Wastewater Needs Assessment and Feasibility Study for Peacham Corner, Peacham, Vermont

FINAL REPORT

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This project is being performed by Stone Environmental, Inc. for the Peacham Fire District No. 1's Prudential Committee with funding provided by the Vermont Department of Environmental Conservation.

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EXECUTIVE SUMMARY

The Prudential Committee of Peacham Fire District No. 1, of Peacham, Vermont, received a planning advance from the Vermont Department of Environmental Conservation (VTDEC). Stone Environmental Inc. (Stone) was retained by the Committee using the VTDEC funding to conduct a wastewater feasibility study for the Peacham Corner area, located along the Bayley Hazen Road.

The overall goals of the study are to:

- Evaluate current environmental conditions relevant to wastewater treatment in Peacham Corner
- Conduct site-specific evaluations of Town-owned wastewater treatment systems serving the Town Hall and Post Office and the old Town Office building
- Identify current and potential future wastewater dispersal problems in Peacham Corner
- Articulate where wastewater treatment capacity exists in systems and soils in the Peacham Corner area, and where treatment capacity is needed to support current land uses and community goals
- Provide feasibility-level characterization of alternatives, costs, and potential funding sources

This draft report provides information about current conditions and the range of wastewater treatment needs in Peacham Corner.

Peacham Corner is a rural residential community located south of Danville. The study area includes 52 developed properties, most of which contain single-family residences. Property sizes range from less than 0.1 acre to over 27 acres. The entire study area covers about 120 acres.

Peacham Corner's natural features pose both opportunities for and limits to the construction and successful operation of onsite wastewater dispersal systems. The sloping topography allows for reasonable drainage, and the general absence of surface water features and wetlands means that there are fewer limits to where onsite systems can be located than is typical for Vermont villages. The soils that underlie the study area pose significant limitations for onsite systems, including areas of shallow groundwater and shallow bedrock. At a planning level, it appears that none of the soils in the study area are suitable for conventional on-site wastewater treatment systems; however, information gathered during individual wastewater treatment system evaluations indicates that the depths to bedrock indicated in the soil survey are generally conservative. Most properties in the study area are served by Peacham Fire District No. 1's community water system; an individual drilled well serves the Peacham Elementary School. In order to protect the drinking water, no onsite wastewater treatment systems can be constructed within a protective buffer zone surrounding wells or springs used as potable water supplies.

Peacham Corner's residences and amenities are all served by individual or shared onsite wastewater treatment systems. Information on the existing systems was gathered from Vermont Department of Environmental Conservation (DEC) Regional Office files, property owner survey questionnaires, interviews, and area site visits.

Stone conducted a needs assessment for the Peacham Corner study area to determine whether each individual property appears to be able support an onsite septic system under the current state wastewater dispersal rules. The assessment was conducted using planning level information, but was corrected to account for the results of individual system evaluations where appropriate. Unless permission was specifically granted by the landowner, no private properties were entered upon to gather data or confirm study results.

The needs assessment combined spatial information, such as topography and soils information, with local information like parcel boundaries, building footprint areas, locations of water supplies, and building uses, to determine what constraints each property might contain for onsite wastewater treatment and dispersal. The needs assessment results were confirmed by reviewing other sources of information collected during the study. This review resulted in an overall recommendation for each property of either maintaining and upgrading a system onsite, or connecting to an offsite solution.

Of the 52 parcels in the study area, there are 38 parcels that likely have the capacity to support an onsite wastewater dispersal system under the assumptions used in this report and under current State wastewater disposal rules. These parcels met all the environmental setbacks required by the Town and the state, as well as depth to groundwater and bedrock criteria. The GIS analysis estimated that 14 parcels could not support an onsite wastewater dispersal system. Of these parcels, 7 were constrained by only environmental setbacks and 5 parcels were constrained only by shallow groundwater. The remaining 2 parcels had a combination of setback and groundwater constraints. Despite the presence of relatively shallow bedrock in much of the Bayley Hazen Road area, the bedrock is not so shallow as to preclude the construction of some form of onsite wastewater treatment system, such as an at-grade system or mound, on many of the village's larger lots.

About a quarter (27%) of the properties within the study area could potentially benefit from an offsite wastewater treatment solution. Parcels with groundwater limitations are clustered at the north end of the village, while properties with area-related limitations are clustered at the main intersection and at the south end of the village.

Wastewater flow projections were developed for four different future scenarios of development in Peacham Corner, ranging from only development of the former Town Office and Bus Barn into a community store and café up to providing expanded capacity for large meetings in the current Town Hall and for the Church and residences in the northern part of the village where the needs assessment showed potential limitations. The projected flows were all less than 6,500 gallons per day, so all of the potential

alternatives were developed using the constraints of the Wastewater System and Potable Water Supply Rules.

A total of 13 different wastewater collection, treatment, and dispersal alternatives were developed, each of which would effectively treat and disperse the wastewater flow from one of the four scenarios. The alternatives each used the most passive, reliable, and appropriate collection, treatment, and dispersal systems as appropriate to Peacham Corner's size and natural limitations, and utilized existing infrastructure to the greatest extent feasible. The four scenarios are as follows:

- Scenario 1 includes only conversion of the former Town Office and bus barn building into a store and café.
- Scenario 2 adds current municipal facilities in the vicinity of the Bayley Hazen Road – Church Street intersection (the Town Hall and Post Office, the library, and the Peacham Historical Association's Historical House at 153 Church Street) to Scenario 1. This scenario assumes that the Town Hall continues in its current use, which is primarily for small public meetings of no more than about 60 individuals.
- Scenario 3 is similar to Scenario 2, except that the Town Hall is utilized for Town Meetings or other large public meetings of up to 200 individuals.
- Scenario 4 builds on Scenario 3 by adding the eight residential properties and the Peacham Congregational Church in the immediate vicinity of the Bayley Hazen Road – Church Street intersection, which were identified as potentially having limitations if their onsite wastewater systems were they to need replacement in the future.

After discussions with the Prudential Committee, nine of the alternatives advanced to the cost development stage. Preliminary estimates of project costs and annual operations, maintenance, and management costs were developed for each of the nine remaining alternatives, and an evaluation matrix was constructed to compare the alternatives using both cost criteria and qualitative criteria such as complexity of construction, implementation feasibility, use of existing resources, and adaptability to future growth. The alternatives within each wastewater flow scenario were ranked as "more" or "less" favorable relative to each other—but the true evaluation and final decision rests with the community, not with the project consultant.

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1. INTRODUCTION

The Prudential Committee of the Peacham, Vermont Fire District No. 1 received a planning advance from the Vermont Department of Environmental Conservation's Clean Water Act State Revolving Loan Fund to conduct a wastewater needs assessment and wastewater feasibility study for the Peacham Corner area located along the Bayley Hazen Road near the center of the Town (Figure 1).

The objectives of the study are to:

- Determine whether each parcel can support an onsite wastewater system that conforms to State regulations;
- Determine whether the existing wastewater treatment system serving the Town Hall and post office has capacity to allow new connections;
- Identify areas where construction of new onsite or offsite systems are needed, or would be necessary if new development occurs;
- Identify potential shared system sites;
- Develop and analyze engineering system and/or management alternatives;
- Prepare preliminary conceptual plans and cost estimates;
- Develop preliminary funding and user fees;
- Make recommendations on structural or management options; and
- Provide information to the residents and local officials on current and potential future conditions.

Stone Environmental Inc. (Stone) was hired to conduct this study. This final report provides information on each of the objectives listed above.

1.1. Education and Outreach

Education and outreach efforts are important in this study for several reasons. Many owners with onsite water supply and sewage dispersal systems are typically aware of what type of system they might have, and what they may need to know about how to properly use and maintain it. Beyond that, they may not understand that since older properties were developed, scientists, engineers, and regulators have learned more about how these systems function and about how, if installed in the wrong conditions or under the wrong design specifications, they can negatively affect groundwater and surface water quality.

An initial public meeting was held (August 18, 2009) on the basics of how systems work, how to maintain them, and how they can impact the environment and water supply wells. A handout describing this study and some basic information was developed prior to the meeting. (Appendix B). A property

owner survey questionnaire was also developed and distributed to the study area property owners along with the handout. The results of the survey are summarized in Table 1. The response rate for the surveys was 57% or 29 out of 51 surveys mailed (so 3% approximately equals one response). Besides collecting important information on sewage dispersal systems and water supplies, we asked whether property owners had any questions or concerns about wastewater needs in Peacham Corner. Most of the respondents left the question blank or had no comment (93%); one respondent (3%) expressed support for the current project, and one respondent expressed concern about limiting natural conditions in the village.

The wastewater treatment system that serves the Town Hall and post office was evaluated by Stone as a workshop open to residents of the study area and the general public on October 29, 2009 (see Section 3.4.2).

A second public meeting to present the results of the preliminary investigation was held on November 10, 2009. A third public meeting to present the overall results of the study was held in conjunction with the Fire District's Annual Meeting on February 9, 2010.

Another approach to outreach and education is an advisory committee. The Fire District No. 1's Prudential Committee acted as an advisory committee for this project; the members are all residents of Peacham Corner. The members of the Prudential Committee are listed in Appendix A. The committee met monthly during the course of the project to take part in more detailed discussions on the study scope and results.

2. STUDY AREA DESCRIPTION

The study area includes parcels within the service area of Peacham Fire District No. 1, commonly known as Peacham Corner, which is located on the Bayley Hazen Road near the center of the Town of Peacham. Peacham is located in Caledonia County in the northeast portion of the state. Figure 1 shows the Town and the study area in their wider geographical context. Table 2 includes a list of properties within the study area including parcel identification numbers, street addresses, owner names, property uses, and approximate parcel sizes.

2.1. Community Profile

Peacham is a rural residential community located between Danville and Groton in northeastern Vermont. The Town is bordered by Danville to the north, Barnet to the east, Groton to the south, and Marshfield and Cabot to the west. Peacham Corner is primarily residential, with a few small businesses and amenities, and is surrounded by woods and agricultural land.

The Town of Peacham's population has grown from 627 in 1990 to 665 in 2000 (US Census, 1990 and Peacham Town Plan, 2005). There was an approximately 6% increase in Peacham's population in this ten year period.

The Peacham Corner study area includes 52 developed properties with a total of about 120 acres. Forty-two properties contain single-family residences. There is a store with an apartment, two apartment buildings owned by Peacham Community Housing, Inc. and designated as senior/affordable housing, and the former Town Office and "Bus Barn" (also owned by Peacham Community Housing). There are also several public buildings including the Town Hall and post office, library, fire house, roller barn, the Peacham Congregational Church, a historic blacksmith's shop and a historical house curated by the Peacham Historical Association, and the Peacham Elementary School. Property sizes range from less than 0.1 acre to about 27 acres.

2.2. Natural Resources

Natural features can pose both opportunities for and limits to the construction and successful operation of decentralized wastewater dispersal systems. These features, such as topography, surface waters, and soils, are described below with particular attention to their impact on the potential for onsite wastewater dispersal in Peacham Corner. Figure 2 identifies environmental sensitivities within the study area.

2.2.1. Topography

The topography of the study area consists mostly of gently rolling terrain, sloping from west to east (Figures 1 and 2). The developed portion of Peacham Corner lies just east of the topographic divide

between the Winooski River and Connecticut River watersheds. Generally, elevations range from around 1500 feet above mean sea level (AMSL) at the eastern edge of the village where Macks Mountain Road leaves the study area, to a low of 1200 feet AMSL to the south and east—where the Bayley Hazen Road and Old Cemetery Road, respectively, leave the study area.

2.2.2. Surface Water and Wetlands

Although the Town of Peacham has eight significant lakes and ponds, several bogs, over 1,000 acres of wetlands, and miles of streams, there is little surface water within the village proper (Figure 2). The village sits at the watershed divide between Peacham Hollow Brook to the north and South Peacham Brook to the south. To the east of the village, an unnamed stream flows from north to south, eventually joining South Peacham Brook, while to the east of the village along Old Cemetery Road, another unnamed stream flows east from a small pond towards Peacham Hollow Brook. Both of these brooks flow to the east, ultimately joining to become the Stevens River and flowing to the Connecticut River along the Vermont-New Hampshire border. None of the streams or ponds in Peacham are currently listed on the state's impaired waters list (also known as the "303(d) list").

2.2.3. Soils

There is a range of soil types in the study area. Soils vary based on geologic material, slope, hydrology, human disturbance, and other factors. The best generalized source of soils data for this area is the Soil Survey Report of Caledonia County prepared by the Natural Resource Conservation Service (NRCS). The NRCS data was derived by mapping the landscape with spot field checks to arrive at an approximate level of resolution of 3 acres, with acknowledged inclusions of other soils. This report describes the soil series, or groups of soils with common properties, found in the study area.

The NRCS soils information is planning-level data, and the 3-acre resolution means that it is not very precise for small parcels of land. Site-specific testing, including backhoe test pits and/or percolation tests, would be required to determine the proper wastewater treatment options for an individual property.

For the purposes of this assessment, we are primarily concerned with the properties of the soils that determine suitability for the siting of onsite septic systems: depth to seasonal high groundwater, depth to bedrock, soil permeability, and slope. Figure 2 shows the soils in the study area and vicinity. Soil characteristics are summarized in Table 3.

There are significant portions of Peacham Corner Village that have limited suitability for conventional subsurface wastewater dispersal systems. Based on the NRCS soils information, it appears that none of the land in the study area is suitable for a conventional in-ground wastewater treatment system under current State rules. Approximately 29% of the study area would require either at-grade systems or conventional systems with pretreatment, primarily to overcome limitations due to shallow bedrock—

especially on properties located along Church Street and at the south end of the village. The majority (about 52%) of the study area, especially along the Bayley Hazen Road and Macks Mountain Road, would require either mound systems or at-grade systems with pretreatment—again, to overcome limitations due to shallow bedrock. About 8% of the study area, primarily located near the elementary school, would require both some form of advanced pretreatment and a mound dispersal system, primarily to overcome limitations due to high seasonal water tables. Finally, about 11% of the land in the study area, mostly to the east along Old Cemetery Road and north of the main intersection in the village, would require some form of 'best fix' solution. 'Best fix' means that if the property is already developed and its wastewater treatment system fails, it may not be possible to construct a replacement system that meets all of the conditions of Vermont's current wastewater treatment rules. If a property with these difficult soils is undeveloped, it may not be developable.

2.2.4. Water Supplies

Onsite wells can limit onsite wastewater capacity because of the required protective setbacks between water supply wells and wastewater dispersal systems. Most properties in the study area are served by a community water system operated by Peacham Fire District No. 1. The community water system serves properties within the village of Peacham Corner, as defined in 1927. The water supply for the community water system consists of two springs and two drilled wells that are located approximately 5,000 feet west-northwest of the village, at an elevation of about 1,550 feet AMSL.

The only property within the study area not served by the community water system is the Peacham Elementary School, which has its own drilled well that is permitted by Vermont DEC as a non-transient, non-community water supply. This well has a mapped wellhead protection area that represents a 500-foot radius from the well's location (Figure 2). In addition, a wastewater system and potable water supply permit has been issued by Vermont DEC for the Northeast Kingdom Observatory Foundation's proposed observatory and classroom on a lot immediately to the south of the Peacham Elementary School; when constructed, the observatory will be served by an individual drilled well.

2.3. Zoning Districts

The study area lies entirely within the Village One zoning district. Peacham's 2005 Zoning Bylaws state that

> Peacham's villages are the population centers of the town. They contain the churches, schools, the library, the municipal building, the stores, the ball field and they are the social centers. Growth should be concentrated within or adjacent to the village centers, leaving open surrounding land undeveloped. It is important to preserve and promote the

residential and historic character of the villages. Village One contains the areas of Peacham Corner, South Peacham and East Peacham.

Minimum lot sizes in the Village One district are 1.0 acre for each family dwelling unit or principal structure—significantly smaller than in other districts in the Town.

3. HISTORIC AND CURRENT WASTEWATER TREATMENT

Peacham Corner is served by individual and shared onsite wastewater dispersal systems. There are no wastewater treatment plants or sewers in the study area. Information on the existing sewage dispersal systems was gathered from state Regional Office files, the property owner survey questionnaires, interviews, and area site visits.

This section begins with some general information on onsite wastewater dispersal systems, how they function and need to be maintained, and some information on newer components, including advanced treatment systems, which can improve wastewater treatment where soils contain limitations. We will then discuss the information gathered from permit files and other sources, as well as the information collected from the surveys and from evaluations of Town-owned and privately owned wastewater treatment systems in the study area.

3.1. Onsite System Components and Maintenance

Onsite wastewater dispersal systems, when properly sited, installed, and maintained, can be a long-term effective means of wastewater treatment and dispersal. However, they can negatively impact surface waters and groundwater when they malfunction or when they are placed too close to the groundwater table or surface waters.

3.1.1. Wastewater Treatment and Distribution

The traditional onsite septic system in the study area (and around Vermont) includes a 1,000 gallon concrete septic tank, a concrete distribution box, and a leach bed or leach trenches. The septic tank settles out the solids and provides some treatment; the distribution box splits the flows evenly between pipes or trenches, and the leach bed or trenches (made out of crushed stone or alternative materials with perforated pipe covered with filter fabric) along with the unsaturated soils below the system provide the final distribution and treatment.

Effluent filters can now be added to the outlets of septic tanks, and are required on new tanks. These filters screen solids from the effluent when it leaves the tank. If the tank is full of solids, the filters will plug and the system will slow or back up before solids leave the tank and enter the dispersal field. The filters need to be hosed off usually once a year.

Pump stations can be added after the septic tank if the dispersal field is higher in elevation than the building outlet, or for mounds, at-grade systems, and advanced treatment systems. Pressurizing the dispersal field also allows for improved distribution of the effluent, making more efficient use of the entire field and preventing overloading of a portion of the field.

Advanced pre-treatment components can be added after the septic tank to improve wastewater treatment prior to dispersal. Pre-treatment components may also allow for increased capacity of onsite systems, which maximizes available soil resources, or may allow for the use of sites not previously approved under the Rules. Since August 2002, the Vermont Environmental Protection Rules (Rules) have contained a process through which pre-treatment technologies can be approved for use in the state. Since the revised Rules were implemented, several different technologies have been approved by DEC and are available for designers to consider (a list of all approvals can be found at http://www.anr.state.vt.us/dec/ww/innovative.htm). A designer should think about the availability of component parts, local service providers, and ongoing operation and maintenance costs when considering or recommending any particular component. Pre-treatment technologies can add $5,000-$10,000 to the construction cost of a system, and because they need to be maintained regularly in order to operate properly, their ongoing costs are often higher than those of a conventional septic system.

3.1.2. Wastewater Dispersal Options

Traditional wastewater dispersal options in Vermont include drywells, in-ground leachfields, and mound systems. The survey responses indicated that approximately 10% of the respondents had drywells, which typically follow septic tanks and consist of concrete cylinders with open bottoms and holes in the sides, surrounded by stone, which holds the wastewater until it disperses into the ground. Two concerns with drywells are that they typically contain a small volume and can be undersized for their intended uses, and that they are usually quite deep in the soil profile, sometimes close to 10 feet. For drywells to comply with current regulations, the soil conditions must be suitable at a depth of four feet below the system. These conditions are unusual on many Vermont sites, including the soils identified in the study area.

Most people are familiar with in-ground leachfields and mound systems. Both systems utilize either trenches or beds that either contain distribution pipes and crushed-stone or prefabricated leaching chambers. These dispersal options both provide treatment in the vicinity of the interface between the trenches (or bed) and the soil, and in the unsaturated soil beneath the trenches (or beds). A traditional leachfield is usually dosed by gravity, where effluent flows from the septic tank to the leachfield based on how much water flows into the septic tank from the structure. An in-ground leachfield requires 36 inches of unsaturated soil between the bottom of the leachfield and groundwater, and 48 inches to bedrock. Since the trenches are usually 24 inches deep, this means at least 5-6 feet of good soil are needed for an in-ground leachfield to work properly.

A mound system is used where soil conditions are more limited. Unlike in-ground leachfields, they are dosed using pressure, usually from a pump tank or siphon placed between the septic tank and the dispersal field. The “mound” is built out of specified sand fill material that meets certain technical requirements, and which provides additional unsaturated soil for wastewater treatment between the gravel bed or trench and the limiting condition (groundwater or bedrock). To be used without any additional pretreatment, a

mound system needs at least 18 inches of undisturbed, unsaturated soil between the ground surface and the groundwater or bedrock.

