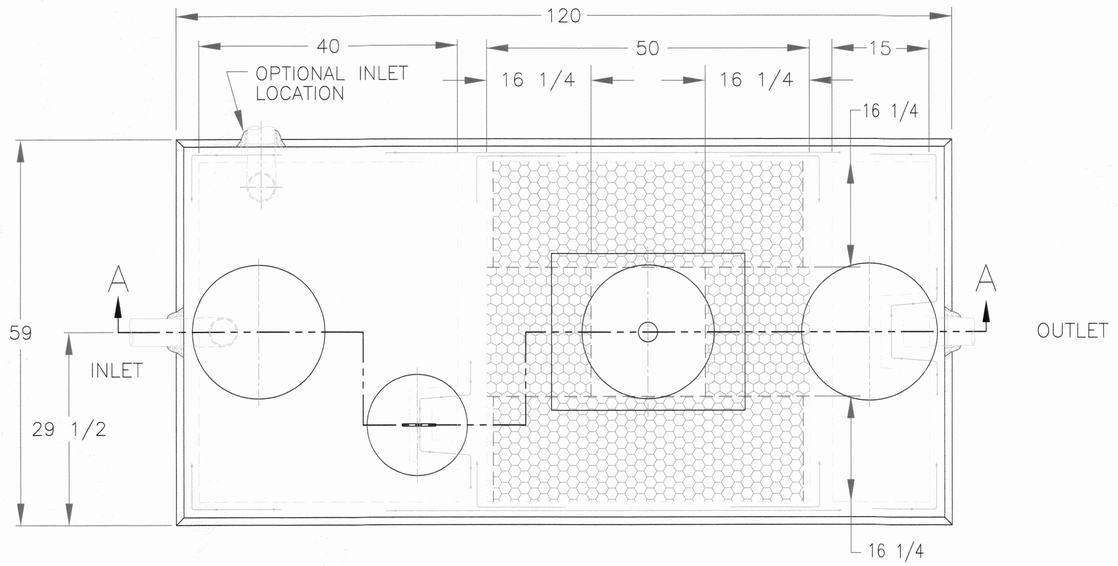


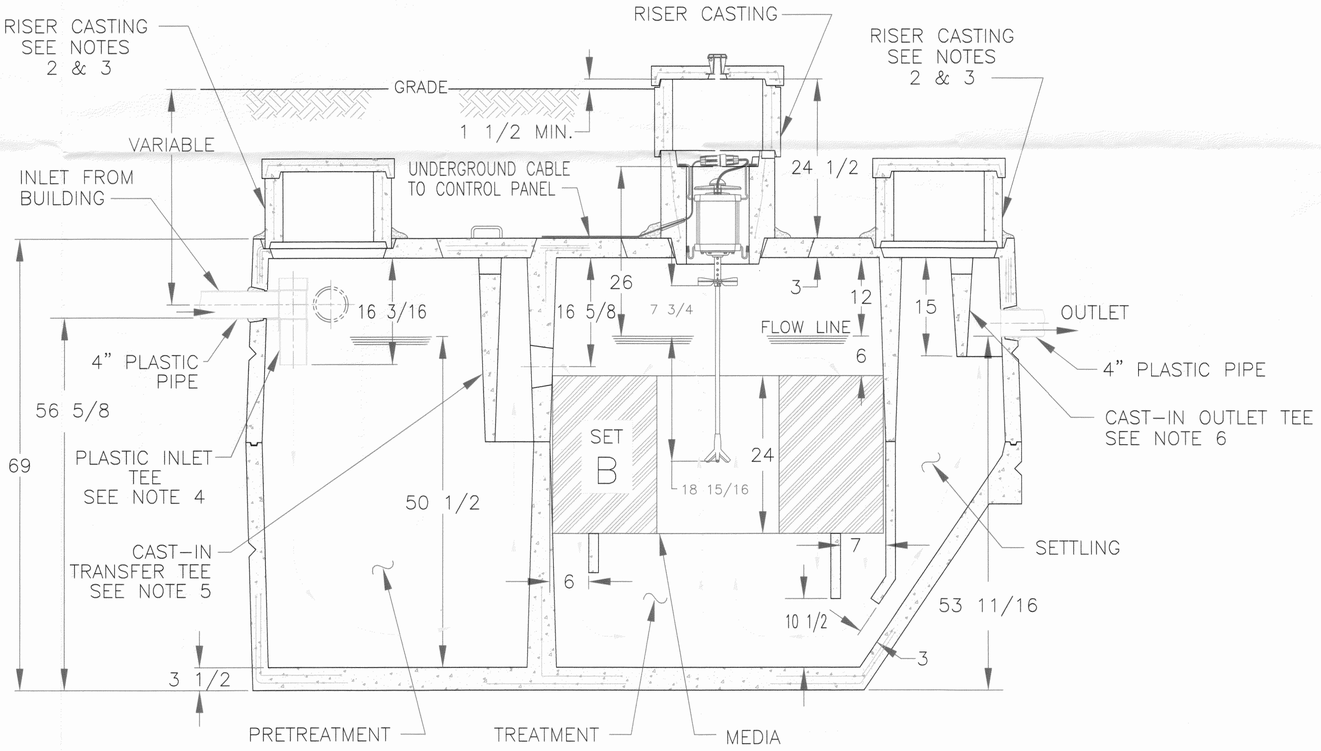
OPTIONAL TRANSFER TEE

DETAIL 3



OPTIONAL OUTLET TEE





SECTION A–A

NOTES:

1.) AERATOR MODEL 700LL IN CYCLED OR CONTINUOUS OPERATION MUST BE USED.

2.) IF AERATOR MOUNTING CASTING HAS NO RISER, RISERS ARE NOT REQUIRED HERE. REMOVABLE CONCRETE COVERS ARE REQUIRED.

3.) IF AERATOR MOUNTING CASTING HAS A RISER(S), COVERED RISERS ARE REQUIRED HERE. RISERS SHOULD BE DEVELOPED TO GRADE OR TO 6"–12" BELOW GRADE.

4.) PLANTS WHICH DO NOT USE A PLASTIC INLET TEE IN THE PRETREATMENT COMPARTMENT MAY USE AN OPTIONAL CAST–IN INLET TEE. SEE DETAIL 1.

5.) PLANTS WHICH DO NOT HAVE A CAST–IN TRANSFER TEE IN THE PRETREATMENT COMPARTMENT MAY USE AN OPTIONAL PLASTIC TRANSFER TEE. SEE DETAIL 2.

6.) PLANTS WHICH DO NOT HAVE A CAST–IN OUTLET TEE IN THE SETTLING COMPARTMENT MAY USE AN OPTIONAL PLASTIC OUTLET TEE. SEE DETAIL 3.

NOTE: THIS IS THE SAME EFFLUENT PRETREATMENT SYSTEM TO BE EMPLOYED BY BUILDING 6, UNIT 6A AND UNITS 6B & 6C.

AVAILABLE FROM OnSite SEPTIC SOLUTIONS,LLC
CONTACT: PAUL BEAUREGARD
P.O. BOX 183
CAMBRIDGE, VERMONT
TELE: (802) 644–5500
ON–LINE: paul@onsitesepticsolutions.biz

JET INC.

CLEVELAND, OHIO

HOME PLANT 750

750 GPD PLANT

PATENTED

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NOT SCANNED

Received
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Drinking Water and Ground Water Protection Division

WW-6-2858

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STATE OF VERMONT — DAVID A. TUDHOPE NO 230 CERTIFIED SITE TECHNICIAN TYPE B

19 JUNE, 2014

Drinking Water and Groundwater Protection Division

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Permit Number: WW-6-2858
Dated: 7/16/2014

DAVID A. TUDHOPE
74 CAYUGA CT.
BURLINGTON VERMONT
05408
TELE. (802) 862–9360
SITE TECH B #230
R.L.S. #538

JET J–750 DETAILS		
DRAWN	*DATE* 03/19/14	*For: Martin & Patricia Lavin*
APPROVED	*DATE*	*U.S. Rte. 2/South St. South Hero, Vermont*
SCALE N.T.S.	*SHEET* 10	*PROJECT NO.* 781

ATTACHMENT D – SOIL TEST PIT LOGS

OTTER CREEK ENGINEERING

SOIL TEST PIT LOG

Project: #1127-001 Town of South Hero

Location: Lavin Lane Property, South Hero, Vermont

Date: December 5, 2024 Time: 9:30 a.m. Weather: Overcast, breezy, 30s°F

Excavation method and Contractor: Volvo EC160BLC Tracked Excavator, Town of South Hero Highway Department

Ground Surface Slope: 5 - 10% Logged by: Bill Norland, C.P.G., Hydrogeologist

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-01	0-0.8	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.8-1.3	Silty clay loam	granular	friable	2.5Y 4/4	-	moist, common roots
	1.3-1.6	Silty clay loam, trace pebbles	subangular blocky	friable	7.5YR 3/3	-	moist, few roots
	1.6-6.3	silty clay loam	subangular blocky	friable	2.5Y 3/3	7.5Y3/4 F-F-F below 1.6'	moist, few roots to 3.1', NGWTD, NBTD, SHWT = 1.6'
TP-24-02	0-1.0	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	1.0-2.0	Silty clay loam	granular	friable	2.5Y 4/4	-	moist, common roots
	2.0-3.6	Silty clay loam, trace pebbles	subangular blocky	friable	7.5YR 3/3	-	moist, few roots
	3.6-6.0	Silt loam	subangular blocky	friable	2.5Y 3/3	-	moist, few roots to 3.7', NGWTD, NBTD, SHWT = 3.6'
TP-24-03	0-1.0	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	1.0-1.8	Silt loam	subangular blocky	friable	10YR 4/6	-	moist, common roots

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-03 (cont.)	1.8-2.0	Silty very fine sand	single grain	loose	2.5Y 3/2	-	moist, few roots
	2.0-6.0	Gravelly silt loam	subangular blocky	firm	10YR 3/2	2.5Y3/4 F-F-F below 2.4'	moist, few roots to 4.5', NGWTD, NBTD, SHWT = 2.4'
TP-24-04	0-1.0	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	1.0-2.2	Silt loam	subangular blocky	friable	10YR 4/6	-	moist, common roots
	2.2-2.5	Silty very fine sand	single grain	loose	2.5Y 3/2	-	moist, few roots
	2.5-6.0	Silt loam, few fine to medium gravel	subangular blocky	firm	10YR 3/2	2.5Y3/4 F-F-F below 2.6'	moist, few roots to 3.5', NGWTD, NBTD, SHWT = 2.6'
TP-24-05	0-0.9	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.9-1.5	Silt loam	subangular blocky	friable	10YR 4/6	-	moist, common roots
	1.5-5.6	Silt loam, few fine to medium gravel	subangular blocky	firm	10YR 3/2	2.5Y3/4 F-F-F below 2.2'	moist, few roots to 3.4', NGWTD, NBTD, SHWT = 2.2'
TP-24-06	0-0.7	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.7-2.0	Silty clay	subangular blocky	friable	10YR 3/3	7.5YR 4/4 F-F-F below 1.5'	moist, few roots

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-06 (cont.)	2.0-5.0	Silt loam, few fine to medium gravel	subangular blocky	firm	10YR 3/2	-	moist, few roots to 2.2', GW seep at 3.7', NBTD, SHWT = 1.5'
TP-24-07	0-1.1	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	1.1-2.0	Silty clay	subangular blocky	friable	5YR 4/4	-	moist, few roots
	2.0-3.7	Silty clay loam	subangular blocky	friable	7.5YR 3/2	2.5YR 3/3 F-F-F below 2.4'	moist, few roots to 2.4', GW seep at 3.7', SHWT = 2.4'
	>3.7'	Limestone bedrock	fractured	-	-	-	
TP-24-08	0-0.8	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.8-1.5	Silty clay	subangular blocky	friable	5YR 4/4	-	moist, few roots
	>1.5	Limestone bedrock	fractured	-	-	-	GW seep at 3.0' SHWT = 1.5'
TP-24-09	0-0.9	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.9-1.6	Silty clay	subangular blocky	friable	5YR 4/4	-	moist, common roots
	1.6-2.2	Pebbly silty clay loam	subangular blocky	friable	7.5YR 3/2	-	moist, few roots
	2.2-2.6	Pebbly coarse sand with bivalve shells	single grain	granular	2.5Y 3/2	-	moist, few roots
	2.6-5.5	Gravelly silty clay loam	subangular blocky	friable	7.5YR 3/2	2.5YR 3/3 F-F-F below 2.6'	moist, few roots to 2.7', GW seep at 2.6', SHWT = 2.6'

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-10	0-0.5	Silt loam	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.5-1.3	Silty clay	subangular blocky	friable	5YR 4/4	-	moist, common roots
	1.3-5.0	Gravelly silty clay loam	subangular blocky	friable	7.5YR 3/2	2.5YR 3/3 F-F-F below 2.2'	moist, few roots to 2.7', GW seep at 3.4', SHWT = 2.2'

Note:
SHWT = Seasonal high water table
GW = Groundwater
NBTD = No bedrock to depth
NGWTD = No groundwater to depth
F-F-F = Few Fine Faint

OTTER CREEK ENGINEERING

SOIL TEST PIT LOG

Project: #1127-001 Town of South Hero

Location: Lavin Lane Property, South Hero, Vermont

Date: December 30, 2024 Time: 9:30 a.m. Weather: Overcast, calm, 40s°F

Excavation method and Contractor: Volvo EC160BLC Tracked Excavator, Town of South Hero Highway Department

Ground Surface Slope: 0 - 5% Logged by: Bill Norland, C.P.G., Hydrogeologist

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-11	0-0.8	Silt loam, trace pebbles	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.8-1.6	Silty very fine sand, some fine to medium gravel	subangular blocky	friable	2.5Y 3/2	-	moist, few roots
	1.6-6.0	Gravelly silt loam	subangular blocky	firm	10YR 3/2	7.5Y3/4 M-M-D below 2.1'	moist to wet, trace roots to 3.0', GW seep at 2.4', NBTD, SHWT = 2.1'
TP-24-12	0-0.9	Silt loam, trace pebbles	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.9-1.8	Silty very fine sand, some fine to medium gravel	subangular blocky	friable	2.5Y 3/2	-	moist, few roots
	1.8-5.8	Gravelly silt loam	subangular blocky	firm	10YR 3/2	7.5Y3/4 M-M-D below 2.3'	moist to wet, trace roots to 3.3', GW seep at 2.8', NBTD, SHWT = 2.3'
TP-24-13	0-0.8	Silt loam, trace pebbles	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.8-1.8	Silty very fine sand, some fine to medium gravel	subangular blocky	friable	2.5Y 3/2	-	moist, few roots

Test Pit #	Depth interval (feet)	Texture	Structure	Consistence	Matrix Color (Munsell)	Mottles/ RMF Colors (Munsell)	Notes
TP-24-13 (cont.)	1.8-6.2	Gravelly silt loam	subangular blocky	firm	10YR 3/2	7.5Y3/4 M-M-D below 2.2'	moist to wet, trace roots to 3.3', GW seep at 2.6', NBTD, SHWT = 2.2'
TP-24-14	0-0.6	Silt loam, trace pebbles	crumb granular	loose	10YR 3/3	-	topsoil, moist, many roots
	0.6-1.7	Silty very fine sand, some fine to medium gravel	subangular blocky	friable	2.5Y 3/2	-	moist, few roots
	1.7-5.4	Gravelly silt loam	subangular blocky	firm	10YR 3/2	7.5Y3/4 M-M-D below 2.0'	moist to wet, trace roots to 3.3', GW seep at 2.4', NBTD, SHWT = 2.0'

Note:
SHWT = Seasonal high water table
GW = Groundwater
NBTD = No bedrock to depth
NGWTD = No groundwater to depth
M-M-D = Many Medium Distinct

June 3, 2015

Ref: 57703.00

By Electronic Copy Only

Ms. Danielle Owczarski
District Wetlands Ecologist
Vermont DEC- Watershed Management Division
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

Re: VEC Solar South Hero Project
South Hero, Vermont
Wetland and Design Changes

Danielle:

This letter follows our May 12, 2015 site visit to the VEC South Hero Solar Project site, where we looked at the two additional wetlands recently delineated by VHB, as well as the wetland 2014-4, originally delineated by VHB to include a potential vernal pool.