Some newer wastewater dispersal options in Vermont include at-grade systems and subsurface drip irrigation. At-grade systems are dosed using pressure, like a mound system, but the gravel trenches or bed are built on the existing soil surface and then covered with non-specified fill material and topsoil. This material can either be moved from another part of the site or brought in from off-site. Since the trenches are built on top of the existing ground surface, they need 3 feet of unsaturated soil (less than is needed for an in-ground system). Subsurface drip irrigation was approved in Vermont in 2007, and uses small-diameter, flexible tubing with widely spaced "emitters" to distribute treated wastewater effluent. Because of the small diameter of the emitters, wastewater must be pre-treated using an advanced treatment technology if subsurface drip dispersal is to be used. However, this technology can be installed without the use of gravel beds, making it a viable option in small spaces where earth-moving equipment cannot gain access. Since pre-treatment is required, subsurface drip irrigation can be used as a filtrate system (see below).

If advanced pre-treatment technology is used on a septic system, Vermont's Rules allow the use of a dispersal system called a filtrate system. The term "filtrate" acknowledges that the pre-treatment component has already done much of the work that the soil would normally do in a traditional septic system, and so less treatment is required of the soil. Filtrate systems may consist of any approved wastewater dispersal technology, but smaller sizes are allowed (up to ½ the area of traditional in-ground leachfield, at-grade system, or mound system), which can be important on small lots. Pre-treatment may also eliminate the need for a mound system in situations with shallow groundwater or bedrock limitations, since reductions in the vertical separations to limiting soils are also gained when pre-treatment is used.

Vermont's Rules also allow for the design and permitting of performance based systems on sites with 18 inches of soil above bedrock and as little as 6 inches of soil above the seasonal high water table. These systems almost always involve advanced pre-treatment and a mound wastewater dispersal system, and the Rules require significant monitoring and reporting to ensure that the systems operate properly.

3.1.3. Operation and Maintenance of Wastewater Treatment Systems

Operation and maintenance of conventional sewage dispersal systems is quite simple. Operation or use of the system can be greatly enhanced by the use of water conservation devices and developing appropriate habits, such as only doing one load of laundry a day and eliminating in-sink garbage disposals. Keeping records of the locations of buried components, tank pumpouts, and repairs can be crucial during a system inspection and is invaluable information for future owners of the system.

Maintenance on conventional systems consists of having someone check the levels in the septic tank and pumping it out when necessary. For the homeowner, this usually means calling the septic tank pumper and always paying for a pumpout, whether it is really necessary or not; homeowners can avoid this unnecessary expense by checking the tank themselves. Depending on the use of the system, it may need to be pumped every year to every seven years. The condition of the tank, particularly its baffles and access, should also be inspected. If there are multiple tanks or pump station tanks, these should be inspected regularly and pumped when necessary due to the accumulation of solids greater than 25-33% of the tank volume. Any electrical parts should be inspected and tested yearly. The effluent filters also need to be checked and cleaned on a yearly basis, with greater or lesser frequencies in specific situations depending on use.

Maintenance of tanks is a lot easier when access to the tank is not a problem, as is the case when the tank is buried under a couple of feet of soil. If the top of the tank is deeper than 12 inches below the surface, access risers should be installed on the tank. In the past the risers were constructed of thick heavy concrete, but lightweight plastic and fiberglass materials for risers are now available, although child safety must be considered.

Another maintenance item is to check the distribution box and make sure all of the outlet pipes are level. If this box is not level (which can easily happen in Vermont's freezing climate), one portion of the dispersal field may be overloaded while other parts go unused. There are plastic devices available that can easily be installed to make the outlet pipes level.

The dispersal field itself should be checked for seepage or surfacing of effluent, or for water loving plant growth, the roots of which can clog pipes. If there is untreated wastewater surfacing or discharging into a ditch or surface waters, there is a real public health hazard that should be addressed immediately. Although not typical in Vermont, some dispersal fields (leach fields) include monitoring pipes so that the stone in the dispersal field can be checked for ponding. Some ponding of treated wastewater in the field can be acceptable, but if the system has a thick clogged mat or is being hydraulically overused the wastewater system may surface or back up.

As septic systems become more complex, it becomes even more important to make sure that they are operating properly. Since the more complicated systems are often installed to overcome difficult site conditions, like shallow groundwater, there is less of a 'margin of safety' if the system malfunctions before sensitive resources such as shallow groundwater are negatively impacted. Systems that use pumps to distribute wastewater effluent, like at-grade or mound systems, should be checked at least once a year to make sure that the pumps are cycling and operating properly. The maintenance requirements for pre-treatment systems vary with the permit requirements of the individual technology, but should include at least one inspection per year. Most technology manufacturers sell maintenance contracts with their systems to ensure that the pre-treatment units keep functioning properly after they are installed, and most

users of these technologies are required to have a current maintenance contract as a condition of the system's permit.

3.2. State Permit Programs & File Reviews

Given the age of most structures in Peacham Corner, it was not surprising that permits were not found for most properties in the village. Permits were found for a few residences, particularly where renovations included changes to the septic systems. Permits were found for all public buildings in the study area, except for the Congregational Church and the store. Stone conducted a review of the files at the District 7 Regional Office in St. Johnsbury and the on-line permit database. A summary of the available permit information is shown in Table 4.

3.2.1. Town Permits

The Town of Peacham records State (DEC) permits in their paper files and land records. However, the Town has never had a separate sewage ordinance or officer. Since Town permits essentially duplicate information available in the State permits, the Town's permit files were not reviewed further.

3.2.2. State Permits

Stone reviewed the DEC permit files in the St. Johnsbury Regional Office for permits for public buildings (almost any occupied building except a single family residence) and for subdivisions that are less than 10 acres in size (since 1969). A total of 18 permits were found for 13 parcels in the study area. Most of these permits were for subdivisions or renovations of existing buildings, particularly those associated with the former Peacham Academy (now senior housing and the Town Hall/post office), the Peacham Library, and the Peacham Elementary School. Several permits are for the construction of new systems as part of renovations, as for the system serving the expanded Peacham Elementary School and for the lot on the southwest corner of the Bayley Hazen Road/Church Street intersection.

3.3. Property Owner Survey

The main goal of the property owner survey was to obtain information regarding existing septic systems. The survey was mailed to Peacham Corner area property owners in early September 2009. Of the 51 surveys sent, we received responses from 29 owners (57%). Table 1 contains a summary of the responses.

The data collected from the individual surveys were very useful to the project consultants during the assessment process. The survey provided information about ages and types of septic systems, when septic tanks were last pumped, and whether the owners had made repairs or had plans on file.

Approximately 20% of the respondents' onsite systems were constructed prior to 1982, when the first major technical design standards for Vermont were published. Fifty-two percent of the properties contained leach fields, and three respondents (10%) had drywells. Three mound systems were identified in the study area. At least four of the septic tanks were two or more feet below grade, which means they are difficult to access unless they have access risers on the tanks, and it means that the leach fields may be deeper in order for gravity flow to reach the field. Only about a quarter of the responding property owners (24%) said they have a copy of the sketches, plans, or permits for their system.

Three questions were directed towards maintenance of septic tanks and system repairs. Approximately a third (34%) of the respondents indicated they pumped their tanks every 1 to 5 years. About half (54%) indicated they had pumped their tank since 2000. Twenty-four percent of the respondents indicated upgrades or repairs to their systems within the last ten years.

Respondents were generally satisfied with the operation of the community water supply system, and most had received a copy of the most recent Annual Report for the water system, which was delivered to Peacham Corner residents by members of the Prudential Committee in July 2009.

3.4. Individual System Evaluations

Several onsite and shared wastewater treatment systems serving several Town-owned and private properties in Peacham Corner either have been evaluated recently by other consultants, or were evaluated by Stone staff. The following sections describe these evaluations, as well as findings and recommendations where applicable.

3.4.1. Peacham Community Housing System Evaluation

An engineering evaluation of the water supply and wastewater treatment systems serving the Peacham Community Housing buildings was originally to be a part of this project, but was instead commissioned by Housing Vermont, Inc. in the spring of 2009. The evaluation was performed by Donald Marsh, P.E., of Marsh Engineering Services (Marsh) in June 2009, and summarized in a letter report dated July 9, 2009.

The system was constructed and permitted in 1982 and consists of a 6-inch diameter sewer collection line from the elderly housing units and two private homes to three 2,500-gallon concrete septic tanks located on the east side of the Bayley Hazen Road. The septic tanks are followed by a dosing station containing two 1,500-gallon tanks and a siphon intended to convey a 1,000-gallon dose per cycle to the dispersal fields, which consist of two 14' by 375' seepage beds located in the Town recreational field. The seepage beds are intended to be alternated annually, by switching a gate valve located at the center of the fields. This system was designed to treat and disperse 4,000 gallons per day of wastewater. The letter report states that current connections (10 units / 11 bedrooms of senior housing, one three-bedroom home, and

one four-bedroom home) represent design flows of approximately 2,500 gallons per day—well within the system's capacity.

Marsh's 2009 evaluation found that, despite lack of completion of repairs to the system's dosing siphon that were recommended in 1995, and lack of recent septic tank pumping or field alternation by the property manager, the dispersal fields continue to function remarkably well. The letter recommends that the siphon be replaced with a more reliable dosing system, and that the septic tanks be pumped. The siphon replacement is considered maintenance, and as such does not require a permit from the Vermont Department of Environmental Conservation.

3.4.2. Town Hall / Post Office System Evaluation

An engineering evaluation of the wastewater treatment system serving the Peacham Town Hall and Post Office was conducted on October 29, 2009 as a workshop open to the public. The evaluation was performed by Bruce Douglas, P.E. and Brent Toth of Stone Environmental, Inc. Also present at the evaluation were Amy Macrellis of Stone, Diana Senturia and Larry Jensen of the Peacham Fire District No. 1's Prudential Committee, Donald Robisky of the Vermont Department of Environmental Conservation, Mark Moore of Peacham, and Mark Simikaski and Mary Burleigh of the Groton Planning Commission.

In preparation for the evaluation, the following documents were collected and reviewed:

- Peacham Town Office and Post Office Wastewater Dispersal System design basis and plans (Dufresne-Henry, Inc., dated October 1989)
- Land Use Permit PB-7-0259 (Water Supply and Wastewater Disposal Permit for the Elementary School)
- Wastewater Permits WW-7-0109 and WW-7-0110 (Water Supply and Wastewater Disposal Permit for the Town Hall and Post Office)
- Wastewater Permit WW-7-0344 and amendments -1 and -2 (Water Supply and Wastewater Disposal Permit for the Peacham Elementary School, with new system serving the School)

The wastewater treatment system serving the Town Hall and Post Office was permitted in October 1989 as a replacement for an existing, malfunctioning system serving the existing Peacham Academy gymnasium. The system consists of a 1,500-gallon septic tank, a 1,500-gallon pump station with simplex pump set to dose the dispersal field once each week, and approximately 1,640 feet of 1 ½" diameter Schedule 40 PVC pressure line which connects to existing leach trenches which were originally permitted in 1980 to serve the Peacham Elementary School.

The dispersal field's basis for design, per plans dated October 1980 by Truline of St. Johnsbury, Vermont, was for a total of 60 students at 20 gallons per day (1,200 gallons per day). The dispersal field consists of seven leach trenches, each 100' long and two feet wide, with 18" of crushed stone beneath the pipe.

When the Town Hall and Post Office were connected to the existing leach trenches in 1989, the permit and engineering report stipulated that while the design accommodated a flow of 1,000 gallons per day, this was considered a maximum for certain town events (i.e., Town Meeting), and that everyday usage of the system would be three employees (45 gallons per day). A subsequent permit was issued for the Peacham Elementary School's system, reducing that permittee's capacity allocation by three students (or about 45 gallons per day).

In 1993, the Elementary School was expanded to accommodate a maximum of 110 students. As part of that expansion, a new wastewater treatment system for the School was permitted in April 1993 with a design flow of 2,200 gallons per day. The new system consists of septic tanks, a dosing siphon, approximately 950 feet of 4-inch diameter PVC force main, and a dispersal field consisting of four in-ground leach trenches, each 115' long, 4' wide, and 16" deep, buried approximately 9 inches below grade. The Elementary School's existing connection to the leachfield shared by the Town Hall and Post Office was abandoned once the new system was constructed; however, the Elementary School continues to utilize its existing drilled well, which was installed in 1968. This well is permitted by the Water Supply Division of the Vermont DEC as a non-transient, non-community water supply, and ongoing water quality testing is required as a condition of the permit.

During the workshop, Stone staff uncovered and evaluated the tanks serving the Town Hall / Post Office system. The septic tank was easily located, as it had been pumped approximately two weeks prior to the evaluation. The septic tank was not full of effluent at the time of the evaluation. The tank contained 6 inches of loose organic material and 18 inches of clear water. There was some evidence that liquid levels in the tank may have overflowed the baffle at some point in the past.

The pump tank is, as shown on the plans, a single chamber tank with pump. The pump tank contained approximately 6 inches of water at the time of evaluation. Stone triggered the pump cycle float, and the pump operated properly. Stone triggered the high water alarm, and the interior alarm operated properly but the exterior alarm light did not. Stone recommends that the light bulb in the exterior alarm be replaced. Later conversations with the Prudential Committee and Town staff indicated that the exterior alarm is likely tied to the Town Hall's thermostat rather than to the high water alarm.

An air release valve is located at the high point in the force main line, just off the southwest corner of the parking lot. The manhole cover was opened, and when the effluent pump was triggered, the air release valve was observed to operate properly. However, it is clear that the valve had not been maintained or evaluated for some time prior to the current inspection. The concrete vault in which the air release valve

is housed is not insulated, and the top of the concrete vault is not sealed to its base. This may be one reason that the system experiences periodic freezing in the winter months. Stone recommends that the air release valve be backwashed with clean water, and that bags of loose insulation be packed around the valve to protect against freezing.

The workshop participants walked the route of the force main from the air release valve vault east-southeast across the Bayley Hazen Road to the Elementary School baseball diamond. Although the forcemain was designed with clean-outs marked by metal markers at regular intervals (about every 120 feet), only one of the cleanouts was located—a highly visible PVC riser in the Elementary School playground, where the Town Hall / Post Office system's force main tied in to the School's septic tank effluent pipe prior to the dispersal field. Stone recommends that additional time be taken, if possible, to locate the cleanouts and clearly mark them.

The leach trenches serving the Town Hall / Post Office system were approximately located; however, the distribution box (if any) could not be located. The trenches appear to begin approximately 24 inches below grade in the eastern half of the baseball diamond. The baseball diamond itself is relatively recent (constructed within the last 10 years); it is not clear whether that construction impacted the functioning of the leachfield in any way.

A hand auger soil boring was advanced in the overgrown area several feet east of the leachfield; within the boring redoximorphic features (soil color evidence that the soils are periodically saturated with water) were observed in brown-gray, fine sandy loam soils approximately 2 feet below ground surface. The soils became increasingly fine-textured and moist with depth, until wet silt loam was encountered at 57 inches below ground surface. Refusal was encountered at 64 inches below ground surface. However, it is not clear whether this soil boring is truly representative of conditions beneath the leach trenches, as the extent of earth-moving activities during the construction of the new baseball diamond is not known.

3.4.3. Peacham Corner Guild and Bus Barn System

An informal evaluation of the wastewater treatment system serving the Peacham Corner Guild was conducted by Brent Toth of Stone on October 25, 2009. Diana Senturia of the Peacham Fire District No. 1 was also present for the evaluation. The property is owned by Peacham Community Housing, Inc. and currently serves as a craft store and the offices of the Peacham Historical Association. The craft store is open seasonally, while the offices are open year-round. No permit history was available for the system. Stone staff was able to locate the septic tank, which is located in front of the old "bus barn" that adjoins the store to the north. The tank is made of metal, of unknown capacity, and is deteriorating due to rusting of the tank. The extent of the tank could not be determined with a probe due to compaction, ledge, and/or rocks surrounding the tank. The building sewer leading to the tank was located, but no effluent piping leading from the tank could be located. The tank may be bottomless, or a dispersal field could be located

beneath the existing parking lot. This is a potentially dangerous situation--if the metal top of the tank were to collapse, a significant safety and health hazard would occur. The post-and-chain system already in place around the tank should be maintained to prevent pedestrian and vehicle traffic.

The available area for a wastewater treatment system on the property is limited to the area in front of the store and bus barn; the property boundary coincides with the drip-line of the roof on the north, west, and south sides of the lot.

During the evaluation, the Town's desire to change the use of the building to accommodate a small store and café with outdoor seating was discussed.

3.4.4. Private System Evaluations

Evaluations of privately owned onsite wastewater treatment systems located in Peacham Corner were offered as a "free" service during the preliminary investigation phase of the project. This service was announced at the start-up meeting in August, and a question in the property owner survey gauged property owners' interest in taking advantage of the service. It was stressed in all cases that the project consultants would take care to keep evaluations confidential, and would only report results in ways that respected the privacy of individual property owners.

Eight evaluations of private onsite wastewater treatment systems serving individual properties in Peacham Corner were conducted by Brent Toth of Stone, with property owners present, in October 2009. In all cases, Stone was able to locate septic tanks. Septic tanks were generally in good condition, and all but one of the tanks did not need to be pumped at the time of evaluation.

Two of the systems evaluated contained pump stations, and in both cases the pumps and alarms were operating properly.

Conventional in-ground leach trenches, drywells, and mound systems were all encountered during the evaluations. In all cases but one, these systems appeared to be operating properly. One dispersal system consisted of a pipe from the septic tank to ground surface, with the pipe outlet surrounded by an area devoid of vegetation. The property owner was advised that this system appears to be a health hazard and a failed system per Vermont Environmental Protection Rules, Chapter 1 (§1-201(a)(24)(C)), and therefore will require a permit under these rules (§1-303(10)). Furthermore, the property owner was advised that he/she should contact the Vermont Department of Environmental Conservation regarding permit requirements.

In many cases, it appeared that adequate undeveloped area existed on the lots evaluated such that, if the dispersal systems currently serving the properties were to malfunction, it was likely that a replacement

system could be sited and constructed. In at least one case, however, an extremely small lot size may cause difficulty if the existing dispersal system were to malfunction in the future.

When time allowed, hand auger soil borings were advanced in the vicinity of probable replacement areas on several lots. The soils encountered were generally consistent with the soils mapped on Figure 2, though in several instances historic fill material was encountered rather than undisturbed soil. Depths to bedrock or refusal encountered with the hand auger soil borings were consistent with the range of depths to bedrock reported in the Caledonia County Soil Survey for the mapped soil series in the study area.

4. NEEDS ASSESSMENT

The needs assessment portion of this study includes a data-driven Geographic Information System (GIS) analysis that combines spatial information, such as USGS topography and NRCS soils information, with local information such as parcel boundaries, building footprint areas, and building uses, to determine what, if any, constraints a property may contain for onsite wastewater treatment and dispersal. The results of the GIS analysis are indicated on Figure 3 by colors summarizing the key constraint(s), if any, for each property.

The results of that analysis were confirmed and refined by including all other sources of information collected and described in Section 3. This review resulted in an overall recommendation for each property of either maintaining and upgrading a system onsite, or potentially connecting to an offsite solution. The property-specific recommendations do not necessarily reflect the current actual conditions of the individual wastewater treatment systems in the study area. A recommendation of "connecting to an offsite solution" simply means that, if an individual system were to fail in the future and need replacement, it may be difficult to site a replacement system on the property that meets all of the setbacks and separation distances that are required by the current State wastewater rules. The results of this assessment are summarized on Table 5 and on Figure 3.

Following is a detailed description of the Needs Analysis and a summary of the results for the study area.

4.1. Data-Driven GIS Needs Analysis

The Needs Analysis was performed to identify parcels that may not be suitable for onsite septic systems. There are two main components to the needs analysis: an "available area" analysis and a "required area" analysis, each of which is described below.

The objective of the available area analysis was to identify which developed parcels would be constrained by inadequate lot size if required to install an upgraded onsite system. There are many factors that result in areas of a parcel being unavailable for construction of an onsite system. For example, state and local regulations require that certain "setbacks" or distances from natural or artificial features be maintained in order to protect those resources. One such setback is a required separation of 50 feet from surface waters such as ponds or streams. It is because of setback regulations that the total area on a parcel is significantly reduced when determining which areas are suitable for onsite systems. A second and equally important part of determining if a parcel has enough suitable land area to support an onsite system is the analysis of the soil conditions on the parcel to determine the area required to treat the wastewater flows from the parcel. Both the determination of available area and that of required area for onsite systems for each developed parcel were addressed. The last step identified those properties with soil conditions where the seasonal high groundwater table was 24 inches or less or where the depth to bedrock was less than 24 inches. Both of these conditions impact the type of onsite system that may be built.

The following assumptions and criteria were used to conduct the needs analysis.

4.1.1. Available Area Analysis

The first step in the assessment of suitable areas was to determine the available area on each developed parcel. This process involved both analyses of GIS data to identify areas unsuitable for onsite system development, as well as complex database operations to identify parcel features that might further limit onsite system development. The table below lists each of the setbacks of features examined in the available area analysis. Each of these features will be briefly discussed.

Area Analysis Criteria

Feature	Required Setback (ft)
Surface waters (ponds and streams)	50
Top of embankment, or slope greater than 30%	25
Bedrock Escarpments	25
Property line	25
Foundation, footing, or curtain drains (assumed around structures)	35
Zone 1 Source Protection Area-School Well	500

Source: Vermont Environmental Protection Rules, Wastewater System and Potable Water Supply Rules, 2007.

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1. Surface Waters: Streams and ponds were identified from the Vermont Hydrography dataset. These lines and areas were spatially buffered with the indicated setback distance using GIS.
2. Top of Embankment, or Slope greater than 30%: Areas with slopes of greater than 30% were identified from the GIS Digital Elevations dataset. These areas were spatially buffered with the indicated setback distance using GIS.
3. Bedrock Escarpments: Bedrock Escarpments were obtained from the Caledonia County soils dataset. Escarpments were spatially buffered with the indicated setback distance using GIS.
4. Property Lines: Property lines were obtained from the Peacham GIS parcel dataset. Property lines were spatially buffered with the indicated setback distance using GIS.
5. Water Supplies: Water supply information was collected from spatial data sources and from permit files. Spatial well locations and wellhead protection areas (for the Elementary School well) were obtained from the State Water Supply GIS dataset. The water supply point was spatially buffered with the indicated setback distance using GIS.
6. Building Footprints: Building footprints were estimated from the available orthophotographs and e911 structure locations. No structure footprint data were available for the study area, so building footprints were estimated by creating square polygons with area of 900 square feet

at the location of each e911 structure. The building footprints were buffered using GIS, and their areas were included in the analysis as areas unavailable for onsite systems.

7. Available Area Calculation: The total available area for a parcel was determined by subtracting an assumed building footprint area from the area of the parcel outside the required setback buffers as calculated by the GIS analysis. This calculation is shown in the following equation:

   Area Available = Parcel Area – Required Setback Buffer – Building Footprint – Wellhead Protection Area Buffer

4.1.2. Required Area Analysis

The required area for construction of an onsite system was determined from two primary pieces of information: 1) soil properties (percolation rates and long-term acceptance rates) for each parcel, 2) design parameters for each onsite system. Assumptions made regarding the determination of each of the inputs to the required area calculation are described below.

4.1.2.1. Soil Properties

Percolation rates and long-term acceptance rates (LTAR) were calculated for each soil type within the study area. We assigned average percolation rates using the soil textures from the NRCS soils data and the average rates listed in the Vermont Indirect Discharge Rules. Each parcel was assigned the properties of the predominant soil type for purposes of determining the required area.

4.1.2.2. Onsite System Design Assumptions

Where suitable soils existed, the onsite system was assumed to be a standard trench leach field design. The standard Vermont Wastewater System and Potable Water Supply Rules long-term application rate (LTAR) effluent loading rates were used in the sizing of the leach field. A standard three-foot wide trench, with four feet separation was used as the typical layout. This resulted in a range of areas needed for the leach field depending on the soil's assumed percolation rate. For soils where only mound systems would be feasible, an estimate of the required area for a mound dispersal system was calculated using the LTAR values for mounds specified in the Rules. It was assumed that if a leach field (or mound) could be successfully sited on the property there was adequate area for other system components, such as septic tanks and distribution boxes.

4.1.3. Area Analysis Assessment

The available area for an onsite system was compared to the required area for each parcel. The required area for a system was based on the predominant soil type on the parcel. Parcels were identified as area

limited if the available area was less than the required area. Parcels were identified as being unconstrained by area when the available area was greater than or equal to the required area.

4.1.4. Seasonal High Groundwater Analysis

An additional GIS analysis was conducted for parcels with potential groundwater limitations. Soils with groundwater depths of less than 24 inches would require a raised system, such as a mound, and would indicate a constraint to a typical subsurface system. A parcel was identified as having a groundwater limitation if the area of the parcel with a groundwater depth of greater than 24 inches represented an area smaller than that required for a conventional onsite system. This analysis may overestimate site limitations regarding depth to groundwater, as it does not account for filtrate systems, alternative systems, or desktop hydrogeologic analyses that may be used under the Wastewater System and Potable Water Supply Rules.

4.1.5. Depth to Bedrock Analysis

Depth to bedrock was assessed to identify parcels with potential bedrock limitations. Parcels with shallow bedrock, of less than 24 inches, would require additional fill to allow an onsite system to function properly. A parcel was identified as having a bedrock limitation if the area of the parcel with a depth to bedrock of greater than 24 inches represents an area smaller than that required for a conventional onsite system.

4.2. GIS Analysis Results

The results of the analysis are represented on Figure 3 and summarized in Table 5. The factors affecting the analysis results are included in the table.

Of the 52 parcels in the study area, there were 38 parcels that can support an onsite wastewater dispersal system under the assumptions listed above. These parcels met all the environmental setbacks required in the Area Analysis Criteria table in section 4.1.1 as well as the depth to groundwater and bedrock criteria described in Sections 4.1.4 and 4.1.5.

There were 14 parcels that the GIS analysis estimated could not support an onsite wastewater dispersal system. Of these parcels, 7 were constrained by only environmental setbacks, 5 parcels were constrained by only shallow groundwater, and none were constrained by only shallow bedrock. The remaining 2 parcels had a combination of setback and groundwater constraints.

One parcel, located immediately west of the Peacham Elementary School, is constrained only by the area restriction of proximity to water supply. No parcels were constrained by the area restriction of proximity to surface waters, but six were constrained by setbacks from structures and property lines. Two of these

parcels were also constrained by shallow groundwater. The remaining five constrained parcels had adequate area available for a potential replacement system, but are constrained by shallow groundwater.

4.3. Lot-by-Lot Review and Recommended Solutions

Once the results of the GIS analyses were produced, a lot-by-lot review was conducted. This review included using all of the additional information known about the properties, confirming the results of the GIS analyses, and developing recommended solutions for each parcel. Onsite solutions are recommended for most properties that did not have any constraints identified in the GIS analyses.

The results of the needs assessment for Peacham Corner (Figure 3 and Table 5) indicate that about a quarter (27%) of the properties could benefit from an offsite wastewater treatment solution. Some of these properties, such as the old Town Office, are sites with known current limitations or constraints. On other (particularly residential) properties, the current wastewater treatment systems may be functioning adequately, but these properties may face challenges siting replacements if their systems were to malfunction in the future. Parcels with groundwater limitations are clustered at the north end of the village, while properties with area-related limitations are clustered at the main intersection and at the south end of the village.

5. WASTEWATER TREATMENT DESIGN CRITERIA AND CLUSTER SYSTEM OPTIONS

Onsite and offsite wastewater treatment systems currently come under a number of different state regulations. In the following pages, design considerations for individual onsite and small and large community cluster wastewater collection, treatment, and dispersal systems are discussed. Recent changes in the rules and regulations are described, including key information about system designs and site conditions.

Design criteria for onsite wastewater systems are contained in two sets of regulations: Chapter 1 of the Environmental Protection Rules (EPRs), Wastewater System and Potable Water Supply Rules (WSPWSRs), and Chapter 14 of the EPRs, the Indirect Discharge Rules (IDRs). Following is a summary of important rule requirements.

5.1. Wastewater System and Potable Water Supply Rules

The latest revisions to the WSPWSRs became effective on September 29, 2007. These rules apply to decentralized wastewater dispersal systems with design flows of less than 6,500 gallons per day (gpd) and to sewer connections for any design flow. Important changes were made in many areas of the WSPWSRs, including the implementation of universal jurisdiction and the 'clean slate', an overall re-organization of the WSPWSRs to improve readability, and the addition of several alternative technologies.

With the latest revision to the WSPWSRs, wastewater systems and potable water supplies that were previously exempt from state regulation may be required to obtain a permit for activities such as:

- new construction (including single family residences that need sewage dispersal and/or water);
- construction or modification of a wastewater system and/or potable water supply;
- new connections to an existing wastewater system and/or potable water supply;
- subdivision of land; and
- repair or replacement of a failed wastewater system and/or potable water supply.

Vermont is the last state in the nation to implement this kind of permit requirement for all properties statewide. This is often referred to as the state having "universal jurisdiction" over sewage and water.

The legislation includes a "clean slate" exemption that basically grandfathers all buildings, campgrounds, lots, wastewater systems, and potable water supplies that were in existence before January 1, 2007. On or after the January 1, 2007 date, a permit is required when any action covered under these rules is taken (for example, if a property is subdivided or a repair or replacement is needed). If the wastewater system or

potable water supply fails, a variance from the rules is available if no fully complying replacement can be found. (This is often referred to as a "best fix" situation, see Section 3.1.) This provides relief for a number of properties that currently are unmarketable due to non-compliance with the rules.

New, clearer definitions are provided for "failed" water supplies and wastewater systems. This is important because anyone with a failed system now needs a repair permit and also has a defect in their property title.

The WSPWSRs now include general approvals for the use of constructed wetlands and subsurface drip distribution systems for the dispersal of wastewater in addition to the different types of alternative systems allowed through product-specific approval. The general use approvals enable these innovative/alternative components to be used when designing wastewater systems.

Other changes to design requirements that may be useful to landowners in the study area include:

- Reduction in minimum design flow for a single family residence to 2 bedrooms (from 3 bedrooms). This will allow smaller wastewater systems to be built.
- If a primary dispersal system is designed and constructed with pressure distribution that can handle 150% of the design flow, no replacement area is required. This change will enable some lots that were not developable (because they lacked the space and soils needed to site the required identical replacement system) to be developed.
- If a mound system is designed and constructed for 100% of the design flow, no replacement area is required. Designers and engineers have advised that, in nearly every case, failed mounds can be replaced or restored to full function on the original footprint. This also means that properties with mound systems and replacement areas that were permitted before the 2007 rule revision may be able to subdivide or redevelop property that was previously at its maximum wastewater treatment capacity.
- Composting toilets are now specifically allowed in the WSPWSRs, and there is no longer a requirement that a project have enough area to build a septic system even though a composting toilet is proposed. The new rules also allow a smaller leachfield to be used for graywater only when a composting toilet is proposed.
- Language has been added to make clear that water and wastewater systems may not be constructed within a floodway and that construction requirements apply when constructing within the flood plain. This brings the WSPWSRs closer in line to what the Town already requires for land within the Flood Hazard Overlay zoning district.

5.1.1. Dispersal System Options

Many options are available for the dispersal of treated wastewater from decentralized systems under the WSPWSRs. Leach trenches or seepage beds are commonly utilized under favorable site conditions (those having percolation rates of between 1 and 60 minutes per inch and at least 5-6 feet to seasonal high groundwater levels and bedrock). At-grade and mound dispersal systems are generally used where minimum site conditions are met, but the site conditions are not favorable enough for the design of subsurface systems. Finally, filtrate effluent dispersal systems may be used when secondary treatment is a component of the wastewater system. Any of the previously discussed soil-based dispersal systems are permissible as filtrate systems; further, loading rates may be increased and vertical separation distances from bedrock and seasonal high water tables may be reduced if the treated effluent meets certain standards (see Section 3.1 for more detail on wastewater dispersal options).

Spray dispersal (disposing of treated wastewater into native soil by surface application, using sprinklers) may also be used under the WSPWSRs for systems with design flows of up to 6,499 gpd. A continuous impeding layer beneath more permeable soils must underlie a spray dispersal site, and the treated wastewater must be chlorinated before dispersal. While these site conditions may be found near the study area, there are also significant requirements for winter storage of wastewater that may be difficult to meet.

5.2. Indirect Discharge Rules

Since January 1990, wastewater treatment systems with design flows of 6,500 gpd or greater are regulated under Chapter 14 of the EPRs, commonly known as the Indirect Discharge Rules or IDRs. The IDRs are used to permit septic tanks and leach fields, and also treatment plants and spray dispersal systems, which use soil as part of the wastewater treatment process. Following primary and/or secondary treatment, the soil provides final effluent polishing and renovation before it reaches groundwater and, eventually, surface water. This is in contrast to direct discharge systems, which may discharge through a pipe directly to surface waters.

Any flows directed to a cluster wastewater treatment system with design flows of greater than 6,500 gpd that is constructed to support development which was already complete as of May 17, 1986 will likely be considered an “Existing Indirect Discharge” under the IDRs. The DEC is required by statute to issue a permit for existing indirect discharges unless they find that the discharge is causing a violation of the Vermont Water Quality Standards. This application category, however, is limited to indirect discharges already occurring in 1986 and thus may not be suitable if significant new development is desired within the study area.

Under the IDRs, a community wastewater treatment system constructed in the study area to support both existing and new development would be considered a “System with New Indirect Discharge”. If wastewater dispersal sites with design flows of greater than 6,500 gpd are located near one of the

unnamed streams on the outskirts of the village, they may be considered "Systems with New Indirect Discharges to Class B Waters" under the IDRs. These systems are required to obtain an indirect discharge permit before construction begins. In order for a permit to be issued, the Town of Peacham or the Fire District, as the permittee, would be required to demonstrate that the new discharge:

- will not significantly alter the aquatic biota of the receiving waters;
- will not pose more than a negligible risk to public health;
- will be consistent with existing and potential beneficial uses of the waters; and
- will not violate Water Quality Standards.

The permittee must also document compliance with the Aquatic Permitting Criteria, the Reliability Permitting Criteria, and the Public Health Protection Criteria as stated in the IDRs before a permit will be issued. The larger a proposed cluster system is, the more likely it is to trigger additional hydrogeological and biological testing and monitoring requirements. Permits issued under the IDRs typically include effluent monitoring and downgradient groundwater monitoring requirements.

The latest IDRs became effective in April 2003. A General Permit is allowed for systems with design flows of 15,000 gpd or less and that do not require a certified operator to manage the system. Annual inspections and reporting of system failures are required under the General Permit.

The Aquatic Permitting Criteria include sampling for nutrient parameters (including total dissolved phosphorus and nitrate-nitrite nitrogen). The current IDRs allow a range of options that permittees can use to demonstrate compliance with the Aquatic Permitting Criteria for projects with smaller design flows that do not appear to have the potential for significant environmental impact.

5.3. Decentralized Wastewater Treatment Options

A "decentralized" wastewater treatment program is one which utilizes a number of on-site or shared systems to treat relatively small volumes of wastewater, generally from individual buildings or groups of buildings, at or near the source. In 1997, U.S. Environmental Protection Agency (EPA) stated that both centralized and decentralized system alternatives would need to be considered when upgrading failing on-site septic systems. The State of Vermont began a process in 1999 to evaluate and revise its overall wastewater review process to make it clearer and to promote "smart growth" or conversely discourage sprawl. The State encourages the review of decentralized approaches in low-density settings in small and rural communities.

The decentralized system treatment and management concept has many advantages for communities that are trying to upgrade existing on-site systems within compact developed areas. For many communities, a suitable centralized treatment option may not be cost-effective because of treatment costs, the

unavailability of dispersal capacity, or the scattered nature of compact development in rural village areas, which require major infrastructure (long sewers or force mains) to collect sewage for treatment. In certain instances (though this is not the case in Peacham Corner), a combination of centralized collection and cluster systems may make sense.

The key to the decentralized concept is that it treats on-site and shared systems as a permanent wastewater treatment solution—as a valuable part of the infrastructure that should be planned for, sited, designed, and installed properly, operated and maintained appropriately, and monitored as required by any relevant permits. The system's owners should meet compliance requirements and ensure that users of the system are knowledgeable about how their actions can impact the system.

Through discussions with the Prudential Committee, it appears that the main concern in this feasibility study is to allow for the conversion of the former Town Office and bus barn into a store and café. Secondary goals include collecting and treating wastewater from other public buildings (such as the Town Hall, the library, and a potential new building associated with the Peacham Historical Society), in the event that the systems currently serving those properties malfunction in the future, and a similar provision of treatment for properties identified as potentially limited in the main intersection area of Peacham Corner.

5.3.1. Wastewater Flow Projections and Land Area Requirements

Estimated wastewater flow projections were developed for four future wastewater treatment scenarios involving selected properties in Peacham Corner, in accordance with the preliminary investigation and conversations with members of the Prudential Committee. Wastewater flow values were developed using the design flow tables in the current (2007) version of the WSPWSRs. The design flow scenarios are as follows:

- Scenario 1 includes only conversion of the former Town Office and bus barn building into a store and café.
- Scenario 2 adds current municipal facilities in the vicinity of the Bayley Hazen Road – Church Street intersection (the Town Hall and Post Office, the library, and the Peacham Historical Association's Historical House at 153 Church Street) to Scenario 1. This scenario assumes that the Town Hall continues in its current use, which is primarily for small public meetings of no more than about 60 individuals.
- Scenario 3 is similar to Scenario 2, except that the Town Hall is utilized for Town Meetings or other large public meetings of up to 200 individuals.
- Scenario 4 builds on Scenario 3 by adding the eight residential properties and the Peacham Congregational Church in the immediate vicinity of the Bayley Hazen Road – Church Street

intersection, which were identified as potentially having limitations if their onsite wastewater systems were to need replacement in the future.

Table 6 summarizes the design flow estimates for each of the four scenarios outlined above. The range of design flows calculated is between 760 and 4,460 gallons per day. Since these estimated flows are all less than 6,500 gpd, the system or systems would be permitted under the Wastewater System and Potable Water Supply Rules (Chapter 1 of the EPRs). Both primary and reserve dispersal areas would be required to be permitted, but only the primary area would need to be initially constructed. Thus, the dispersal system would need to be initially designed for only the actual design flow, unless the Town chose to construct both primary and replacement systems. (If the final design included a mound system at 100% of design flow, a replacement area would not be required.)

This design flow would translate to an estimated range of required in-ground absorption field area of between 3,300 – 20,850 square feet (or from less than one-tenth of an acre to approximately half an acre). Thus, to site both primary systems and replacement areas, suitable land area of approximately an acre would be needed. A wastewater dispersal system using a mound would require a larger land area, but the exact area needed is dependent on the slope of the individual site and a number of other factors. Thus, the land area needed for a mound system is very specific to the soil and site conditions were a mound is located. Approximate land areas for siting mound systems were estimated for each scenario based on NRCS soil mapping and USGS topographic contours.

5.3.2. Potential Dispersal Site Options

Several areas of land within and near the Peacham Corner study area were considered as potential individual or shared dispersal system sites. Figure 4 presents the specific areas of need, and also provides potential areas of suitable soils near each of these areas of need. These areas have generally not been field tested for soil suitability, and in some cases it is unknown if they are available for use as individual or shared dispersal systems. The areas are identified to show that such systems are feasible, and to provide a basis for cost estimating.

Some of the criteria used in evaluating sites for individual or shared systems included:

- Well suited soils over an area large enough to support an individual or shared leachfield
- Relatively flat or moderate slopes
- Proximity to properties recommended for offsite solutions
- Environmental issues such as downgradient water supplies, surface water crossings, floodways and floodplains
- Physical issues such as access, bedrock depths for collection system, bridge or river crossings, and water line crossings

- Local knowledge of properties
- Other permit issues

Aside from site evaluations of Town-owned systems that were conducted as part of the preliminary investigation, no on-site evaluation of any of the potential dispersal areas discussed below was conducted during this study. Site-specific soil testing and topographic surveying would be required to confirm suitability of each potential site to confirm suitability for wastewater dispersal system. The permission of the individual landowners would be needed before any site-specific evaluations could occur.

Several Town-owned properties with some capacity for siting shared dispersal systems are located within or adjacent to Peacham Corner, as are two privately owned properties.

5.3.2.1. Town Hall and Post Office – Existing Dispersal System (Area 1)

The dispersal area that formerly served the Peacham Elementary School (Area 1), which currently serves the Town Hall and Post Office, is mapped by the NRCS as being underlain by two soil types: Buckland fine sandy loam soil with three to eight percent slopes, and Vershire-Lombard complex soils with fine sandy loam texture and eight to 15 percent slopes (see Figure 4 and Table 3). The primary limitation for Buckland soils is a shallow seasonal water table (1-2 feet below the ground surface), while Vershire-Lombard complex soils are sometimes limited by shallow bedrock. Soil auger testing conducted during the workshop evaluation of this system (see Section 3.4.2) revealed depths to seasonal groundwater more consistent with Buckland soils, though the presence of fill material complicated the evaluation. The original design drawing for this leachfield was obtained from the Vermont State Archives in Middlesex, and test pit logs in the vicinity of the leachfield indicate silty sands to a depth of 96" with no water or bedrock encountered to depth. However, the test pit logs give no indication of whether redoximorphic features were encountered, and the location of the School's drilled well is not shown on the plans although the well was installed in 1968.