As you are aware, the two additional wetlands were identified within the planned Project site by VHB in April 2015. Subsequently, they were delineated and VHB has proposed classifications under the Vermont Wetland Rules ("VWR"). The two additional wetlands are shown on the attached Natural Resources Map (Attachment 1) as features 2015-7 and 2015-8. These wetlands have been field reviewed by the USACE (M. Adams) as well as yourself, with no boundary changes made. I've attached the Wetland Determination Forms (Attachment 2) documenting the additional delineation, as well as VHB's revised Summary of Wetland and Stream Delineations table (Attachment 3).

As discussed in the field, the two additional wetlands are not contiguous jurisdictionally, nor to wetland areas that were delineated originally. Wetland 2015-8 does include a vernal pool (delineated as 2015-VP-4) as documented vernal pool biology was found during 3 site visits this spring. Biota found in the pool included wood frog (adult), blue-spotted salamander (egg masses), and fairy shrimp, as well as other biota including water boatmen, mosquito larva, water scavenger beetles, and other Dytiscids (aquatic beetles). This wetland would be presumed Class II subject to 50-foot buffers based on the VWR presumptions 4.6a and 4.6d. Additionally, due to the presence of two S3 (uncommon) species (blue-spotted salamander and plant *Ranunculus flagellaris*) noted by VHB during spring 2015, the wetland would meet presumption 4.6g.

Wetland 2015-7 is a small wetland disconnected from 2015-8 (uphill) and 2014-4 (downhill), with some evidence of surface flow between the wetlands likely during very high precipitation events (evidenced by braided and inconsistent leaf scours indicating surface water movement at low duration/frequency). Based on VHB's functional analysis, this wetland provides VWR functions 5.1 and 5.2 at an insignificant level as these functions are independent of uphill and downhill wetlands, and as such VHB proposes it should be considered Class III.

Engineers | Scientists | Planners | Designers

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Suite 200
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P 802.497.6100
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Wetland 2014-4, delineated in late summer 2014, has been considered a Class II wetland during initial project planning and design as it contained a depression identified as a potential vernal pool. Without previously being able to biologically assess the depression due to time of year limitations, VHB conservatively assumed it could be a vernal pool for VWR classification purposes. Subsequently, based on three separate site visits conducted in spring 2015 (April 21, April 30 and May 12), no vernal pool biota was present. Given the absence of evidence of breeding use by vernal pool biota, VHB now proposes that this wetland be considered a Class III wetland, similar in limited function and nature as wetland 2015-7.

Since the identification of the additional wetlands, VHB has been working with VEC to modify the site design to avoid undue adverse impacts to wetlands based on this additional wetland information, and still meet the project purpose of developing a 1.5MWac solar photovoltaic project. As discussed during our site visit, VEC is constrained to the lease area as agreed upon with the landowner, with the agreement developed in large part based on Project size. As shown on the attached concept layout (Attachment 4), the Project has been significantly modified from the original plan submitted with the petition for a CPG (as well as other state permits). This plan has avoided the 50-foot buffer from Class II wetland 2015-8. Given the site constraints, including topography and tree cover, the plan was able to avoid both array placement and clearing in wetland 2015-7, would require clearing of overstory trees within wetland 2014-4, but the array would be sited to be outside the wetland. As discussed with the USACE, tree clearing within a wetland would not trigger the USACE Section 404 jurisdiction if completed without soil impacts. This design would allow the Project to meet the energy output purpose while also avoiding direct impacts to wetlands and minimizing overall forest clearing within the forested area surrounding vernal pool 2015-VP-4.

As proposed, this plan allows VEC to build a project that would meet the energy output goal, as well as avoiding impacts to proposed Class II wetlands/buffers. Although VHB proposes that both the Vermont Wetland Permit and USACE Section 404 Permit would not be required for the revised Project, VEC recognizes the vernal pool habitat value and volunteers further steps to ensure impacts to wetland function within the forested area surrounding the vernal pool, as well as within the proposed Class III wetland 2014-4, are avoided. Such steps being considered are:

- Development of a tree clearing/shade management plan to be included with revised Project plans, particularly for the northeast corner of the array, to preserve understory woody vegetation and avoid soil impacts within wetland 2014-4 during construction/operation of the Project.
- Annual post-construction monitoring of vernal pool 2015-VP-4 within wetland 2015-8 for the purpose of documenting evidence of breeding use by vernal pool biota. VHB proposes that the details of such monitoring, if so suggested by ANR, would include:
  - Annual surveys for minimum 3 years beginning with the first spring breeding season following project construction
  - Surveys to include qualitative observations of species use when compared to documented use observed and documented in field notes during spring 2015
  - Results assessed to determine if the Project is negatively impacting use of the vernal pool by documented obligate amphibians and invertebrates (e.g. *Ambystoma* salamander species, wood frogs, fairy shrimp). Negative impact would be defined as the absence of one or more of each group within two consecutive survey seasons in which vernal pool hydrology was suitable
  - Annual results to be reported to the ANR by December 31 of the monitoring year, and would include a summary of methods, results, recommendations, and supporting data documentation

- Monitoring to be conducted for a minimum of 3 years, upon which monitoring would cease if biota continues to be present. If negative impacts are observed in two consecutive years within the first 3 years, monitoring would extend to 5 years.

With your review and input, VEC is prepared to submit revised Project plans to the Vermont Public Service Board to restart the Section 248 review for a CPG. Thank you for your time in reviewing these materials, and we look forward to any comments or thoughts you may have regarding the above by June 15, 2015, so that additional Project reviews and detailed design plan revisions may proceed.