The original basis of design for this dispersal system was for 60 students x 20 gallons per day (gpd) per student = 1,200 gpd. When the Town Hall and Post Office was connected to this leachfield in 1989, the normal flows were expected to be three employees x 15 gpd per employee = 45 gpd, while peak flows associated with Town Meeting were expected to be 200 people x 5 gpd per person = 1,000 gpd. Due to the public meeting use, the tanks and force mains were designed to accommodate a flow of 1,000 gpd. The permit (WW-7-0110) stipulates that the project is limited to a maximum occupancy of three employees, with exception for special public meetings (i.e. Town Meeting).

Since the issuance of permit WW-7-0110, the Elementary School has constructed a completely separate wastewater treatment and dispersal system as part of an expansion of the School, and has removed its connection to this leachfield. However, no concurrent permit was applied for or issued to re-allocate the

capacity within this leachfield, formerly utilized by the Elementary School, for use by the Town. Therefore, although most of the leachfield's capacity is not currently being utilized, it is not currently clear whether that capacity could be utilized by the Town.

The Town Hall and Post Office system's dispersal area is included as a potential dispersal site with the understanding that if alternatives that include connection of new flows to the Town Hall and Post Office system become preferred for further consideration by the Prudential Committee, the following next steps will be necessary:

- Contact the DEC Regional Office to determine what capacity within the existing leachfield may be available given the system's permit history and current regulations.
- Contact the DEC Regional Office to ascertain whether the existing leachfield's presence within the 500' wellhead protection area for the Elementary School's drilled well will constitute a permitting obstacle if new flows are connected to the leachfield.
- Conduct a more detailed evaluation of the dispersal area, preferably using backhoe test pits, to ensure that the leachfield is operating properly and complies with vertical separation distances to seasonal groundwater and bedrock. Though the system currently appears to be operating properly, the test pit logs accompanying the original design are not of sufficient detail to allow licensed designers or regulators to ascertain that the soils would be appropriate under current regulations.

5.3.2.2. Peacham Community Housing – Existing Dispersal System (Area 2)

The dispersal area that serves the Peacham Community Housing elderly housing units and two private homes (Area 2) is mapped by the NRCS as being underlain by Cabot silt loam with three to eight percent slopes (Figure 2 and Table 3). The primary limitation for Cabot series soils is a shallow seasonal water table (0-1.5 feet below the ground surface). The recent system evaluation by Marsh Engineering Services (see Section 3.4.1) indicated that the system was functioning as designed, though specific observations of redoximorphic features were not recorded during the evaluation.

The system was designed to treat and disperse 4,000 gallons per day of wastewater. Marsh Engineering Services' report states that current connections (10 units / 11 bedrooms of senior housing, one three-bedroom home, and one four-bedroom home) represent design flows of approximately 2,500 gallons per day—well below the system's capacity.

Although the Peacham Community Housing system appears to have approximately 1,500 gpd of wastewater treatment capacity that is not currently being utilized, there are a number of challenges to be overcome if that capacity is to be used for new connections:

- Planning and re-visioning efforts are currently underway regarding the future of the Peacham Community Housing buildings. At least one building may be demolished and reconstructed, and at this time it is not clear whether additional structures might be built. Given this uncertainty, representatives of the land trust currently managing the Peacham Community Housing property indicated to Stone staff that it would be very challenging to consider adding new connections to the system for properties not affiliated with the community housing development.
- Any new connection would require negotiation and amendment to the current four-party ownership agreement governing the wastewater treatment system.
- Legal agreements pertaining to the land upon which the septic and siphon tanks for this system are sited may not be clear to the parties to said agreement; this should be carefully considered in any discussion of potential modifications to the system.

5.3.2.3. Former Vermont Land Trust Property (Area 3)

Area 3, the first of three undeveloped, Town-owned properties with potential wastewater treatment capacity located along Church Street and Academy Hill Road, is mapped by the NRCS as being underlain by Dummerston very fine sandy loam soils with moderate (8 to 15 percent) slopes; depths to bedrock and seasonal high groundwater are estimated at 60 inches below ground surface (Figure 2 and Table 3). This 3.5 acre parcel is located more than 500 feet west of the Peacham Elementary School's protective water supply buffer, and is more than 1,400 feet from the nearest mapped surface water body. Area 3 is located at a higher elevation than most of the properties which would be served by a wastewater treatment system at this site, so it would be necessary to pump the wastewater up to the dispersal field. The area is about 800 feet from the Bayley Hazen Road – Church Street intersection, so the length of pressurized force-main needed to transport the wastewater to the dispersal site would be generally less than that required for either the Town Office/Post Office or Peacham Community Housing systems. Area 3 is about 60 feet higher in elevation than the main intersection. While no bedrock outcrops were observed along Church Street between the Bayley Hazen Road – Church Street intersection and Area 3, historic backhoe test pits excavated on the former Peacham Inn property encountered bedrock at 30-48" below ground surface, so ledge removal may be necessary in order to accommodate the line. Since this property was previously held by the Vermont Land Trust, it is possible that the property's title includes restrictions on the land's future use. If the Prudential Committee decides to pursue this site further as a potential shared system site, the property's deed should be examined to ensure that use of the property as a wastewater dispersal field is not precluded by conditions included in the deed.

5.3.2.4. Fire Station Adjacent Property (Area 4)

Area 4, an undeveloped, Town-owned property located immediately east of the Fire Station, is mapped by the NRCS as also being underlain by Dummerston very fine sandy loam soils (Figure 2 and Table 3). This

1.4 acre parcel is located more than 1,200 feet west of the Peacham Elementary School's protective water supply buffer, and is more than 1,200 feet from the nearest mapped surface water body. Area 4 is also located at a higher elevation than most of the properties which would be served by a wastewater treatment system at this site, so it would be necessary to pump the wastewater up to the dispersal field. The area is about 950 feet from the Bayley Hazen Road – Church Street intersection, and about 70 feet higher in elevation than the main intersection. As with Area 3 above, some ledge removal may be necessary in order to accommodate force mains. There is some indication in the 2006 Village Plan Report that the portion of this property which is currently used as a farm field may be utilized for overflow event parking in the future. Dispersal fields generally cannot be sited beneath areas where vehicular traffic is expected, so this factor may preclude the use of Area 4 as a dispersal field site. In addition, members of the Prudential Committee advise that test pits evaluated on this site during construction of the addition to the adjacent Fire Station encountered shallow bedrock.

5.3.2.5. Overlook Park (Area 5)

Area 5, an undeveloped, Town-owned property located between the Fire Station and the Cemetery, is also mapped by the NRCS as being underlain by Dummerston very fine sandy loam soils (Figure 2 and Table 3). This 2.1 acre parcel is located more than 1,300 feet west of the Peacham Elementary School's protective water supply buffer, and is about 900 feet from the nearest mapped surface water body. Area 5 is located at a higher elevation than most of the properties which would be served by a wastewater treatment system at this site, so it would be necessary to pump the wastewater up to the dispersal field. The area is about 1,100 feet from the Bayley Hazen Road – Church Street intersection, and about 75 feet higher in elevation than the main intersection. As with Areas 3 and 4 above, some ledge removal may be necessary in order to accommodate force mains. The 2006 Village Plan Report indicates that this property is deeded to the Town "to remain open for people to play on". Use of the field for wastewater treatment and dispersal would not necessarily preclude the use of the field for recreation; however, to achieve this additional objective additional fill may be required to provide grading around the potential leachfield. If the Prudential Committee decides to pursue this site further as a potential shared system site, the property's deed should be examined to ensure that use of the property as a wastewater dispersal field is not precluded by conditions included in the deed.

5.3.2.6. Former Peacham Inn (Area 6)

Area 6, known locally as the Peacham Inn, is a privately owned residence which, in the mid-1980s, was permitted as a 20-seat restaurant serving two meals per day, for a design flow of 15 gallons per seat x 2 meals/day x 20 seats = 600 gpd (permit number PB-7-0430). The property is mapped by the NRCS as being underlain by Vershire-Lombard complex soils, with fine sandy loam texture and eight to 15 percent slopes (Figure 2 and Table 3). The primary limitation for Vershire-Lombard complex soils with regard to wastewater treatment is shallow bedrock. This 1.07 acre parcel is located more than 700 feet west of the

Peacham Elementary School's protective water supply buffer, and is about 650 feet from the nearest mapped surface water body.

Area 6 is located at a slightly higher elevation than the former Town Office and bus barn, so it would be necessary to pump the wastewater up to the dispersal field. The area is about 350 feet from the former Town Office and bus barn, and about 20 feet higher in elevation than the main intersection. As with Areas 3-5 above, some ledge removal may be necessary in order to accommodate force mains.

When Area 6 was originally permitted in 1984, both primary and replacement mound sites were located on the property. To date, only the primary dispersal area has been constructed or utilized. The replacement area for this system is located southwest of the house and barn, along Church Street. Test pits conducted during the design of the primary system found sandy loam soils in the replacement area with little indication of seasonal high groundwater to a depth of 30-48 inches below ground surface, where ledge was encountered.

Given the challenging conditions facing redevelopment of the former Town Office and bus barn, and recent revisions to the Environmental Protection Rules such that replacement areas are no longer required for fully complying mound systems, it may be possible to obtain a Wastewater Treatment and Potable Water Supply Permit to subdivide Area 6 for the purpose of constructing a wastewater treatment system to serve the proposed store and café to be located in the former Town Office/bus barn building if the soils and site are evaluated again and determined to be suitable under the current rules.

Upon further discussion with the property owner and the Prudential Committee, it was determined that the proximity of the property's driveway to the replacement area likely significantly limits the available area for a new mound system in that replacement area, such that it is unlikely sufficient capacity could be located on the lot for a new wastewater dispersal system. If no other alternative is feasible, the owner is cautiously in favor of conducting testing to determine whether the replacement area might be suitable for a new system to serve the proposed store and café—but this option could be considered a last resort, if the owner grants permission to evaluate this site further.

5.3.2.7. Field Adjacent to Former Vermont Land Trust Property (Area 7)

Area 7, an undeveloped, privately owned property located immediately to the east and southeast of the former Vermont Land Trust property (Area 3), is also mapped by the NRCS as being underlain by Dummerston very fine sandy loam soils (Figure 2 and Table 3). This 8.4 acre parcel is located about 450 feet west of the Peacham Elementary School's protective water supply buffer, and is more than 1,200 feet from the nearest mapped surface water body. Area 7 is located at a higher elevation than the properties which would be served by a wastewater treatment system at this site, so it would be necessary to pump the wastewater up to the dispersal field. The area is about 1,200 feet from the Bayley Hazen Road –

Church Street intersection, and about 60 feet higher in elevation than the main intersection. As with Areas 3-6 above, some ledge removal may be necessary in order to accommodate force mains. Members of the Prudential Committee indicated that a former owner of this property had informally offered a portion of it to the Town for the purpose of community wastewater dispersal, but that the property has changed ownership since the offer was originally made.

5.3.2.8. Summary of Potential Dispersal Areas

The characteristics, potential wastewater treatment capacities, and advantages/disadvantages of each of the seven areas described above are summarized in Table 7. Of these sites, the Town Hall and Post Office existing dispersal area (Area 1) has very limited additional wastewater treatment capacity and the potential for significant permitting hurdles and additional costs if any new connections were to be added. Thus, though its continued current use is not problematic, Area 1 was not considered suitable as part of a community wastewater system under any of the four scenarios defined in Section 5.3.1. The remaining six areas have significant existing or potential wastewater treatment capacity and soils and site conditions that are potentially suitable for one or more of the scenarios.

5.3.3. Collection, Treatment, and Dispersal System Alternatives

A total of 13 wastewater treatment and dispersal alternatives were developed using the following order of priority, emphasizing the value of existing wastewater treatment infrastructure investments and considering passive, low-maintenance systems first wherever possible:

1. Repair or upgrade existing malfunctioning or inadequate onsite systems to comply with current regulations, with centralized management to provide monitoring, operation, maintenance, and replacement.
2. Replace existing malfunctioning onsite systems with new ones on each lot, with centralized management to provide monitoring, operation, maintenance, and replacement.
3. Combine properties with malfunctioning onsite systems into clustered, soil-based wastewater treatment systems with centralized management.

The range of wastewater collection, treatment, and dispersal alternatives that are potentially feasible within each of the four scenarios described in Section 5.3.1 all have design flows less than 6,500 gallons per day, so the siting and design requirements of the Wastewater System and Potable Water Supply Rules (Chapter 1 of the EPRs) apply to all scenarios.

A range of different collection system technologies could potentially be utilized to convey wastewater from the building sewers of individual properties to further treatment and, ultimately, to dispersal sites in or near the village. Table 8 lists these technologies, their advantages and disadvantages, and whether each technology is potentially feasible in Peacham Corner. Due to the potential for shallow bedrock (and thus

the need to limit excavation depths as much as feasible), as well as the need to pump effluent to a higher elevation than the service connections for dispersal on the majority of the potential shared system sites (see Section 5.3.2), most of the alternatives developed use a combination of effluent gravity and effluent pumping collection systems.

Initially, four potential alternatives were developed for Scenario 1 (Figures 5, 6, 7, and 8), four alternatives were developed for Scenario 2 (Figures 9, 10, 11, and 12), three alternatives were developed for Scenario 3 (Figures 13, 14, and 15), and two alternatives were developed for Scenario 4 (Figures 16 and 17).

Table 9 provides a short narrative summary of each of the 13 wastewater treatment and dispersal alternatives.

Upon further consideration and discussion with the Prudential Committee, it was decided that alternatives that included dispersal at Area 6 were unlikely to be successful due to the limited area available for a new system within the footprint designated as a replacement area. Thus, Alternatives 1A, 1B, 2A, and 3A did not advance to the project costing stage.

5.3.4. Preliminary Costs

A summary of estimated project costs for each of the remaining nine alternatives is presented in Table 10. Each of these alternatives or clusters can be considered a separate project on its own, so total project costs including the technical services and other related costs are broken down for each alternative for comparison. The details of how the consultant arrived at opinions of probable cost for the construction of each alternative are included in Appendix C. The ranges of estimated total project costs, including related site testing, design, permitting, and installation, were as follows:

- Scenario 1 (proposed store/café only): $70-83,000
- Scenario 2 (proposed store/café plus municipal buildings, limited meeting size at Town Hall): $123-143,000
- Scenario 3: (proposed store/café plus municipal buildings, full meeting size at Town Hall): $152-165,000
- Scenario 4: (proposed store/café, municipal buildings, and potentially limited properties): $355-371,000

A more detailed feasibility study, including site-specific testing of the potential wastewater dispersal sites discussed in Section 5.3.2, would be needed in order to further refine these cost estimates. The final project costs could be lower if, for example, a conventional in-ground dispersal system could be constructed instead of an at-grade or mound system, or if a downgrade suitable site was discovered such

that effluent gravity systems could be utilized instead of pumping. However, costs could also shift higher if, for example, extensive pre-treatment was needed in order to utilize a particular dispersal site.

5.3.5. Permitting and Other Environmental Concerns

The following permits and environmental reviews are needed for all of the alternatives:

- Wastewater System and Potable Water Supply Permits will be needed for the permitting and construction of any alternative described above
- Any local permits that would be required.

The following permits and environmental reviews may or may not be needed, depending on which scenario the Town chooses to move forward:

- If alternatives under Scenarios 3 and 4 disturb more than one acre of land during construction activities, the project will need to obtain coverage under General Permit 3-9020 for stormwater runoff from construction sites. Given the distance of the potential projects from wetlands or surface waters, significant areas of fields and woods between the potential disturbed areas and surface waters, and the fact that the watershed is not currently designated as being impaired due to stormwater or sediment as specified on Part A of the Vermont 303(d) list, any project is likely to qualify as Low Risk, and thus will need to file a Notice of Intent and follow applicable practices detailed in the *Low Risk Site Handbook for Erosion Prevention and Sediment Control*.
- With receipt of federal loans or grants, a National Environmental Policy Act (NEPA) environmental review process will be required. Due to the small area of disturbance, an Environmental Assessment (EA), which is a level of review required when environmental impacts are expected from a project and the State is charged with determining the level of impact, may not be needed. Ultimately, the desired outcome is a "Finding of No Significant Impact (FONSI)" from the federal agency providing the funding. However, the preliminary evaluation is not sufficient to confirm that this is achievable. Further investigation of specific alternatives, which include STEP tanks, collection system routes, and dispersal sites, will be necessary.
- With receipt of federal loans and/or grants, a project Archeological Resource Assessment (ARA) may be required in the early stage of a project to assess the likelihood of finding significant historic and archeological resources within the proposed disturbed areas.

Due to the relatively small sizes and upland locations of all the alternatives, the following permits and environmental reviews are unlikely to be required for any of the alternatives described:

- There are no State Routes within the study area, so no construction within road right-of-ways will require a Permit to Work within the State Right-of-Way from the Agency of Transportation.
- None of the alternatives would disturb more than 10 acres, which is the threshold for municipal infrastructure projects to require an Act 250 permit.
- There are no wetlands within the study area, so no federal or state wetland permits will be needed for the project
- No stream crossings are proposed, so no Stream Alteration Permits would be needed from the ANR Water Quality Division.

Continued discussions with ANR Wastewater Management Division personnel will be needed regarding the potential for utilizing existing dispersal sites such as the Peacham Community Housing system, as well as coordination of preliminary testing of potential dispersal sites. If further investigation on any of the potential dispersal sites confirms soil and site suitability, then these investigations could in turn lead to small-scale Wastewater System and Potable Water Supply permits. Each of the proposed alternatives has design flows of less than 6,500 gpd, so the Indirect Discharge Permit program is unlikely to be involved.

Any design that involves work in the right-of-way on Church Street, Old Cemetery Road, or the Bayley Hazen Road will need to avoid the existing potable water supply mains to the greatest extent possible, or to plan for properly designed water/sewer crossings. At least one such crossing will be required for any of the proposed alternatives, and in some cases multiple crossings of service to individual properties or mains will be required.

6. COST/BENEFIT ANALYSIS

In order to properly review and compare alternatives, annual costs must be compared to what Town and Fire District members and officials view as "reasonable" and "affordable" in Peacham Corner.

Annual costs include:

- Repayment of debt service for construction costs
- Operation and maintenance costs for the public facilities within the service area, including periodic inspections and periodic septic tank pump-outs. These functions may require part-time or contracted personnel, preferably to someone who is knowledgeable in the construction and maintenance of on-site systems, such as a local septic designer or engineer.
- General administration and billing—particularly if shared systems serving multiple private properties such as those described in Scenario 4 are implemented.

Annual costs for each alternative were estimated based on a per-gallon estimate utilizing engineering judgment. Table 11 summarizes the potential annual costs for each of the alternatives. The various potential funding solutions are discussed in the next section.

Each line item in Table 11 will have an effect on the end user costs – including any potential grant funding, the interest rate for debt service, O&M costs, number of connections (especially for Scenario 4 alternatives), and the level of Town support through tax assessments, if any. A sensitivity analysis of each of these criteria is beyond the scope of this report, but may be a good step to take once the Town decides on a particular scenario or alternative.

For each alternative, a cost per gallon per day of wastewater treatment capacity was calculated to assess and compare the cost effectiveness of each alternative. Often, a cost per Equivalent Residential Unit is also calculated at this stage, but since only one of the four scenarios includes residential properties this was not considered to be a useful comparative cost value.

At this stage in a project, it is not always clear where funding will be coming from; this report is to provide guidance as to how much funding is necessary in order to make a project implementable. Given the current climate in Washington, grant funding is becoming significantly more competitive. Searching for and securing project grants will be a high priority if a community is determined to pursue a project, and efforts may need to continue through all stages of the project.

While project costs and ongoing operations and maintenance expenses are a significant consideration in making decisions about any municipal infrastructure project, they are not the only criteria which should be considered. Often, qualitative considerations (such as quality-of-life for residents, ease of project implementation, ease of maintenance, whether the project implements or impedes local planning goals,

etc.) can have a significant impact on the decision making process. Table 12 presents a matrix which ranks the relative advantages and disadvantages of each alternative using a variety of different criteria. While we have assigned a "more favorable" or "less favorable" ranking for alternatives within each of the four scenarios based on our own professional judgment, the final decision about which alternative or scenario to pursue rests with the residents and stakeholders of Peacham.

7. FINANCING OPTIONS

There are several common sources of grant and loan funding for municipal projects. More detailed evaluation of the applicability of these sources will be made in the next planning phase. The Prudential Committee has already begun involving the Vermont Department of Environmental Conservation (DEC), Facilities Engineering Division in this project--Mr. Don Robisky of the Wastewater Management Division is currently working with Fire District's consultant and providing coordination with Facilities Engineering. The DEC and USDA Rural Development (RD) have programs that can provide grants or loans for eligible municipal wastewater projects, providing the various funding program requirements are satisfied. All grant and loan recipients must be municipal entities and nearly all past projects receiving grant and loan funding have served designated municipal growth centers.

7.1. State and Federal Programs

There are several state and federal funding programs that can help finance wastewater projects. Many of these programs are administered through the Vermont DEC Facilities Engineering Division, with the noted exception of Rural Development funds. The most common wastewater funding sources are summarized in the following sections. It is worth noting that, for projects with relatively small construction costs such as those in Scenarios 1, 2, and 3, the additional regulatory and administrative requirements of some of the state and federal funding sources may significantly increase the overall project cost.

7.1.1. Vermont Department of Environmental Conservation: 35% Grant – Dry Weather Pollution Abatement (10 V.S.A. Chapter 1625)

Awards may be made to municipalities for the planning and construction of facilities for abatement of dry-weather pollution. This may include interceptor and collection sewers, pump stations, sewage treatment facilities, outfall sewers, and subsurface dispersal treatment and dispersal systems. This grant is normally not implemented unless there is tandem State or Federal grant/loan funding for the project. This grant requires the identification of points of pollution to document these sources of pollution to the surface waters of the State. A State Facilities Engineering Division engineer will inspect the potential points of pollution to determine eligibility for State funding.

7.1.2. U.S. Department of Agriculture, Rural Development (USDA-RD) Loans and Grants

Awards may be made on qualifying municipal wastewater projects to municipalities under 10,000 in population. Loan and grant amounts are based upon the municipality's medium household income from the 2000 census and the estimated equivalent user cost for the chosen wastewater project. The RD loan % value is re-evaluated every quarter and is subject to change on a quarterly basis. The Town of Peacham's

2000 census median household income is $40,000, which is slightly below RD's intermediate rate. This means that the project may qualify for RD grants funding. However, an income survey of households in the area will provide additional and more specific information regarding incomes in the service area. The project may also qualify for an RD loan.

7.1.3. VT Department of Housing and Community Affairs, Community Development Block Grant Program (Vermont Community Development Program - VCDP)

Awards are based on a very competitive process. Wastewater projects that meet VCDP benefit requirements, (51% of persons benefiting must be low to moderate (low-mod) income eligible) can apply for the implementation grant. Implementation grants range from $50,000 to a maximum of $750,000. A special multi-year grant option can go as high as $1,000,000. VDCP, on a very limited basis, also provides a two-phase grant up to $1,500,000.

7.1.4. The U.S. Environmental Protection Agency (EPA), State and Tribal Assistance Grant (STAG)

Each year municipalities work with Vermont's U.S. Senators in an effort to get their wastewater projects into the U.S. Capital Budget for STAG grants. In a typical year, one traditional and one non-traditional STAG grant may be awarded in Vermont. The grants are based on need, and each project must receive the support of the DEC for the U.S. Senators to consider a project for a STAG grant. These grants typically require a local match of approximately 35 percent.

7.1.5. VT Department of Environmental Conservation: SRF (State Revolving Fund) Loans - Pollution Control (24 V.S.A. Chapter 120)

Awards can be made to municipalities on pollution control related work for planning, design or construction. Peacham Fire District No. 1 has received a "planning advance" loan to fund the current project. The planning advance does not have to be repaid to the State if the project is not constructed. However, should the project continue into the next phase, a potential source of planning funds is the SRF program. Planning loans are interest-free, while construction loans carry a 2% administration fee. The construction loans are repaid in equal annual payments over a term of up to 20 years. Loan repayments are returned to the revolving fund for subsequent use as new loans. This funding source is the Clean Water Act, State/EPA Revolving Loan Fund – or CWSRF. Loans are used to help finance the local share of the project. A local bond vote typically secures the loan funding.

7.2. Wastewater System Revenue Concepts

Financing a municipal wastewater system can be accomplished using several potential revenue streams, depending on local politics and on residents' perception of the direct and indirect benefits of the project to

the community and to individual landowners. Several of the potential revenue streams that may be viable for the Fire District's project are discussed below.

7.2.1. Service Connection Fees, Connection or "Hookup" Fees, and User Fees

Publicly owned wastewater systems customarily establish a Rate Schedule for the users or customers of the system. The normal approach is to charge for both the privilege of connecting (one time) as a connection fee, then an ongoing fee, normally computed on an annual basis and billed quarterly, for the actual use of the service. Although this may be one way to raise revenue if Scenario 4 alternatives become the preferred solution, only municipally owned properties would be connected in Scenarios 1, 2, and 3. If a Scenario 4 alternative becomes preferred, these potential revenue sources can be explored in more detail.

7.2.2. Special Management District Fees

The Fire District is not currently proposing to serve its entire water service area with cluster or off-site wastewater systems, but could consider establishing a "Wastewater Management District"—especially if alternatives within Scenario 4 end up being preferred. Within the district, those properties which are not connected to an offsite system could voluntarily choose (or be required, if the District members made that decision) to have their systems managed by a public entity (such as the Town or a Fire District). Each system would be inspected annually, and the tank would be pumped as needed (generally every 3 to 5 years).

This approach does several things:

- Regular inspection and maintenance extends the life of onsite systems and results in fewer failures
- The Town can monitor the areas of septic problems and plan for future extensions
- Property owners will be more aware of the importance of proper system use
- Provides a source of revenue to the municipally-owned system

A typical range of fees for this service would be $100 to $400 per year, depending on whether pumpout costs are included.

7.2.3. Fire District-Wide Cost Sharing

The members of Peacham Fire District No. 1 already share the costs and benefits of a municipal water system, paying a rate set annually which covers the ongoing expenses and maintenance costs for their water supply and distribution system. If the members agree that constructing wastewater treatment improvements within the District represents a significant benefit that they wish to support financially,

they could choose to increase their financial support to the District to finance a portion of the improvements. However, it is also true that alternatives within Scenarios 1-3 represent improvements to Town-owned infrastructure that may be best supported by all Peacham residents, rather than only those within the Fire District's boundaries.

7.2.4. Town-Wide Tax

Often, communities include a town-wide tax to augment the required revenues to support a community wastewater system that serves only a small portion of the municipality. This is a balancing act, because usually all town voters will be asked to support a bond vote, and a tax on properties not served will be viewed negatively. If this revenue option is considered, a clear point needs to be made that a vital "village center" is important to all town residents, so that local businesses may continue or expand, and that town-owned properties are improved. When implemented for more conventional sewer projects in Vermont, the tax provides about 10% of the overall revenue needed, and may be about 1 to 2 cents on the tax rate.

8. RECOMMENDATIONS

This study has shown that, depending upon the Town's ultimate goals, a variety of feasible wastewater treatment options can be constructed to meet the environmental, public health, and community development needs of Peacham Corner. This report contains information that can now be considered by the Selectboard and town staff, the members of the Fire District, and the citizens for implementation. While the consultant can recommend one scenario over another, the real decision lies with the community.

Following are some items to consider for the next steps in a potential wastewater project:

Committee/Town Work

- Review and decide on favored alternative to move forward, including management and local funding options
- Initiate discussions and obtain permission for preliminary soils testing on privately owned cluster system sites
- Develop public outreach plan for building support for construction and funding, especially if an alternative under Scenarios 1 or 4 is preferred
- Continue to work with consultants on technical work (described below).

Technical Work

- Preliminary soil and site investigations on potential cluster system sites, including conducting preliminary hand auger tests or backhoe soil test pits, developing hydrogeological capacity estimates, and understanding other technical permit issues relating to specific sites.

In addition, we offer the following recommendations regarding maintenance of the Town Hall and Post Office's wastewater treatment system:

- Determine whether the exterior alarm at the Town Hall is connected to the building thermostat or to the high water alarm for the wastewater treatment system's pump tank. If the exterior alarm is for the pump tank, the light bulb should be replaced.
- The air release valve should be backwashed with clean water, and bags of loose insulation should be packed around the valve to protect against freezing. Additionally, the top of the concrete vault should be sealed to its base as additional protection against freezing.
- We recommend that time be taken in the spring (after snowmelt but before vegetation starts to grow) to locate the cleanouts in the line between the air release valve and the dispersal

field. The cleanouts should be opened and repaired if necessary, and clearly marked for future inspection and maintenance.

- The distribution box for the dispersal field was not located during the October 2009 evaluation. Time should be taken in the spring to precisely locate and uncover the distribution box, and the box should be re-leveled if needed to ensure even distribution of effluent in the field.

9. REFERENCES

Town of Peacham. 2005. Peacham Town Plan (adopted June 15, 2005).

Town of Peacham. 2005. Bylaws (approved December 7, 2005).

Town of Peacham. 2006. Planning Report for Peacham Corner (dated March 11, 2006).

Vermont Department of Environmental Conservation. 2003. Environmental Protection Rules, Chapter 14: Indirect Discharge Rules. Effective April 30, 2003. Accessed online at http://www.anr.state.vt.us/dec/ww/Rules/IDR/Adopted-IDR-4-30-03.pdf on January 16, 2008.

Vermont Department of Environmental Conservation. 2007. Environmental Protection Rules, Chapter 1: Wastewater System and Potable Water Supply Rules. Effective September 29, 2007. Accessed online at http://www.anr.state.vt.us/dec/ww/Rules/OS/2007/FinalWSPWSRuleEffective20070929.pdf on January 16, 2008.

TABLES AND FIGURES

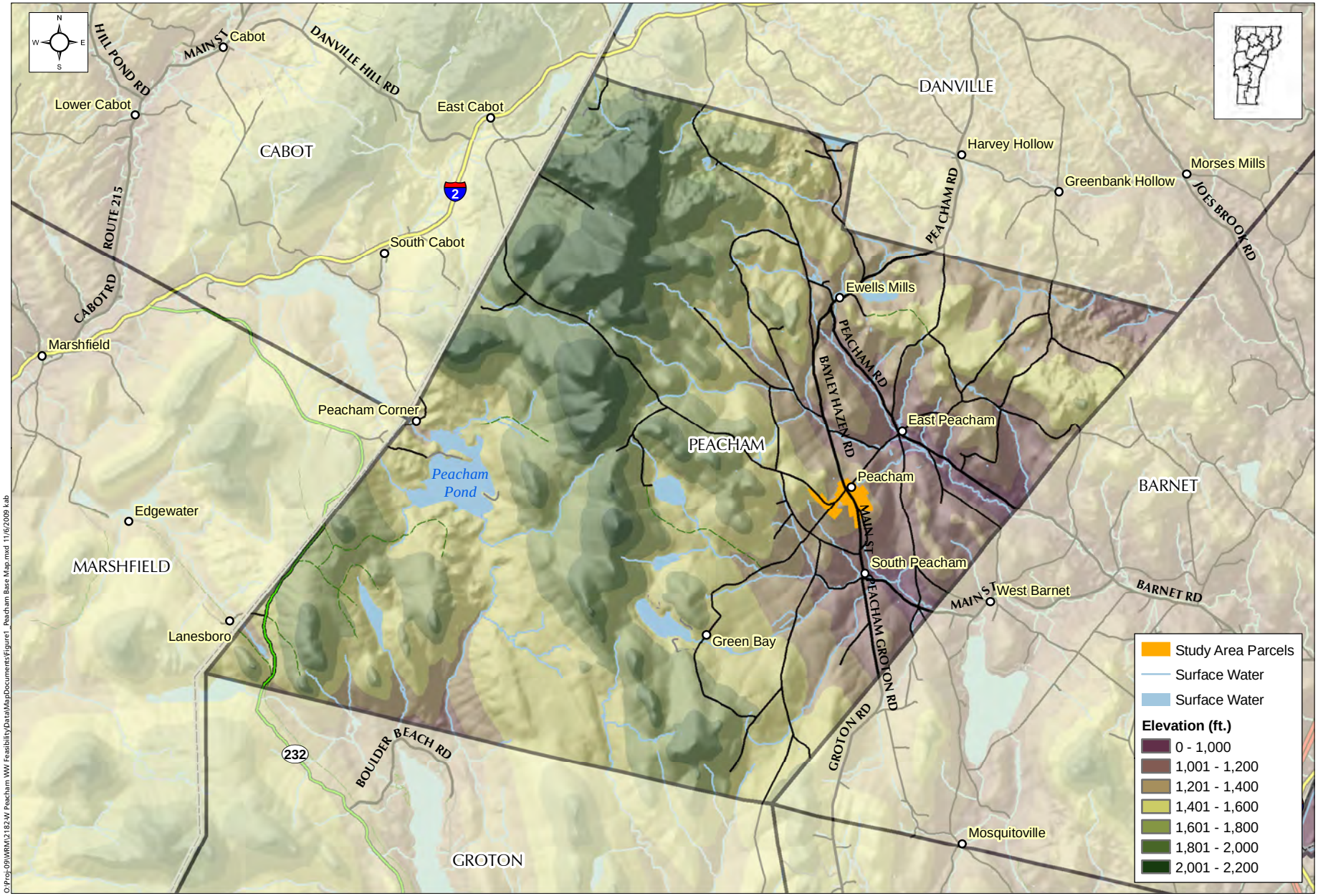

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FIGURE 1: LOCATION MAP

Wastewater Needs Assessment and Feasibility Study for Peacham Corner

Town of Peacham, Vermont

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007;
Digital Elevation Model, VCGI, 2001; Town Boundaries, VCGI, 2001; Parcel Boundaries, NVDA.

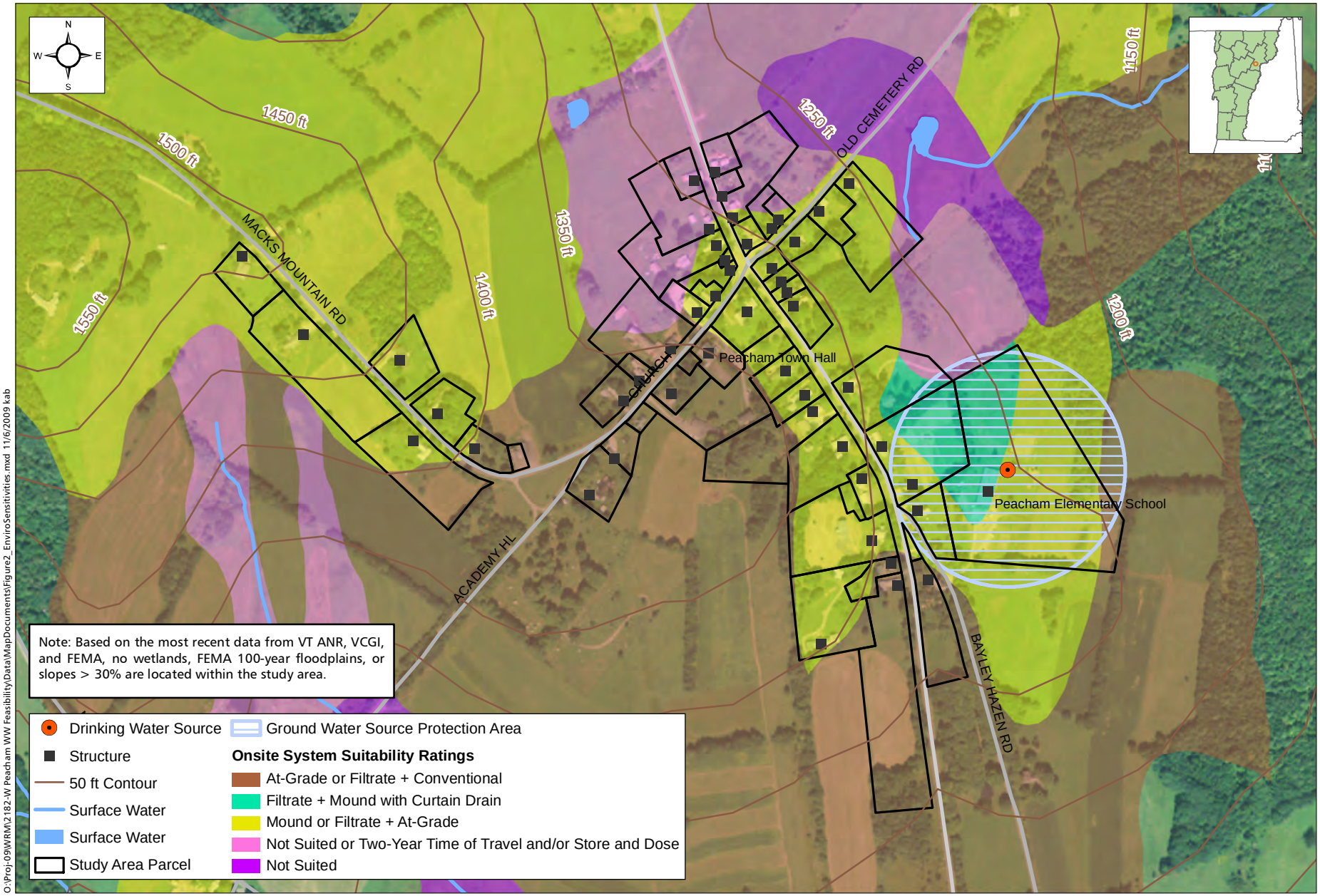

FIGURE 2. ENVIRONMENTAL SENSITIVITIES
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Onsite System Suitibility, SEI, 2007; Map Unit Symbols, NRCS, 2004; Imagery, NAIP, 2008.

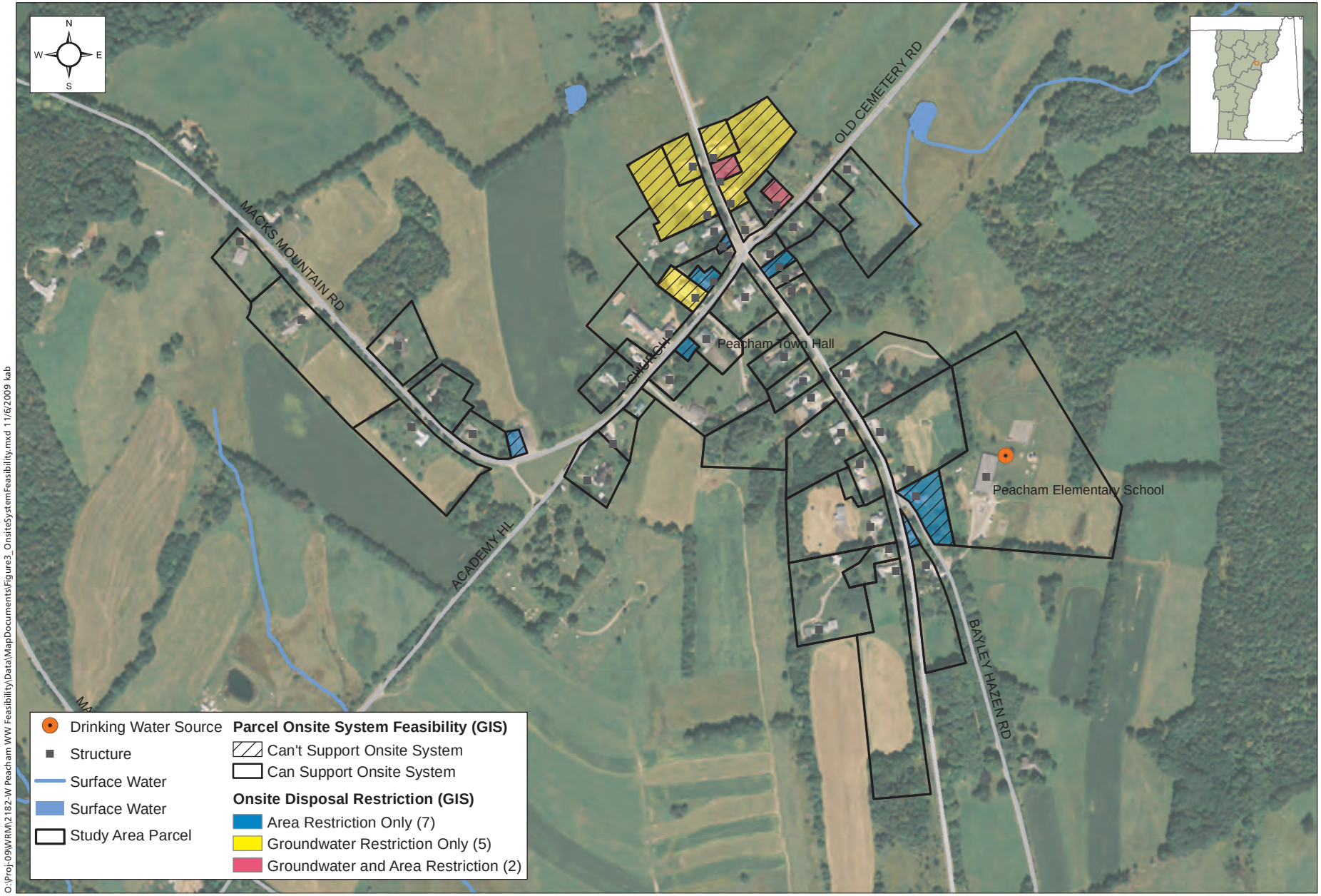

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FIGURE 3. ONSITE SYSTEM FEASIBILITY
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Onsite System Suitibility, SEI, 2007; Onsite System Suitibility, SEI, 2009; Imagery, NAIP, 2008.