Respectfully,

Adam R. Crary, PWS, PWD
Senior Wetland Scientist

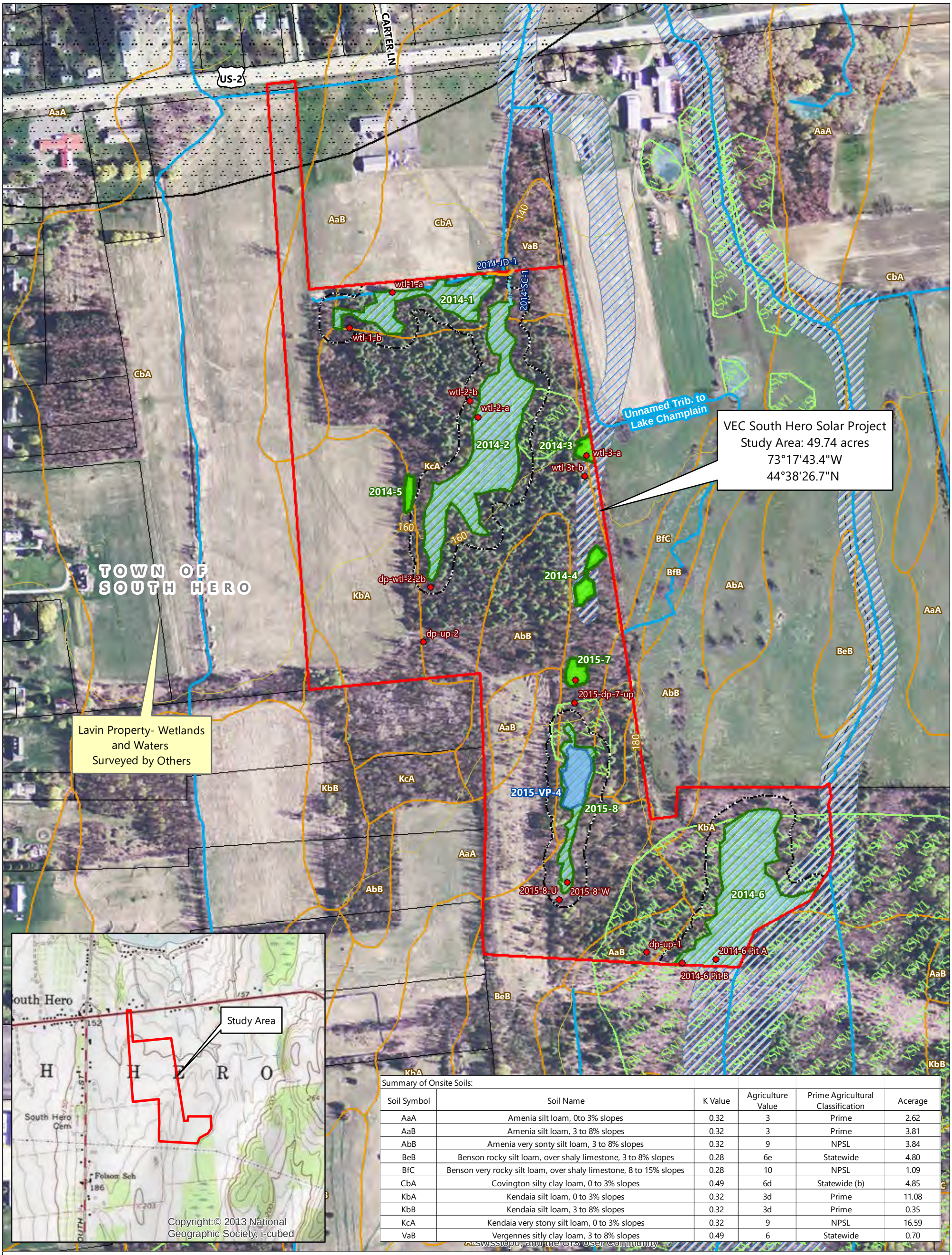
Attachments

Attachment 1 – South Hero Solar Natural Resources Map (revised)
Attachment 2 – Additional USACE Datasheets
Attachment 3 – Summary of Wetland and Stream Delineations Table (revised)
Attachment 4 – Vermont Electric Cooperative Inc. South Hero Solar Site Plan (draft revised concept)

cc: Jeffrey Wright (VEC)
Michael Adams (USACE)
Don Einhorn (ANR)
Joslyn Wilschek (Primmer, Piper, Eggleston & Cramer PC)

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ATTACHMENT 1



Summary of Onsite Soils:

Soil Symbol	Soil Name	K Value	Agriculture Value	Prime Agricultural Classification	Acerage
AaA	Amenia silt loam, 0to 3% slopes	0.32	3	Prime	2.62
AaB	Amenia silt loam, 3 to 8% slopes	0.32	3	Prime	3.81
AbB	Amenia very sonty silt loam, 3 to 8% slopes	0.32	9	NPSL	3.84
BeB	Benson rocky silt loam, over shaly limestone, 3 to 8% slopes	0.28	6e	Statewide	4.80
BfC	Benson very rocky silt loam, over shaly limestone, 8 to 15% slopes	0.28	10	NPSL	1.09
CbA	Covington silty clay loam, 0 to 3% slopes	0.49	6d	Statewide (b)	4.85
KbA	Kendaia silt loam, 0 to 3% slopes	0.32	3d	Prime	11.08
KbB	Kendaia silt loam, 3 to 8% slopes	0.32	3d	Prime	0.35
KcA	Kendaia very stony silt loam, 0 to 3% slopes	0.32	9	NPSL	16.59
VaB	Vergennes sitly clay loam, 3 to 8% slopes	0.49	6	Statewide	0.70

Study Area (VHB)
VHB Delineation Data Point
VHB Delineated Wetlands
Proposed Class
Class II
Class III
VHB Delineated Stream (Type)
Intermittent
Jurisdictional Ditch
Wetland Buffer
Vernal Pool (VHB)
VSWI Wetland
Waterbody
NHI Element Occurrences
Deer Wintering Area*
Ground Water Protection Area*
Surface Water Protection Area
100 Year Flood Zone
500 Year Flood Zone*
NRCS Soils
South Hero Parcels
20 Ft. Contour
100 Ft. Contour

*Feature does not occur within map extent

N

300 150 0 300
Feet

vhb

Vermont Electric Cooperative, Inc.
South Hero Solar Site
South Hero, Vermont
Natural Resources Map

May 18, 2015

Sources: Background Orthophoto by VCGI (2013); NHI Element Occurrences, Surface Water Protection Area, Ground Water Protection Area, and Deer Wintering Area by ANR (2013); Contours generated from HydroDEM by VCGI (2009); Streams by VHD (2010); Soil Boundary by NRCS (2008); VSWI Wetlands by ANR (2013); Flood Zones by FEMA (2008); Parcel data by VHB (2009); Approx. Study Area, VHB Natural Resource features delineated by VHB (2014); Project components by VHB (2015).

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ATTACHMENT 2

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project Site:	VEC Solar, South Hero	City/County:	Grand Isle	Samp. Date:	4/23/2015
Applicant/Owner:	Vermont Electric Cooperative, Inc.	State:	Vermont	Sampling Point:	2015-7-W
Investigator(s):	ARC	Section, Township, Range:	South Hero		
Landform (hillslope, terrace, etc.):		Local relief (concave, convex, none):		Slope (%):	0-3%
Subregion (LRR or MLRA):	LRR R	Lat:	44°38'26.324"N	Long: 73°17'42.42"W	Datum: NAD 83
Soil Map Unit:	Kendaia very stony silt loam				NWI Class: PFO

Are climatic/hydrologic conditions on the site typical for this time of year? **Yes** (If no, explain in Remarks.)

Are Vegetation, Soil, or Hydrology significantly disturbed? **No** Normal Circumstances? **Yes**

Are Vegetation, Soil, or Hydrology naturally problematic? **No** (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	YES	Is This Sample Area Within a Wetland? **YES**
Hydric Soil Present?	YES	
Wetland Hydrology Present?	YES	

Remarks:

Wetland flag near flag 2015-7-4

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

				Secondary Indicators (minimum of two required)	
					Surface Soil Cracks (B6)
X	Surface Water (A1)	X	Water-Stained Leaves (B9)	X	Drainage Patterns (B10)
	High Water Table (A2)		Aquatic Fauna (B13)		Moss Trim Lines (B16)
X	Saturation (A3)		Marl Deposits (B13)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living Roots (C3)		Saturation Visible on Aerial (C9)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Recent Iron Reduction in Tilled Soils (C6)		Geomorphic Position (D2)
	Iron Deposits (B5)		Thin Muck Surface (C7)		Shallow Aquitard (D3)
	Inundation Visible on Aerial (B7)		Other (Explain in Remarks)		Microtopographic Relief (D4)
	Sparsely Vegetated Concave Surface (B8)				FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	X	Depth (inches):	3	Wetland Hydrology Present? **YES**
Water Table Present?	X	Depth (inches):	Surface	
Saturation Present?	X	Depth (inches):	Surface	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Rainfall for the month of April was 2.52"(a 0.49 departure from normal); 1.3" in the 5 days prior (NOAA)

Remarks:

Surface water and saturation enhanced by recent high rainfall

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 2/2						Mucky loam	
9-14	2.5Y 4/2		10Yr 5/6				Gravely Clay Loam	MMP Redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