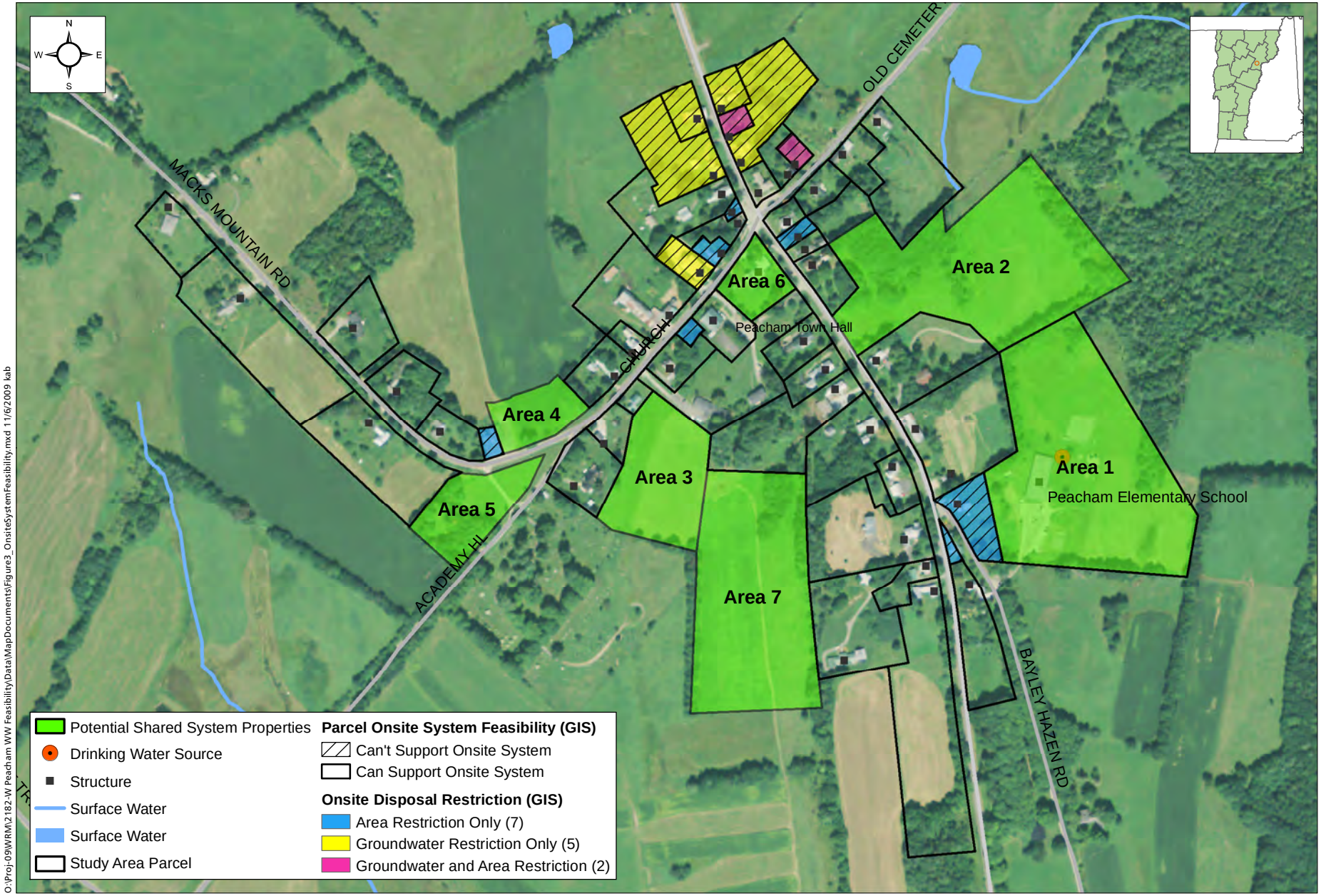

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FIGURE 4. ONSITE SYSTEM FEASIBILITY AND POTENTIAL SHARED SYSTEM SITES
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Onsite System Suitibility, SEI, 2007; Onsite System Suitibility, SEI, 2009; Imagery, NAIP, 2008.

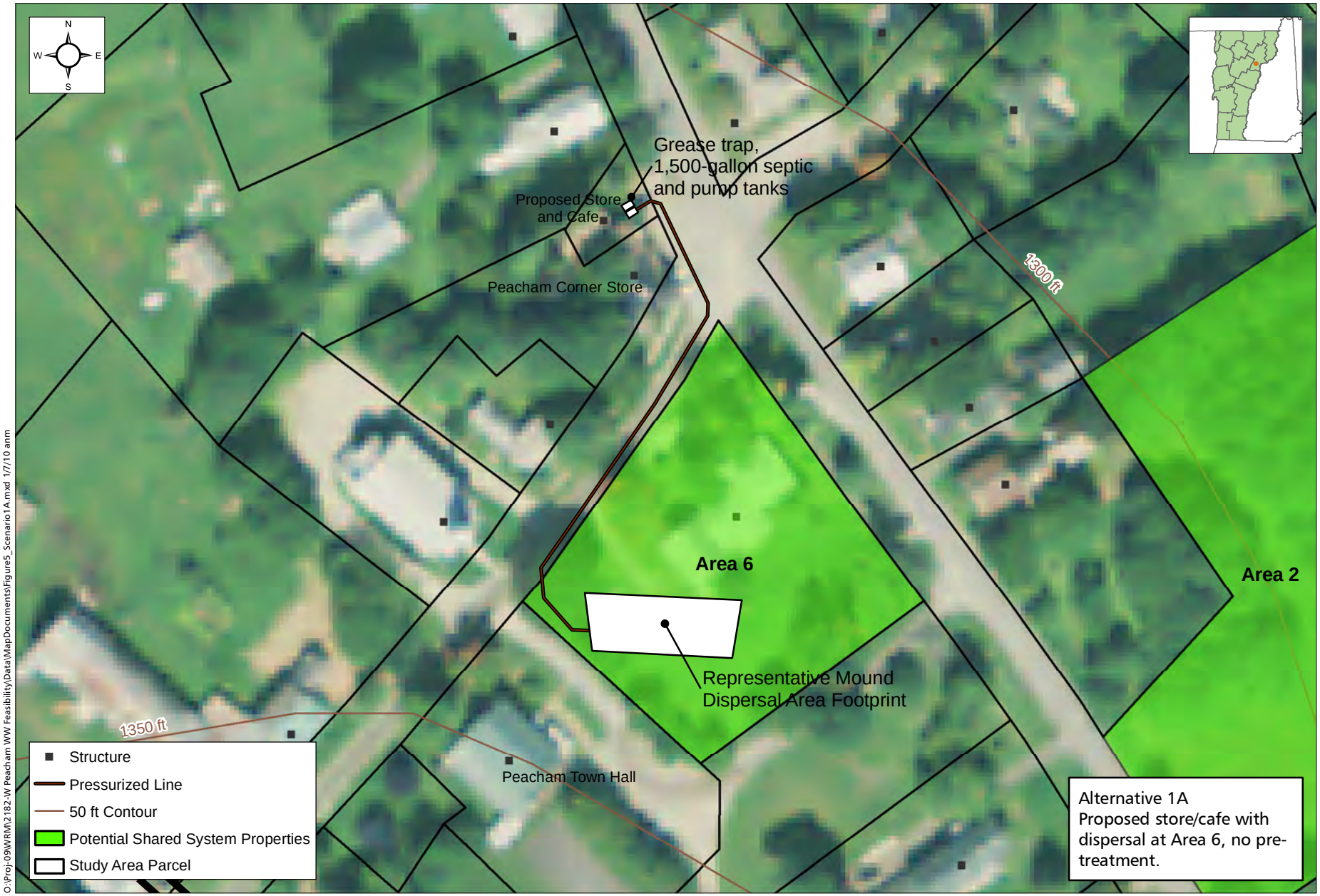

FIGURE 5. ALTERNATIVE 1A
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

FIGURE 6. ALTERNATIVE 1B
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

FIGURE 7. ALTERNATIVE 1C
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing system components are approximate.

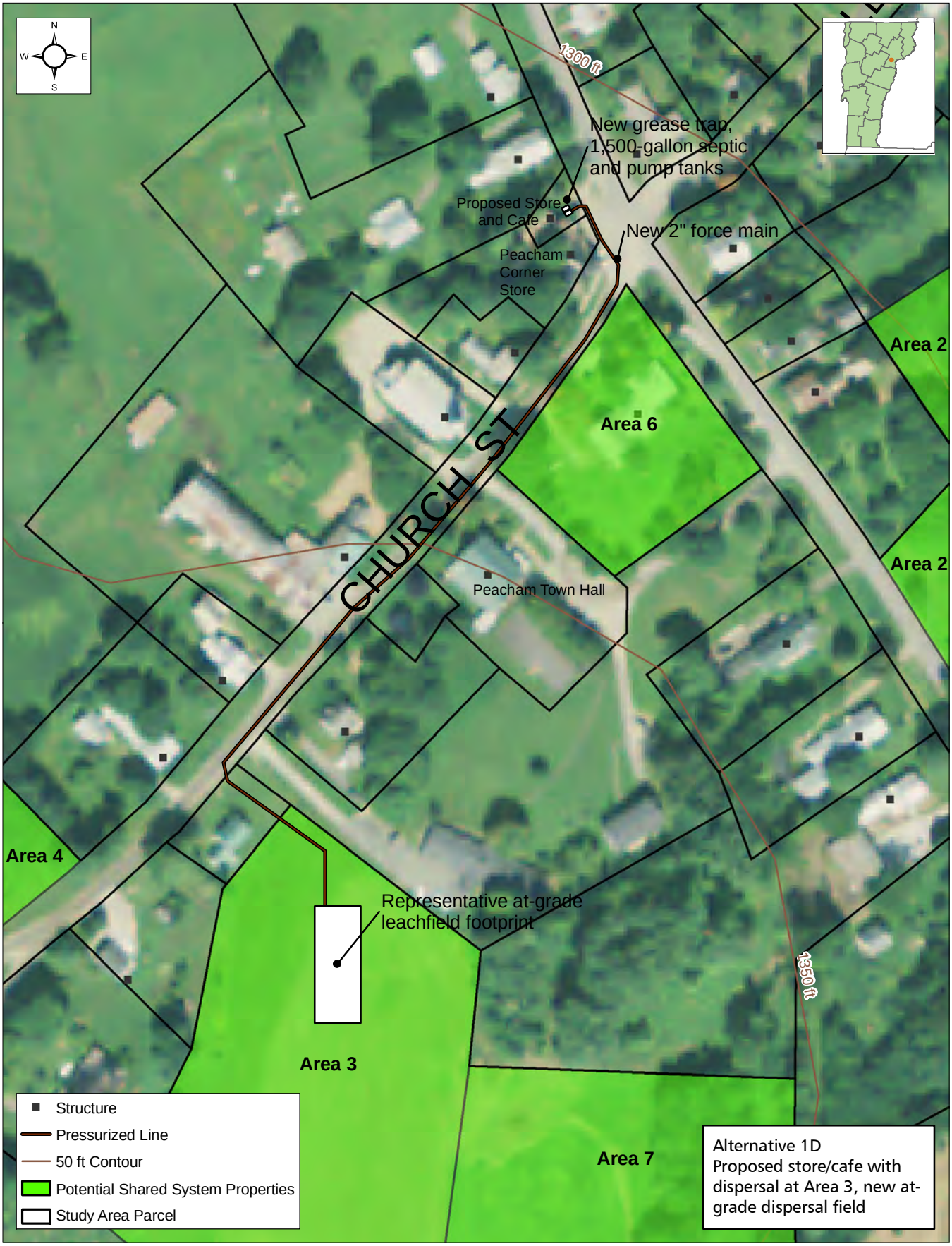

FIGURE 8. ALTERNATIVE 1D
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

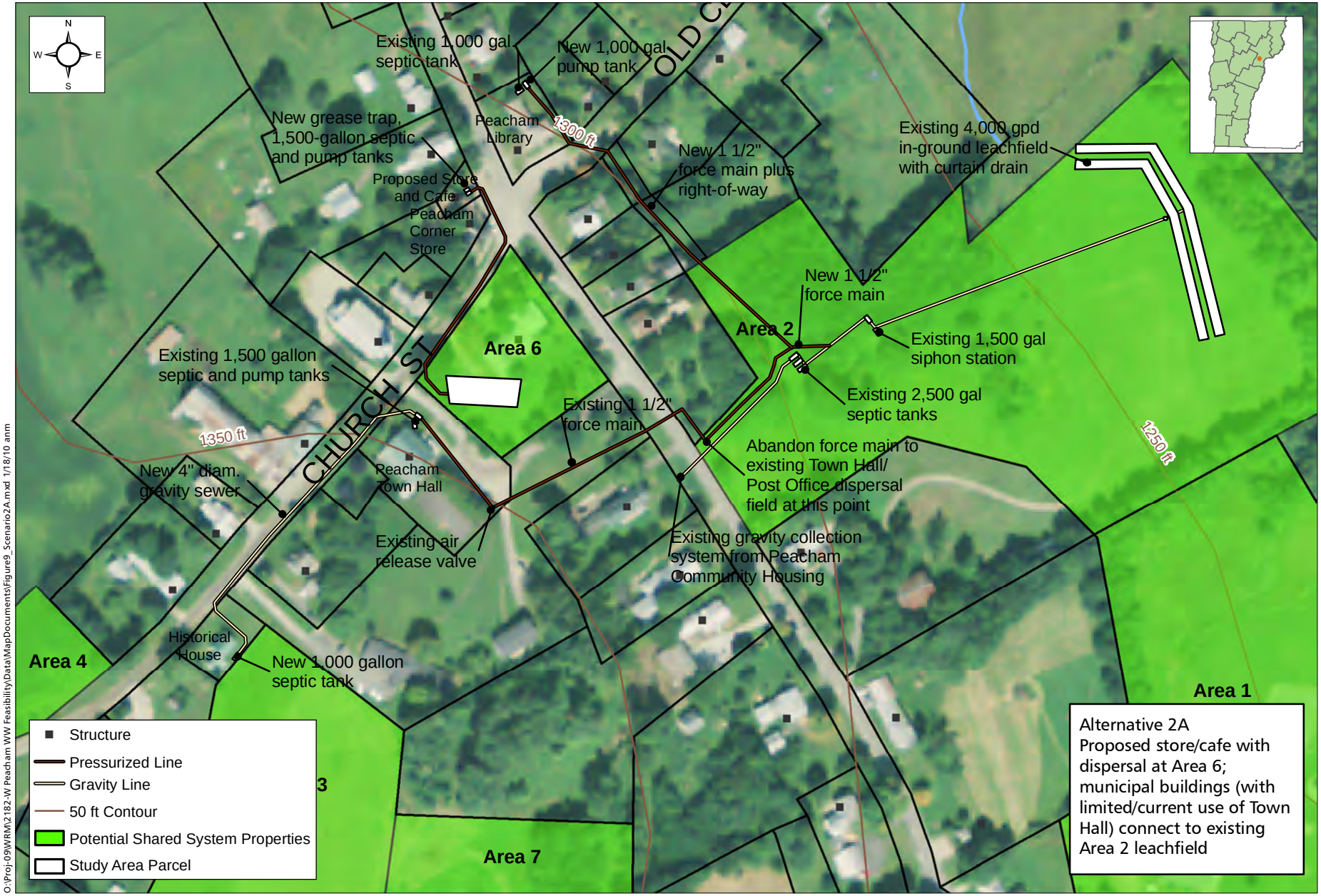

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FIGURE 9. ALTERNATIVE 2A
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

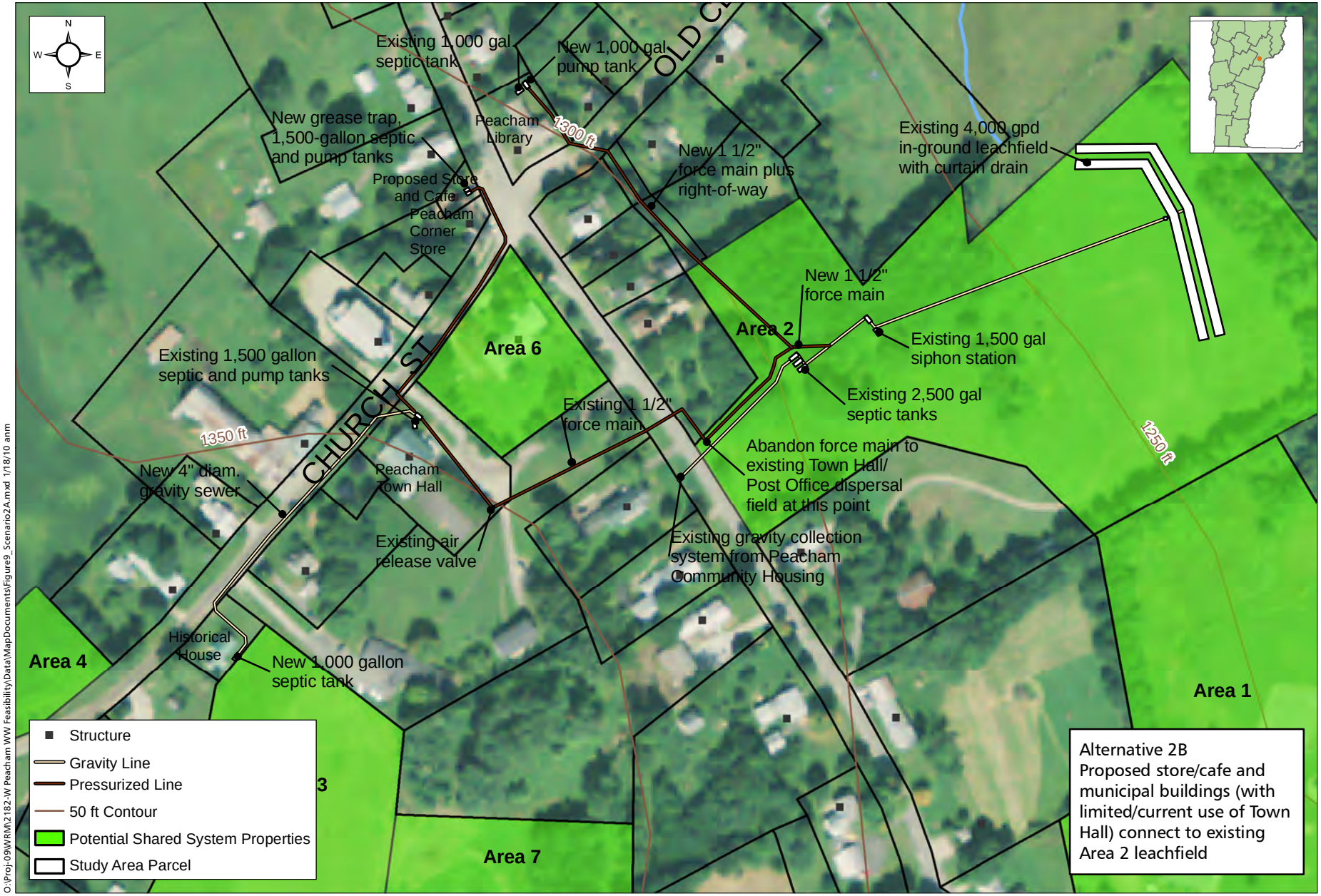

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FIGURE 10. ALTERNATIVE 2B
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

FIGURE 11. ALTERNATIVE 2C
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

FIGURE 12. ALTERNATIVE 2D
Wastewater Needs Assessment and Feasibility Study for Peacham Corner

Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

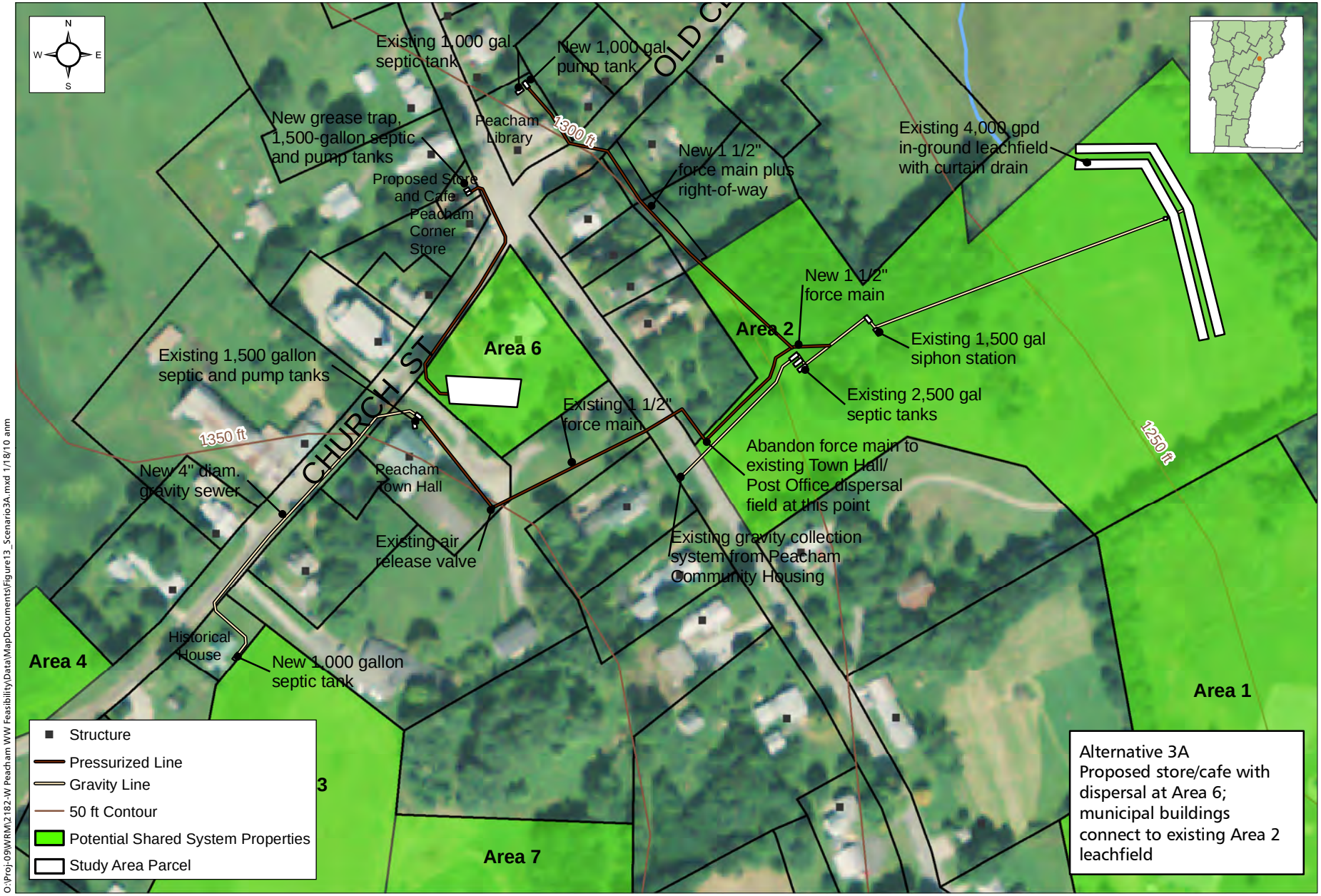

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FIGURE 13. ALTERNATIVE 3A
Wastewater Needs Assessment and Feasibility Study for Peacham Corner

Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

FIGURE 14. ALTERNATIVE 3B
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

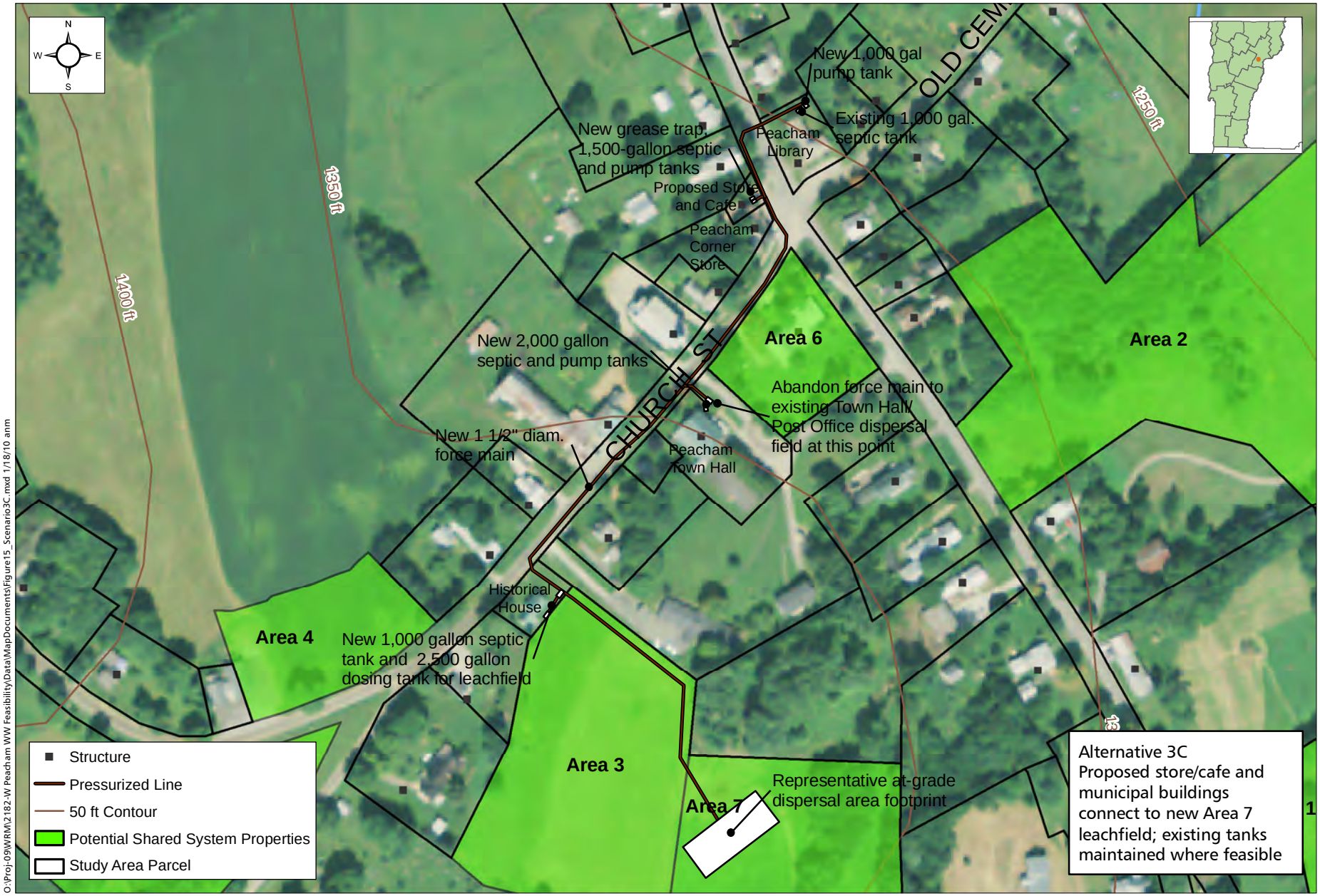

FIGURE 15. ALTERNATIVE 3C
Wastewater Needs Assessment and Feasibility Study for Peacham Corner

Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

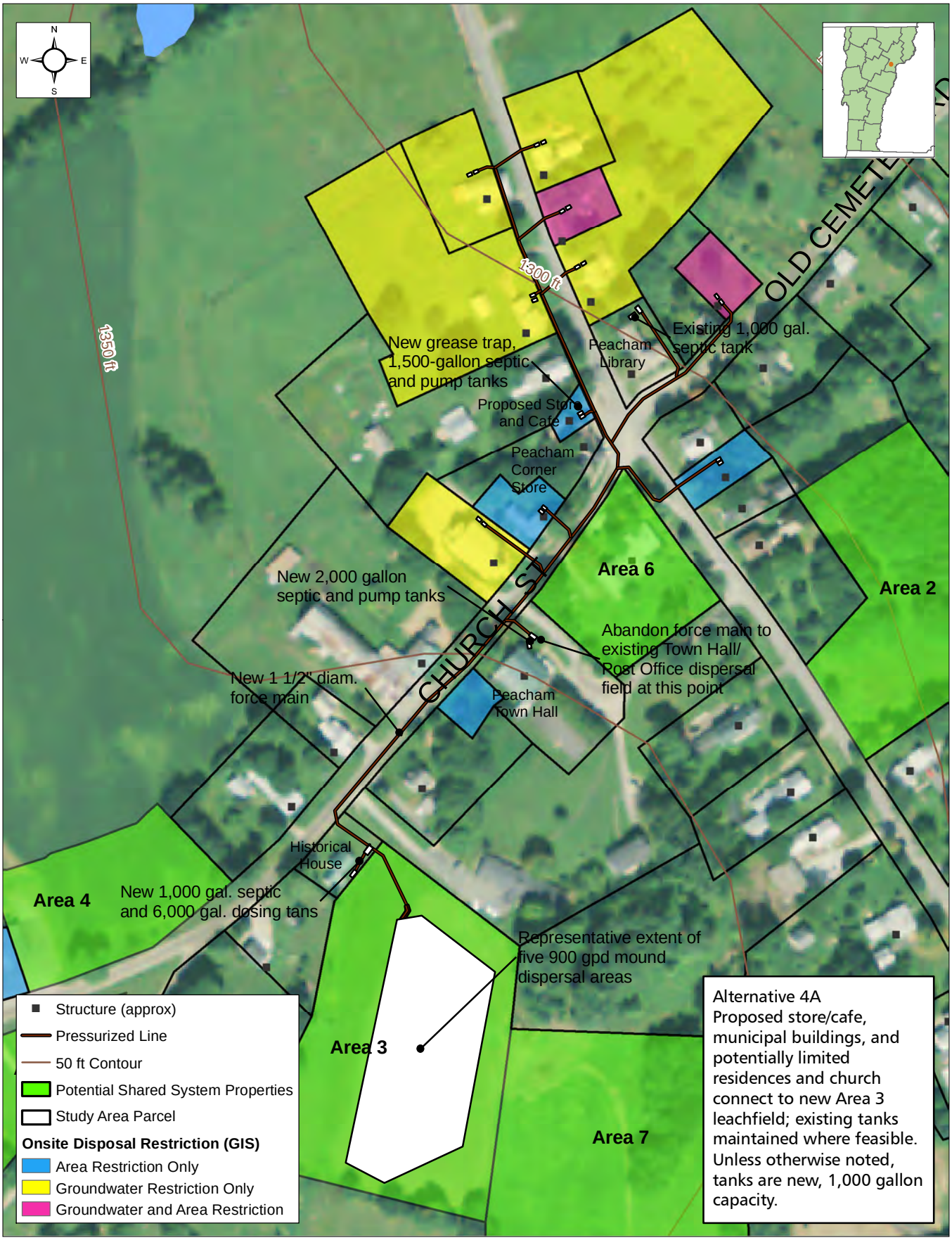

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FIGURE 16. ALTERNATIVE 4A
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

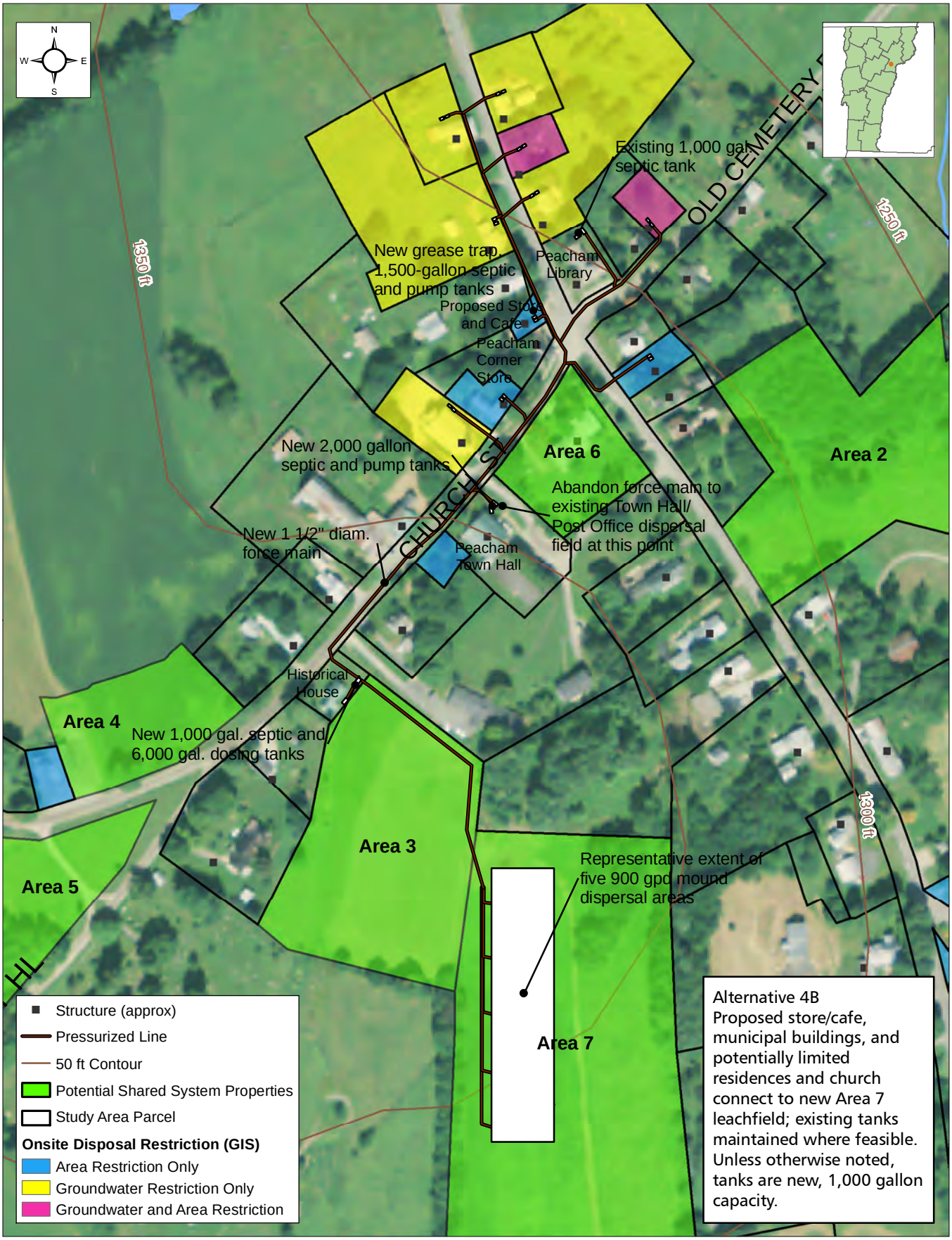

FIGURE 17. ALTERNATIVE 4B
Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, VT

Sources: Hydrography, VCGI, 2007; Roads, VCGI, 2007; Structures, ESites, 2008; Parcel Boundaries, NVDA, 2002; Imagery, NAIP, 2008. Locations of existing components are approximate.
Note: Potential site and soil suitability conditions are based on soil survey data and need to be field verified.

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 1: Summary of Survey Responses Regarding Wastewater Needs
Surveys Mailed: 51, Surveys Returned: 30, Response Rate: 59%

Survey Question	Response	Number of Responses	% of Responses
1.	How many people live or work in the building served by your wastewater treatment system?		
	1-2	18	60%
	3-4	8	27%
	5-6	2	7%
	7-8	2	7%
2.	If the building served by your wastewater treatment system is a residence, how many bedrooms does it have?		
	1-2	4	13%
	3-4	18	60%
	5-6	1	3%
	Blank or no answer	6	20%
3.	How long have you lived in your residence or owned your business?		
	1-5 years	4	13%
	5-10 years	4	13%
	Less than a year	2	7%
	More than 10 years	18	60%
4.	Is there more than one septic system on your property?		
	No	28	93%
	Yes	2	7%
5.	Please indicate when your septic system was originally installed:		
	1970-1981	3	10%
	1982-1989	5	17%
	1990-1995	1	3%
	1996-2001	7	23%
	2002-present	2	7%
	Before 1970	3	10%
	Unsure	8	27%

Source: Property owner surveys, Stone Environmental, 2009.
Date/init: 11/6/09 anm
Path: O:\Proj-09\2182-W-Peacham\Data\GISData\Peacham_092182-W.mdb [rptTable1_SurveyResults]

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 1 (cont.): Summary of Survey Responses Regarding Wastewater Needs
Surveys Mailed: 51, Surveys Returned: 30, Response Rate: 59%

Survey Question	Response	Number of Responses	% of Responses
6.	Please indicate any upgrades or repairs that have been performed on your septic system within the last ten years:		
	None or blank	22	73%
	Other repair	4	13%
	Replaced the leachfield	3	10%
	Replaced the septic tank	3	10%
7.	Please indicate the components of your septic system by checking as many boxes as apply:		
	Concrete septic tank	19	63%
	Distribution box (d-box)	2	7%
	Dry well	3	10%
	Leachfield	16	53%
	Metal septic tank	1	3%
	Mound	3	10%
	Other	3	10%
	Other septic tank	4	13%
	Pump station	2	7%
	Unknown	6	20%
8.	How often is the septic tank pumped?		
	1-2 years	3	10%
	3-4 years	7	23%
	5-7 years	3	10%
	More than 7 years	4	13%
	Unknown	12	40%
8a.	Year that septic tank was last pumped:		
	2001	1	3%
	2003	1	3%
	2005	2	7%
	2006	1	3%
	2007	4	13%
	2008	4	13%
	2009	3	10%
	Before 2000	2	7%

Source: Property owner surveys, Stone Environmental, 2009.
Date/init: 11/6/09 anm
Path: O:\Proj-09\2182-W-Peacham\Data\GISData\Peacham_092182-W.mdb [rptTable1_SurveyResults]

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 1 (cont.): Summary of Survey Responses Regarding Wastewater Needs
Surveys Mailed: 51, Surveys Returned: 30, Response Rate: 59%

Survey Question	Response	Number of Responses	% of Responses
8b.	What company pumps your septic tank?		
	B & B Septic	14	47%
	Other	4	13%
	Royal Flush Sanitation	1	3%
9.	How deep below the surface is the top of your septic tank?		
	0-1 foot	4	13%
	1-2 feet	7	23%
	2-3 feet	3	10%
	More than 3 feet	1	3%
	Unsure	14	47%
10.	Have you ever experienced any of the following conditions in or around your leach field or drywell?		
	None	25	83%
	Overflow through pipe to a ditch	1	3%
	Sewage smell	2	7%
	Sink holes	1	3%
11.	Have you ever experienced sewage back up into a building?		
	No	27	90%
	Yes	2	7%
11a.	If Yes, has the situation been corrected?		
	Yes	2	7%
11b.	If Yes, please briefly describe how the situation was corrected.		
	Describe in comment	2	7%
12.	Do you have a copy of any sketches, plans or permits of your septic system available for reference?		
	No	22	73%
	Yes	7	23%
13.	Do you have any plans to change the way your property is used?		
	No	29	97%
	Yes (describe in comment)	1	3%

Source: Property owner surveys, Stone Environmental, 2009.
Date/init: 11/6/09 anm
Path: O:\Proj-09\2182-W-Peacham\Data\GISData\Peacham_092182-W.mdb [rptTable1_SurveyResults]

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 1 (cont.): Summary of Survey Responses Regarding Wastewater Needs
Surveys Mailed: 51, Surveys Returned: 30, Response Rate: 59%

Survey Question	Response	Number of Responses	% of Responses
14.	If sewage capacity were not an issue, is there anything you would want to do with your property that you can't do now?		
	No	25	83%
	Yes (describe in comment)	4	13%
15.	Do you have any comments regarding wastewater management in Peacham Corner?		
	No or blank	28	93%
	Yes (describe in comment)	2	7%
16.	Do you have any questions or concerns about the water supply and distribution system that serves your property?		
	No	24	80%
	Yes (describe in comment)	3	10%
17.	Did you receive a copy of this year's Annual Report for the water system, which was delivered to your house in early July?		
	No	4	13%
	Yes (describe in comment)	24	80%
17a.	If "No", would you like to have a copy mailed to you?		
	No	2	7%
	Yes	2	7%
18.	Are you interested in receiving a free evaluation of your wastewater treatment system?		
	No	17	57%
	Yes	11	37%
19.	Contact information provided?		
	No or blank	13	43%
	Yes (describe in comment)	17	57%
20.	Sketch of property included, with location of septic system?		
	No sketch	5	17%
	Sketch completed	24	80%

Source: Property owner surveys, Stone Environmental, 2009.
STONE ENVIRONMENTAL, INC
Date/init: 11/6/09 anm
Path: O:\Proj-09\2182-W-Peacham\Data\GISData\Peacham_092182-W.mdb [rptTable1_SurveyResults]

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 2: Study Area Description

Parcel ID	Property Location	Owner or Contact Name	Acres	Property Description
00609-000	35 ACADEMY HILL	VIRGINIA L ESCALADA	1	HOUSE AND LAND
04106-005	340 BAYLEY HAZEN RD	PEACHAM SCHOOL DISTRICT	10.67	ELEMENTARY SCHOOL
00154-000	398 BAYLEY HAZEN RD	WILLIAM W COBB AND PHOEBE CAVANAUGH COBB	0.75	HOUSE AND LAND
00152-000	443 BAYLEY HAZEN RD	PRISCILLA J ENGLE	0.7	HOUSE AND LAND
00151-000	458 BAYLEY HAZEN RD	MARK W & KAREN E FITZHUGH	2	HOUSE AND LAND
00150-000	475 BAYLEY HAZEN RD	RODNEY J REIS	1.88	HOUSE AND LAND
00148-000	480 BAYLEY HAZEN RD	ROY GIBSON PARRISH	1	HOUSE AND LAND
00149-000	511 BAYLEY HAZEN RD	JOHN C MEYER, JR	2.39	HOUSE AND LAND
00147-000	535 BAYLEY HAZEN RD	MARY ELIZABETH BROWN	0.5	HOUSE AND LAND
00145-002	555 BAYLEY HAZEN RD	MARC J MATZ	0.74	HOUSE AND LAND
00144-001	588 BAYLEY HAZEN RD	KATHLEEN A SCHAUER	2.79	HOUSE AND LAND
00143-000	604 BAYLEY HAZEN RD	RICHARD A & JOSETTE A. LYDERS TRUST	0.74	HOUSE AND LAND
00141-000	613 BAYLEY HAZEN RD	LAWRENCE & REBECCA JENSEN	1	HOUSE AND LAND
00142-000	614 BAYLEY HAZEN RD	ELLEN AND RICHARD A. O'LEARY	0.25	HOUSE AND LAND
00140-000	624 BAYLEY HAZEN RD	DRUSILLA B POWDEN	0.25	HOUSE AND LAND
00139-000	641 BAYLEY HAZEN RD	KAREN E STAWIECKI	0.25	STORE, APARTMENT AND LAND
00138-000	643 BAYLEY HAZEN RD	PEACHAM COMMUNITY HOUSING	0.05	OLD TOWN OFFICE
00134-005	656 BAYLEY HAZEN RD	PEACHAM LIBRARY CORPORATION	0.06	LIBRARY AND LAND
00136-000	665 BAYLEY HAZEN RD	JEAN CLARK	1.87	HOUSE AND LAND
00135-000	679 BAYLEY HAZEN RD	EMMA BEAN (LIFE ESTATE)	1.41	HOUSE AND LAND
00134-000	680 BAYLEY HAZEN RD	DOUGLAS JAMIESON	1.75	HOUSE AND LAND

Source: Town of Peacham Grand List, 2009.