	Histosol (A1)		Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
	Histic Epipedon (A2)		Thin Dark Surface (S9) (LRR R, MLRA 149B)
	Black Histic (A3)		Loamy Mucky Mineral (F1) (LRR K, L)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)
	Stratified Layers (A5)		Depleted Matrix (F3)
X	Depleted Below Dark Surface (A11)		Redox Dark Surface (F6)
	Thick Dark Surface (A12)		Depleted Dark Surface (F7)
	Sandy Mucky Mineral (S1)		Redox Depressions (F8)
	Sandy Gleyed Matrix (S4)		
	Sandy Redox (S5)		
	Stripped Matrix (S6)		
	Dark Surface (S7) (LRR R, MLRA 149B)		

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Indicators for Problematic Hydric Soils[3]:

	2 cm Muck (A10) (LRR K, L, MLRA 149B)
	Coast Prairie Redox (A16) (LRR K, L, R)
	5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
	Dark Surface (S9) (LRR K, L, M)
	Polyvalue Below Surface (S8) (LRR K, L)
	Thin Dark Surface (S9) (LRR K, L)
	Iron-Manganese Masses (F12) (LRR K, L, R)
	Piedmont Floodplain Soils (F19) (MLRA 149B)
	Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
	Red Parent Material (F21)
	Very Shallow Dark Surface (TF12)
	Other (Explain in Remarks)

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? **YES**

Remarks:

VEGETATION - Use scientific names of plants.

Sampling Point: **2015-7-W**

Tree Stratum (Plot size: **30'RAD**)	Absolute % Cover	Dom. Sp?	Indicator Status
1. **Fraxinus pennsylvanica**	**15**	**X**	**FACW**
2. **Ulmus americana**	**15**	**X**	**FACW**
3. **Acer rubrum**	**3**		**FAC**
4.			
5.			
6.			
7.			
	33	= Total Cover	
Sapling Stratum (Plot size: **30'RAD**)			
1. **Fraxinus pennsylvanica**	**3**	**X**	**FACW**
2.			
3.			
4.			
5.			
6.			
7.			
	3	= Total Cover	
Shrub Stratum (Plot size: **15'RAD**)			
1. **Lonicera morrowii**	**38**	**X**	**FACU**
2. **Rhamnus cathartica**	**15**	**X**	**FAC**
3. **Cornus amomum**	**15**	**X**	**FACW**
4. **Viburnum dentatum**	**15**	**X**	**FAC**
5.			
6.			
7.			
	83	= Total Cover	
Herb Stratum (Plot size: **5'RAD**)			
1. **Thelypteris palustris**	**3**	**X**	**FACW**
2. **Iris versicolor**	**3**	**X**	**OBL**
3. **Onoclea sensibilis**	**3**	**X**	**FACW**
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	9	= Total Cover	
Woody Vines (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Dominance Test Worksheet:

Dominants OBL, FACW, FAC: **9** (A)

Dominants across all strata: **10** (B)

% Dominants OBL, FACW, FAC: **90%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply By:
OBL	**3**	x 1 =	**3**
FACW	**54**	x 2 =	**108**
FAC	**33**	x 3 =	**99**
FACU	**38**	x 4 =	**152**
UPL		x 5 =	
Sum:	**128** (A)		**362** (B)

Prevalence Index = B/A = **2.83**

Hydrophytic Vegetation Indicators:

- **X** Dominance Test is > 50%
- **X** Prevalence Index is <= 3.0
- ____ Problematic Hydrophytic Vegetation[1] (explain)
- ____ Rapid Test for Hydrophytic Vegetation
- ____ Morphological Adaptations

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and 3in (7.6cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and less than 3in (7.6cm) DBH.

Shrub - Woody plants, excluding woody vines, approximately 3 to 20ft (1 to 6m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3ft (1m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? **YES**

Remarks: (If observed, list morphological adaptations below).

Unidentified Carex Sp. 3% and a Grass 38%

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project Site: **VEC Solar, South Hero** City/County: **Grand Isle** Samp. Date: **4/23/2015**
Applicant/Owner: **Vermont Electric Cooperative, Inc.** State: **Vermont** Sampling Point: **2015-7-U**
Investigator(s): **ARC** Section, Township, Range: **South Hero**
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): **0-3%**
Subregion (LRR or MLRA): **LRR R** Lat: **44°38'25.623"N** Long: **73°17'42.41"W** Datum: **NAD 83**
Soil Map Unit: **Kendaia very stony silt loam** NWI Class:
Are climatic/hydrologic conditions on the site typical for this time of year? **Yes** (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? **No** Normal Circumstances? **Yes**
Are Vegetation, Soil, or Hydrology naturally problematic? **No** (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present? **NO**
Hydric Soil Present? **NO**
Wetland Hydrology Present? **NO**
Is This Sample Area Within a Wetland? **NO**

Remarks:
Upland in surface drainage between 2015-7 and 2015-8

HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Depth (inches):
Water Table Present? Depth (inches):
Saturation Present? **X** Depth (inches): **0-9**
Wetland Hydrology Present? **NO**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Rainfall for the month of April was 2.52"(a 0.49 departure from normal); 1.3" in the 5 days prior (NOAA)

Remarks:
Saturation from recent high precipitation/runoff (not wetland hydrology); upland flow patterns present; no coroborative growing season hydrology indicators present

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	**2.5Y 3/2**						**CLAY LOAM**	
9-16+	**2.5Y 4/2**		**2.5Y 4/4**				**Gravely Clay Loam**	**MMF Redox**

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.
[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR R, MLRA 149B)
- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S9) (LRR K, L, M)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Restrictive Layer (if observed):
Type:
Depth (inches):
Hydric Soil Present? **NO**

Remarks:

VEGETATION - Use scientific names of plants.

Sampling Point: **2015-7-U**

Tree Stratum (Plot size: **30'RAD**)	Absolute % Cover	Dom. Sp?	Indicator Status
1. **Fraxinus pennsylvanica**	**63**	**X**	**FACW**
2.			
3.			
4.			
5.			
6.			
7.			
	63	= Total Cover	

Sapling Stratum (Plot size: **30'RAD**)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	

Shrub Stratum (Plot size: **15'RAD**)			
1. **Zanthoxylum americanum**	**38**	**X**	**FACU**
2. **Lonicera morrowii**	**38**	**X**	**FACU**
3. **Rhamnus cathartica**	**15**		**FAC**
4.			
5.			
6.			
7.			
	91	= Total Cover	

Herb Stratum (Plot size: **5'RAD**)			
1. **Potentilla indica**	**3**	**X**	**FACU**
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	3	= Total Cover	

Woody Vines (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Dominance Test Worksheet:

Dominants OBL, FACW, FAC: **1** (A)

Dominants across all strata: **4** (B)

% Dominants OBL, FACW, FAC: **25%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:
OBL	x 1 =	
FACW **63**	x 2 =	**126**
FAC **15**	x 3 =	**45**
FACU **79**	x 4 =	**316**
UPL	x 5 =	
Sum: **157** (A)		**487** (B)

Prevalence Index = B/A = **3.10**

Hydrophytic Vegetation Indicators:

- ____ Dominance Test is > 50%
- ____ Prevalence Index is <= 3.0
- ____ Problematic Hydrophytic Vegetation[1] (explain)
- ____ Rapid Test for Hydrophytic Vegetation
- ____ Morphological Adaptations

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and 3in (7.6cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and less than 3in (7.6cm) DBH.

Shrub - Woody plants, excluding woody vines, approximately 3 to 20ft (1 to 6m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3ft (1m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? **NO**

Remarks: (If observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project Site:	VEC Solar, South Hero	City/County:	Grand Isle	Samp. Date:	4/23/2015
Applicant/Owner:	Vermont Electric Cooperative, Inc.	State:	Vermont	Sampling Point:	2015-8-W
Investigator(s):	ARC	Section, Township, Range:	South Hero		
Landform (hillslope, terrace, etc.):		Local relief (concave, convex, none):		Slope (%):	3-8%
Subregion (LRR or MLRA):	LRR R	Lat:	44°38'19.729"N	Long: 73°17'42.658"W	Datum: NAD 83
Soil Map Unit:	Benson rocky silt loam				NWI Class: PFO

Are climatic/hydrologic conditions on the site typical for this time of year? **Yes** (If no, explain in Remarks.)

Are Vegetation, Soil, or Hydrology significantly disturbed? **No** Normal Circumstances? **Yes**

Are Vegetation, Soil, or Hydrology naturally problematic? **No** (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	YES	Is This Sample Area Within a Wetland? **YES**
Hydric Soil Present?	YES	
Wetland Hydrology Present?	YES	

Remarks:

Near flag 2015-8-29

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

				Secondary Indicators (minimum of two required)	
					Surface Soil Cracks (B6)
X	Surface Water (A1)	X	Water-Stained Leaves (B9)	X	Drainage Patterns (B10)
X	High Water Table (A2)		Aquatic Fauna (B13)	X	Moss Trim Lines (B16)
X	Saturation (A3)		Marl Deposits (B13)		Dry-Season Water Table (C2)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)		Crayfish Burrows (C8)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living Roots (C3)		Saturation Visible on Aerial (C9)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)		Stunted or Stressed Plants (D1)
	Algal Mat or Crust (B4)		Recent Iron Reduction in Tilled Soils (C6)		Geomorphic Position (D2)
	Iron Deposits (B5)		Thin Muck Surface (C7)		Shallow Aquitard (D3)
	Inundation Visible on Aerial (B7)		Other (Explain in Remarks)		Microtopographic Relief (D4)
	Sparsely Vegetated Concave Surface (B8)				FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	X	Depth (inches):	6	Wetland Hydrology Present? **YES**
Water Table Present?	X	Depth (inches):	Surface	
Saturation Present?	X	Depth (inches):	Surface	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Rainfall for the month of April was 2.52"(a 0.49 departure from normal); 1.3" in the 5 days prior (NOAA)

Remarks:

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-0							Muck	
0-6	2.5Y 3/1		2.5Y 4/4				CLAY LOAM	FMD Redox
6-12	2.5Y 4/2		2.5Y 4/4				CLAY	MMD Redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

				Indicators for Problematic Hydric Soils[3]:	
	Histosol (A1)		Polyvalue Below Surface (S8) (LRR R, MLRA 149B)		2 cm Muck (A10) (LRR K, L, MLRA 149B)
	Histic Epipedon (A2)				Coast Prairie Redox (A16) (LRR K, L, R)
	Black Histic (A3)		Thin Dark Surface (S9) (LRR R, MLRA 149B)		5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
	Hydrogen Sulfide (A4)		Loamy Mucky Mineral (F1) (LRR K, L)		Dark Surface (S9) (LRR K, L, M)
	Stratified Layers (A5)		Loamy Gleyed Matrix (F2)		Polyvalue Below Surface (S8) (LRR K, L)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)		Thin Dark Surface (S9) (LRR K, L)
	Thick Dark Surface (A12)	X	Redox Dark Surface (F6)		Iron-Manganese Masses (F12) (LRR K, L, R)
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)		Piedmont Floodplain Soils (F19) (MLRA 149B)
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)		Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
	Sandy Redox (S5)				Red Parent Material (F21)
	Stripped Matrix (S6)		[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.		Very Shallow Dark Surface (TF12)
	Dark Surface (S7) (LRR R, MLRA 149B)				Other (Explain in Remarks)

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present? **YES**

Remarks:

VEGETATION - Use scientific names of plants.

Sampling Point: **2015-8-W**

Tree Stratum (Plot size: **30'RAD**)	Absolute % Cover	Dom. Sp?	Indicator Status
1. **Fraxinus pennsylvanica**	**63**	**X**	**FACW**
2.			
3.			
4.			
5.			
6.			
7.			
	63	= Total Cover	
Sapling Stratum (Plot size: **30'RAD**)			
1. **Fraxinus pennsylvanica**	**38**	**X**	**FACW**
2. **Ulmus americana**	**3**		**FACW**
3.			
4.			
5.			
6.			
7.			
	41	= Total Cover	
Shrub Stratum (Plot size: **15'RAD**)			
1. **Fraxinus pennsylvanica**	**15**	**X**	**FACW**
2. **Rhamnus cathartica**	**15**	**X**	**FAC**
3. **Lonicera morrowii**	**15**	**X**	**FACU**
4.			
5.			
6.			
7.			
	45	= Total Cover	
Herb Stratum (Plot size: **5'RAD**)			
1. **Onoclea sensibilis**	**3**	**X**	**FACW**
2. **Carex lupulina**	**3**	**X**	**OBL**
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	6	= Total Cover	
Woody Vines (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Dominance Test Worksheet:

Dominants OBL, FACW, FAC: **6** (A)

Dominants across all strata: **7** (B)

% Dominants OBL, FACW, FAC: **86%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply By:
OBL	**3**	x 1 =	**3**
FACW	**122**	x 2 =	**244**
FAC	**15**	x 3 =	**45**
FACU	**15**	x 4 =	**60**
UPL		x 5 =	
Sum:	**155** (A)		**352** (B)

Prevalence Index = B/A = **2.27**

Hydrophytic Vegetation Indicators:

- **X** Dominance Test is > 50%
- **X** Prevalence Index is <= 3.0
- ____ Problematic Hydrophytic Vegetation[1] (explain)
- ____ Rapid Test for Hydrophytic Vegetation
- ____ Morphological Adaptations

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and 3in (7.6cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and less than 3in (7.6cm) DBH.

Shrub - Woody plants, excluding woody vines, approximately 3 to 20ft (1 to 6m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3ft (1m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? **YES**

Remarks: (If observed, list morphological adaptations below).

Unidentified Grass 3% and Bidens Sp.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project Site: **VEC Solar, South Hero** City/County: **Grand Isle** Samp. Date: **4/23/2015**
Applicant/Owner: **Vermont Electric Cooperative, Inc.** State: **Vermont** Sampling Point: **2015-8-U**
Investigator(s): **ARC** Section, Township, Range: **South Hero**
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): **3-8%**
Subregion (LRR or MLRA): **LRR R** Lat: **44°38'19.183"N** Long: **73°17'43.043"W** Datum: **NAD 83**
Soil Map Unit: **Benson rocky silt loam** NWI Class:
Are climatic/hydrologic conditions on the site typical for this time of year? **Yes** (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? **No** Normal Circumstances? **Yes**
Are Vegetation, Soil, or Hydrology naturally problematic? **No** (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present? **YES**
Hydric Soil Present? **NO**
Wetland Hydrology Present? **NO**
Is This Sample Area Within a Wetland? **NO**

Remarks:
30' south of flag 2015-8-28

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Depth (inches):
Water Table Present? Depth (inches):
Saturation Present? **X** Depth (inches): **0-7"**
Wetland Hydrology Present? **NO**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Rainfall for the month of April was 2.52"(a 0.49 departure from normal); 1.3" in the 5 days prior (NOAA)

Remarks:
Saturation and saturated innundation in micro-relief from recent high precipitation and not wetland hydrology

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(in)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	**2.5Y 3/2**						**CLAY LOAM**	
7-12+	**2.5Y 3/1**		**2.5Y 4/4**				**CLAY**	**FFD Redox**

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.
[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR R, MLRA 149B)
- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S9) (LRR K, L, M)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Restrictive Layer (if observed):
Type:
Depth (inches):
Hydric Soil Present? **NO**

Remarks:

VEGETATION - Use scientific names of plants.

Sampling Point: **2015-8-U**

Tree Stratum (Plot size: **30'RAD**)	Absolute % Cover	Dom. Sp?	Indicator Status
1. **Quercus bicolor**	**15**	**X**	**FACW**
2. **Acer saccharum**	**15**	**X**	**FACU**
3. **Ulmus americana**	**15**	**X**	**FACW**
4. **Populus tremuloides**	**15**	**X**	**FACU**
5. **Fraxinus pennsylvanica**	**15**	**X**	**FACW**
6.			
7.			
	75	= Total Cover	
Sapling Stratum (Plot size: **30'RAD**)			
1. **Ulmus americana**	**15**	**X**	**FACW**
2. **Fraxinus pennsylvanica**	**15**	**X**	**FACW**
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	
Shrub Stratum (Plot size: **15'RAD**)			
1. **Rhamnus cathartica**	**38**	**X**	**FAC**
2. **Lonicera morrowii**	**38**	**X**	**FACU**
3. **Zanthoxylum americanum**	**3**		**FACU**
4. **Juniperus virginiana**	**3**		**FACU**
5.			
6.			
7.			
	82	= Total Cover	
Herb Stratum (Plot size: **5'RAD**)			
1. **Potentilla indica**	**3**	**X**	**FACU**
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	3	= Total Cover	
Woody Vines (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Dominance Test Worksheet:

Dominants OBL, FACW, FAC: **6** (A)

Dominants across all strata: **10** (B)

% Dominants OBL, FACW, FAC: **60%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:
OBL		x 1 =
FACW	**75**	x 2 = **150**
FAC	**38**	x 3 = **114**
FACU	**77**	x 4 = **308**
UPL		x 5 =
Sum:	**190** (A)	**572** (B)

Prevalence Index = B/A = **3.01**

Hydrophytic Vegetation Indicators:

- **X** Dominance Test is > 50%
- ____ Prevalence Index is <= 3.0
- ____ Problematic Hydrophytic Vegetation[1] (explain)
- ____ Rapid Test for Hydrophytic Vegetation
- ____ Morphological Adaptations

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and 3in (7.6cm) or larger in diameter at breast height (DBH).

Sapling - Woody plants, excluding woody vines, approximately 20ft (6m) or more in height and less than 3in (7.6cm) DBH.

Shrub - Woody plants, excluding woody vines, approximately 3 to 20ft (1 to 6m) in height.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3ft (1m) in height.

Woody vine - All woody vines, regardless of height.

Hydrophytic Vegetation Present? **YES**

Remarks: (If observed, list morphological adaptations below).

ATTACHMENT 3

Summary of Wetland and Stream Delineations
Vermont Electric Cooperative, Inc.
Project Name: VEC Solar, South Hero
Location: South Hero, Vermont
Prepared by VHB
February 12, 2015
Revised: 5/26/2015

VHB Delineated Wetlands

Wetland ID*	Delineated Area (Square Feet)[1]	Cowardin Classification[2]	Vermont Wetland Rules Classification						Typical Vegetation	Comments
			Contiguous to a VSWI-mapped Wetland?	Riparian Wetland Contiguous to Stream Channel? (Flow Regime)[3]	VWR Section 4.6 Presumptions[4]	VWR Section 5 Functional Criteria Presence/ Significance		VHB Potential VWR Classification[6]		
						Type[5]	VHB-Proposed Significant?			
2014-1	**29,746**	PFO	No	No	a,e	5.1,5.2,5.4	Yes	II	*Fraxinus pennsylvanica, Juniperus virginiana*	Wetland located in slight topographical at the edge of a forested area and south of a mowed field; wetland feature contains a potential vernal pool assumed to be viable (no biota on 4/21/15); saturated to the surface with water stained leaves
2014-2	95,438	PFO	Yes	No	a,e	5.1,5.2,5.4	Yes	II	*Fraxinus pennsylvanica, Rhamnus cathartica*	Wetland feature located in slight topographical depression; water stained leaves; potential vernal pool assumed to be viable (no biota on 4/21/15)
2014-3	**3,312**	PFO	No	No	-	5.1,5.2	No	III	*Fraxinus pennsylvanica, Ulmus americana*	Small feature located on edge of pasture land; depressional wetland feature
2014-4	5,844	PFO	No	No	-	5.1,5.2	No	III	*Fraxinus pennsylvanica, Ulmus americana*	Depressional feature was a presumed vernal pool but no biota present on 4/21/15, 4/30/15, and 5/12/15; located at the base of a slope; receives overland flow from pasture
2014-5	2,685	PFO	No	No	-	5.1	No	III	*Fraxinus pennsylvanica, Rhamnus cathartica*	Small wetland feature located at the edge of a mowed field in a topographical depression in the woods; saturated
2014-6	**92,752**	PEM/PFO	Yes	No	a	5.1, 5.2	Yes	II	*Acer rubrum, Ulmus americana*	Large mapped VSWI; extends outside of the Study Area
2015-7	4,289	PFO	No	No	-	5.1,5.2	No	III	*Fraxinus pennsylvanica, Ulmus americana*	Small forested depressional wetland that recieves some flow through uplands from wetland 2015-8
2015-8	23,650	PFO	Yes	No	a,d,g	5.1, 5.2, 5.4, 5.5, 5.6	Yes	II	*Fraxinus pennsylvanica, Ulmus american, Carex lupulina*	Mapped VSWI: with a ranked Vernal pool located in the Northern end of feature; Observed Blue-Spotted Salamander (S3) and Ranunculus flagellaris (S3) in the pool.

Delineated wetland areas in **BOLD** extend outside of the Study Area; on the area within VHB's Study Area is represented.

[1]All wetlands field-delineated per the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast and North Central Region* . U.S. Army Corps of Engineers. 2011. Wetlands field reviewed by USACE on 9/3/14.

[2]Classification follows Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitat of the United States. U.S. Fish and Wildlife Service. FWS/OBD-79/31. 103pp.

[3]Wetland contiguity to streams as defined in the Vermont ANR 12/9/05 *Guidance for Agency Act 250 and Section 248 Comments Regarding Riparian Buffers* and confirmed if a delineated perennial or intermittent stream channel inflows, throughflows, and outflows from a delineated wetland (ephemeral channels not typically being subject to ANR Riparian Buffer Guidance). The vegetative assemblage or natural community type is used when determining riparian vegetation function. Flow regime determined based on qualitative observations of instream hydrology indicators and geomorphic characteristic and are subject to professional judgment (P=perennial, I=intermittent, E=ephemeral).

[4]Alpha-numeric codes correspond with Section 4.6 Presumptions of the 2010 Vermont Wetland Rules.

[5]VWR Section 5: Functional Criteria for Evaluating a Wetland's Significance: 5.1=Water Storage for Flood Water and Storm Runoff, 5.2=Surface and Groundwater Protection, 5.3=Fish Habitat, 5.4=Wildlife Habitat, 5.5=Exemplary Wetland Natural Community, 5.6=Rare, Threatened or Endangered Species Habitat, 5.7=Education and Research in Natural Sciences, 5.8=Recreational Value and Economic Benefits, 5.9=Open Space and Aesthetics, 5.10=Erosion Control Through Binding and Stabilizing the Soil.

[6]VHB-Proposed VWR Classification is based on review and application of the VWR; wetland delineations were field reviewed by DEC on September 3, 2014, April 21, 2015 and May 12, 2015

VHB Delineated Streams

Stream ID	Stream Name	Associated Wetlands	Average Ordinary High Water Width (OHW) Feet[1]	Flow Regime (Ephemeral Intermittent and Perennial)[2]	Watershed Size > 0.5 square miles (Yes/No)[3]	Comments
2014-JD-1	-	W-1	1.5	Intermittent/ Ephemeral	No	Jurisdictional ditch which drains wetland 2014-1 to Stream 2014-SC-1; clay silt and rock substrate; no flow at time of delineation
2014-SC-1	-	W-2	4.0	Intermittent	No	Clay and gravel substrate; no flow or surface water; clay and gravel substrate; no flow or surface water at time of delineation

[1]U.S. Army Corps of Engineers (USACE). 2005. "Regulatory Guidance Letter. Subject: Ordinary High Water Mark Identification." No. 05-05.

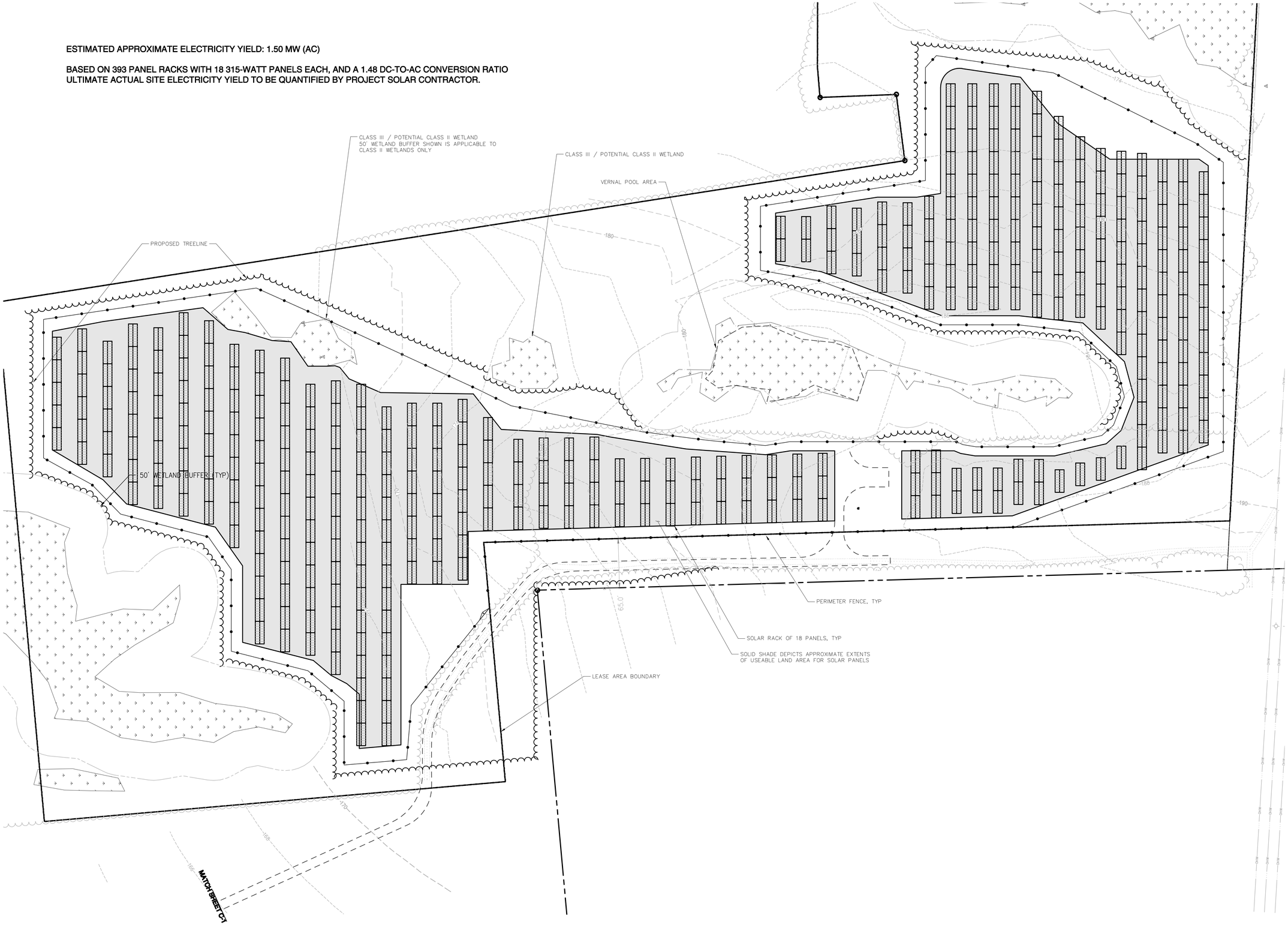
[2]Stream flow regime determined based on qualitative observations of instream hydrology indicators and geomorphic characteristic and are subject to professional judgment.

[3]Watershed size was determined from Vermont ANR Stream Alteration Regulatory Program mapping for the town of South Hero.

ATTACHMENT 4

ESTIMATED APPROXIMATE ELECTRICITY YIELD: 1.50 MW (AC)

BASED ON 393 PANEL RACKS WITH 18 315-WATT PANELS EACH, AND A 1.48 DC-TO-AC CONVERSION RATIO
ULTIMATE ACTUAL SITE ELECTRICITY YIELD TO BE QUANTIFIED BY PROJECT SOLAR CONTRACTOR.



vhb.com
vhb
40 IDX Drive
Building 100, Suite 200
South Burlington, VT 05403
802.497.6100

N
60 0 60 120
SCALE IN FEET

Vermont Electric Cooperative, Inc.
South Hero Solar Site
South Hero, VT

No.	Revision	Date	Appvd.

Designed by | Checked by

Issued for | Date

May 27, 2015

Not Approved for Construction

Drawing Title

Schematic Site Plan

Drawing Number

C-2

Sheet 1 of 1

Project Number
57703.00
57703-SP_052115_REVISIONS.DWG

Saved: Friday, May 22, 2015 5:26:43 PM TGINGRAS Plotted: Wednesday, May 27, 2015 9:03:20 AM Gingras, Tyler

Village of South Hero

Community Wastewater System - Lavin Property

Project Number: 1127-001, D5
Project Name: Community Wastewater Feasibility
Date: 4/29/2025
Input by: Drew Kiernan, Staff Engineer
Checked by: Robert M. Clark, P.E. - Principal Engineer

Groundwater Mounding Analysis

Darcy's Law for Movement of Water through Porous Media applied to Groundwater Mounding

Q=KiA =Ki(DxL)

Input Values:

K	20		Hydraulic Conductivity of the Soil (ft/day)
I	0.05		Hydraulic Gradient (ft/ft)
h	1.50	2.00	Depth to Redox or Impeding Conditions (ft)
		0.50	Minus 6-inch minimum free board at toe (ft)
		1.50	Available Transmitting Thickness (ft)
L	1.00		Solving for Linear Loading Rate (LLR)

Solve for Linear Loading Rate (LLR)

LLR	11.2	Linear Loading Rate (gpd/linear foot)

Solve for Thickness of Mound Sand

TP-24-14		Limiting Test Pit on Lot #6
	2.00	Depth to Limiting Condition (ft)
h	1.50	Induced GW Mounding (ft)
	0.50	Depth to Limiting Condition, Minus h (ft)
	3.00	Required Total Unsaturated Soil (ft)
D=	2.50	Required Mound Sand Thickness (ft)

Mound Design

Length	300	Length of Mound Bed / Trench (ft)
Width	10	Width of Mound Bed / Trench (ft)
N	1	Number of Trenches / Beds
Area	3,000	Area of Bed (ft^2)
Capacity of System	3,366	gpd
Calculated Application Rate	1.12	gpd/ft^2

Check Application Rates

Maximum Application Rate	2.00	gpd/ft^2
Is the Application Rate Acceptable?	**YES,CHECK IF PRETREATMENT IS REQUIRED BELOW**	
Maximum Linear Loading Rate	11.22	gpd/linear foot
Is LLR Acceptable	**YES,CHECK IF PRETREATMENT IS REQUIRED BELOW**	
Pretreatment Required	**YES, PRETREATMENT IS REQUIRED, CHECK TO SEE IF IT IS APPLICABLE**	
Pretreatment Required	**YES, PRETREATMENT IS APPROPRIATE**	