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Notes: Parcel acreage is from the Assessor's list. If data was unavailable, the value was left blank.

Path: O:\Proj-09\WRM\2182-W Peacham WW Feasibility\Data\GISData\Peacham_092182.mdb [rptTable02_StudyAreaProperties]

Date/init: 11/06/09 anm

TABLE 2 (continued): Study Area Description

Parcel ID	Property Location	Owner or Contact Name	Acres	Property Description
00133-000	700 BAYLEY HAZEN RD	JENNIFER STEVENSON	0.25	HOUSEAND LAND
00131-000	719 BAYLEY HAZEN RD	GEORGE & PATRICIA KEMPTON	1	HOUSE AND LAND
00132-000	720 BAYLEY HAZEN RD	JONATHAN KAPLAN	0.5	HOUSE AND LAND
00601-000	38 CHURCH ST	NANCY BUNDGUS - LIFE ESTATE	0.33	HOUSE AND LAND
00607-006	56 CHURCH ST	PEACHAM CONGREGATIONAL CHURCH	0.75	CHURCH AND LAND
00145-003	79 CHURCH ST	TOWN OF PEACHAM	0.74	TOWN OFFICES AND LAND
00603-000	94 CHURCH ST	GEORGE & PATRICIA KEMPTON	20.79	HOUSE AND LAND
00603-004	101 CHURCH ST	PEACHAM HISTORICAL ASSOC	0.11	OUTBUILDING AND LAND
00145-005	121 CHURCH ST	MICHAEL & LISA DELISO	0.59	HOUSE AND LAND
00605-000	132 CHURCH ST	SANDRA CRAIG GOSS	0.33	HOUSE AND LAND
00145-001	135 CHURCH ST	PEACHAM HOUSING LTD PARTNERSHIP	2.63	APARTMENTS AND LAND
00606-000	150 CHURCH ST	JEAN BOARDMAN	0.76	HOUSE AND LAND
00607-005	153 CHURCH ST	PEACHAM HISTORICAL ASSOC	0.1	HOUSE AND LAND
00607-000	185 CHURCH ST	J & C BERWICK, LLC	0.48	HOUSE AND LAND
04201-000	64 MACKS MTN RD	TOWN OF PEACHAM	5	FIRE HOUSE, ROLLER BARN AND LAND
04202-000	110 MACKS MTN RD	ROBERT & EDNA FURR TRUST	1	HOUSE AND LAND
04204-000	147 MACKS MTN RD	JULIAN SMITH	2.91	HOUSE AND LAND
04205-000	154 MACKS MTN RD	MCTIGUE REVOCABLE TRUST	1	HOUSE AND LAND
04207-000	206 MACKS MTN RD	SCHENCK ROBERT M & ALICE B	1.33	HOUSE AND LAND
04208-000	275 MACKS MTN RD	BEATRICE C DE ROCCO	3	HOUSE AND LAND
04211-000	355 MACKS MTN RD	DORCAS GRAY	1.25	HOUSE AND LAND

Source: Town of Peacham Grand List, 2009.

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Notes: Parcel acreage is from the Assessor's list. If data was unavailable, the value was left blank.

Path: O:\Proj-09\WRM\2182-W Peacham WW Feasibility\Data\GISData\Peacham_092182.mdb [rptTable02_StudyAreaProperties]

Date/init: 11/06/09 anm

TABLE 2 (continued): Study Area Description

Parcel ID	Property Location	Owner or Contact Name	Acres	Property Description
04301-000	33 OLD CEMETERY RD	SEAN L & JUDITH A MARKEY	0.5	HOUSE AND LAND
04302-000	40 OLD CEMETERY RD	SMITH HILARY & DABNEY THOMAS TRUSTEES	0.75	HOUSE AND LAND
04304-000	70 OLD CEMETERY RD	ALFRED R HIRSCHFELD & POLLY M INGRAHAM	0.5	HOUSE AND LAND
04305-000	102 OLD CEMETERY RD	DUNCAN & GRETCHEN BOND	27.13	HOUSE AND LAND
00159-000	749 SOUTH MAIN ST	LYNN BONFIELD & KAREN LEWIS, TRUSTEES	4.8	HOUSE AND LAND
00160-000	752 SOUTH MAIN ST	PAUL E & MARGARET CLEMONS	1.6	HOUSE AND LAND
00158-000	769 SOUTH MAIN ST	V ANNE BROWN	0.51	HOUSE AND LAND
00157-001	775 SOUTH MAIN ST	FRANCIS R MAGLEBY	3	HOUSE AND LAND
00156-000	780 SOUTH MAIN ST	JEROME & DIANA SENTURIA	0.25	HOUSE AND LAND
00155-000	791 SOUTH MAIN ST	JOHN FRANCIS ENGLE	2.64	HOUSE AND LAND

Source: Town of Peacham Grand List, 2009.

Notes: Parcel acreage is from the Assessor's list. If data was unavailable, the value was left blank.

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Date/init: 11/06/09 anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 3
Summary of Soil Characteristics Regarding Onsite Wastewater Disposal Within Study Area

Series Name	Mapping Unit	Slope (Percent)		Water Table (Feet)		Hydric Soil	Depth to Bedrock (Inches)		Potential On-Site System Suitability	% Study Area
		Low	High	Low	High		Low	High		
Buckland fine sandy loam	20B	3	8	1	2	N	60	60	Filtrate + Mound with Curtain Drain	8.4
Cabot silt loam	22B	3	8	0	1.5	Y	60	60	Not Suited or Two-Year Time of Travel and/or Store and Dose	11.3
Dummerston very fine sandy loam	16C	8	15	6	6	N	60	60	At-Grade or Filtrate + Conventional	26.9
Dummerston very fine sandy loam	16D	15	25	6	6	N	60	60	At-Grade or Filtrate + Conventional	1.6
Peacham muck, very stony	24A	0	3	-1	0.5	Y	60	60	Not Suited	0.2
Vershire-Lombard complex, rocky	14C	8	15	6	6	N	20	72	Mound or Filtrate + At-Grade	39.3
Vershire-Lombard complex, rocky	14D	15	25	6	6	N	20	72	Mound or Filtrate + At-Grade	12.2

Source: National Resource Conservation Service (NRCS), SEI Field Notes

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Notes: % Area was calculated using data from NRCS and Geographic Information Systems (GIS) by dividing the total area (acres) of each Series in the Service Area by the total area (acres) of the study area.

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Date/Initials: 11/10/09 anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
Table 4: Permit Information Summary

Parcel ID	Land Owner or Applicant Name	Permit Date	Permit No.	Location	Reason for Permit
00152-001	Verna Rowe Kinsey	8/30/1984	DE-7-1333	State Aid Highway 1	CONVEY 0.19 ACRE
00609-001	George Kempton	3/10/1976	EC-7-0241	Cemetary Hill Rd.	Single lot SUBDIVISION
00141-000	John Farrell	8/20/1984	PB-7-0430	Town Highways 1 and 6	Renovate existing tourist home to add a 20-seat restaurant
00174-001	Peacham Academy Property Corp	12/24/1974	DE-7-0074	State Aid Highway 1	1.79 acres
00145-001	Peacham School, Inc.	8/16/1976	PB-7-0088	Church St.	Renovation of Kenerson Hall for Classroom space for 70 students
00174-001	Peacham Academy Property Corp	1/11/1980	DE-7-0714	State Aid Highway 1	+/- 6 acres
00145-001, 00146-001	Peacham Associates, Inc.	11/14/1980	PB-7-0264	State Aid Highway 1	Conversion of alumni hall to 2 apartments , conversion of kenerson hall to 6 apartments
00145-001	Peacham Associates, Inc.	10/31/1989	EC-7-1391	Peacham Village	2-lot subdivision (existing buildings)
00145-001, 00145-002, 00145-005	Hilary Smith / Peacham Associates, Inc.	4/10/1992	EC-7-1623	Town Highways 1 and 6	3 lot subdivision with apartment buildings
00145-003	Town of Peacham	10/31/1989	WW-7-0110	Town Highway 6	Renovations of former Peacham Academy Gym building into town office and a post office
00134-005	Peacham Library	2/1/2000	WW-7-0791	Town Highways 1 and 43	Construction of a 24 ft. by 44 ft. addition to the existing library
04201-000	Town of Peacham Fire Department	9/12/2000	WW-7-0822	Macks Mountain Road	Addition to the existing fire station
04106-005	Peacham School Board	10/6/1980	PB-7-0259	340 Bayley Hazen Road	Construction of replacement wastewater disposal system
04106-005	Peacham Elementary School	10/30/1989	WW-7-0109	340 Bayley Hazen Road	Reduce enrollment capacity from 60 to 57
04106-005	Peacham Town School District	4/30/1993	WW-7-0344	340 Bayley Hazen Road	Proposed addition to school including new wastewater disposal system
04106-005	Peacham School Board	10/8/2008	WW-7-0344-1	340 Bayley Hazen Road	Amendment to WW-7-0344 to divide 10.38 acres into 2 lots
04106-005	Peacham School Board	1/26/2009	WW-7-0344-2	340 Bayley Hazen Road	Amendment to WW-7-0344-1 to reconfigure Lots # 1 & 2
00160-000	Northeast Kingdom Astronomy Foundation	8/3/2009	WW-7-2878	336 Bayley Hazen Road	Construction of a observatory with a classroom building served by on-site water supply and on-site wastewater

Source: Vermont DEC permit search, Sept. 2009

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Date/init: 11/10/09 anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
Table 5: Summary of Needs Assessment Results

Description:

42 Single Family Residences
2 Apartments
1 Store and Apartment
7 Municipal or Institutional Properties
52 Properties Total

Water Supplies:

49 Connections to Community Water System
1 Non-Transient, Non-Community Water Supply (Drilled Well)

Factors Affecting Recommended Solutions:

Factor	Number of Properties Affected	% of Total
Limited Available Area Only	7	13%
Proximity to Water Supply Wells	1	2%
Proximity to Structures or Property Lines	6	12%
Shallow Seasonal Groundwater Only	5	10%
Shallow Seasonal Groundwater and Limited Available Area	2	4%
Shallow Bedrock Only	0	0%
No Restrictions	38	73%

Recommended Solutions:

Properties Recommended for an Onsite Solution	38	73%
Properties May Need Offsite Solutions	14	27%

Source: Stone field notes; Survey results; Town Grand List data table; VT DEC permits; parcel GIS database

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Date/init: 11/09/09 anm, rev 2/8/10 anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 6: Representative Wastewater Flows and Estimated Land Area Requirements

Building Type	Flow Basis (gallons per unit, per day)	Estimated Units	Estimated Design Flows (gallons per day)	Estimated Land Area Required (square ft.)**
Scenario 1: Proposed Store/Café Only				
Restaurant (2 meals/day)	30 / Seat	20 seats	600	
Retail/Convenience Store (small dry goods store)	100 / store	1 store	100	
Historical Association office and Retail Craft Store	15 / Employee	4 employees	60	
Scenario 1 Total Wastewater Flows			**760**	**3,275**
Scenario 2: Proposed Store/Café plus Municipal Buildings at Current Use				
Town Offices and Post Office	15 / Employee	3 employees	45	
Town Hall (for public meetings)	5 / Person	60 persons	300	
Library	15 / Employee	4 employees	60	
Historical Association (Historical House)	15 / Employee	1 employee	15	
Scenario 2 Total Wastewater Flows			**1,180**	**5,263**
Scenario 3: Proposed Store/Café plus Municipal Buildings at Public Meeting Capacity				
Town Offices and Post Office	15 / Employee	3 employees	45	
Town Hall (for public meetings)	5 / Person	200 persons	1,000	
Library	15 / Employee	4 employees	60	
Historical Association (Historical House)	15 / Employee	1 employee	15	
Scenario 3 Total Wastewater Flows			**1,880**	**8,561**
Scenario 4: Proposed Store/Café, Municipal Buildings at Public Meeting Capacity, and Limited Properties near Main Intersection				
Residential (All properties with limitations in 4-corners sharing a dispersal system)*	285 / Residence	8 residential units	2,280	
Peacham Congregational Church	5 / Person	60 persons	300	
Scenario 4 Total Wastewater Flows			**4,460**	**20,851**

Notes: *Residential flows range from 420 gpd for an individual residence or by bedrooms up to 4 units, to as low as 245 gpd per unit for 20+ units.

**Estimated land area is calculated assuming conventional in-ground absorption trenches, 3 feet wide and 4 feet on center, and no longer than 100 fee per trench, with approximate loading rates for fine sandy loam soils from IDRs and EPRs. At-grade systems and mound systems require larger areas.

Source: VT EPRs, Chapter 1, eff. September 29, 2007.

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 7: Summary of Potential Wastewater Dispersal Sites

Area Number	Description	Existing Dispersal Area Capacity, gpd	Estimated or Potential Available Capacity, gpd*	Advantages	Disadvantages
1	Town Hall and Post Office – Existing Dispersal System	1,200	155	• System already exists • Municipal ownership • Sufficient capacity for Scenario 1 dry goods store and offices	• Limited additional capacity (not sufficient for Scenario 1 café) • Dispersal field in School WHPA • Soils may not meet current rules' minimum conditions • Tanks for existing system at higher elevation than most connections, pumping required
2	Peacham Community Housing – Existing Dispersal System	4,000	1,500	• System already exists • Sufficient capacity for Scenarios 1 OR 2 (not both) • Tanks at similar or lower elevation than most connections, gravity collection potentially feasible	• Complex ownership agreement • Future planning decisions may reduce potentially available capacity
3	Former Vermont Land Trust Property		2,000-5,000	• Capacity likely sufficient for any scenario • Municipal ownership • No existing infrastructure to work around	• Site at higher elevation than connections, pumping required • Deed may contain restrictions on future property uses
4	Fire Station Adjacent Property		2,000-5,000	• Municipal ownership • No existing infrastructure to work around	• Site at higher elevation than connections, pumping required • Proposed use of site for event parking not compatible with dispersal field siting • Capacity may be limited

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 7: Summary of Potential Wastewater Dispersal Sites

Area Number	Description	Existing Dispersal Area Capacity, gpd	Estimated or Potential Available Capacity, gpd*	Advantages	Disadvantages
5	Overlook Park		2,000-5,000	• Capacity likely sufficient for any scenario • Municipal ownership • No existing infrastructure to work around	• Site at higher elevation than connections, pumping required • Deed may contain restrictions on future property uses
6	Former Peacham Inn	600	600	• Some site characterization information available • With pre-treatment, may be sufficient for Scenario 1 • Site very close to proposed store/café	• Site at higher elevation than connections, pumping required • Ownership negotiations required • Available land area is limited • Modifications to existing system may be required if property is subdivided
7	Field Adjacent to Former Vermont Land Trust Property		2,000-5,000	• Capacity likely sufficient for any scenario • No existing infrastructure to work around	• Site at higher elevation than connections, pumping required • Ownership negotiations required

Notes: gpd = gallons per day

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*Estimated available capacity within existing systems calculated based on narrative in Section 5.3 of this report.
Potential available capacity for undeveloped sites is based on Soil Survey soil texture and estimated land requirements in Table 6.
No site confirmation testing or site-specific capacity analysis was performed during this study.

Source: VT EPRs, Chapter 1, eff. September 29, 2007, and Stone Environmental, Inc. 2010 calculations.

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Date/init: 1/5/2010, anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 8: Comparison of Collection System Alternatives

Type	Advantages	Disadvantages	Suitable for Project?
Gravity Sewer	• Current standard of practice for most public systems • Low maintenance • Once system in place, any property can connect by gravity or by pumping	• Must collect downhill from connections; otherwise a private pump is required • Significant excavation depths required to maintain grade • Infiltration into collection system can be problematic for soil-based dispersal fields • Increased potential for odors in gravity sewers	Yes, only where connection is at higher elevation than collection point
Septic Tank Effluent Pump (STEP)	• Often can utilize existing septic tanks • Collection system is small diameter pipe • Not required to be laid in straight segments or at a single slope	• Pumps and controls needed at individual properties • Small diameter force main limits the number of additional connections • May need to replace septic tanks or add pump vaults on some properties	Yes
Septic Tank Effluent Gravity (STEG)	• Often can utilize existing septic tanks • May reduce cost for pump stations and preliminary treatment	• May need to replace tanks on some properties • Increased potential for odors in gravity sewers	Yes, only where connection is at higher elevation than collection point
Low Pressure Sewer	• Collection system has small diameter pipes • Not required to be laid in straight segments or at a single slope	• Pumps and controls needed at individual properties • Grinder pumps at individual properties require relatively frequent maintenance • Small diameter force main limits the number of additional connections • May need to replace septic tanks or add pump vaults on some properties	No
Vacuum Sewer	• Less obtrusive than individual pump stations • Best suited to lakeshore settings or areas with little topographic relief	• High maintenance costs • Loss of vacuum can quickly result in sewage backup	No

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 9: Summary of Potential Wastewater Treatment and Dispersal Alternatives

Scenario	Alternative No.	Treatment System	Collection System	Dispersal	Figure Reference
Scenario 1: Conversion of former Town Offices and bus barn building to co-op store and café (760 gpd).	1A	New grease trap, septic tank, and pump tank	Low-pressure pipe for septic tank effluent	New mound system at Area 6	Figure 5
	1B	New grease trap, septic tank, and pump tank; advanced treatment prior to dispersal	Low-pressure pipe for septic tank effluent	New filtrate mound system at Area 6 (advanced treatment allows smaller dispersal system area)	Figure 6
	1C	New grease trap, septic tank, and pump tank	Low-pressure pipe for septic tank effluent	Existing in-ground leachfield at Area 2	Figure 7
	1D	New grease trap, septic tank, and pump tank	Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 3	Figure 8
Scenario 2: Scenario 1 plus the Town Hall and Post Office (with the Town Hall at its current use for small public meetings), library, and the Historical House (1,180 gpd).	2A	New grease trap, septic tank, and pump tank for store/café; existing or new septic tanks and pump tanks for Town Hall, library, and Historical House	Gravity or low-pressure pipe for septic tank effluent, as appropriate	New mound system at Area 6 for store/café; existing in-ground leachfield at Area 2 for Town Hall, library, and Historical House.	Figure 9
	2B		Gravity or low-pressure pipe for septic tank effluent, as appropriate	Existing in-ground leachfield at Area 2	Figure 10
	2C		Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 3	Figure 11
	2D		Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 7	Figure 12

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 9: Summary of Potential Wastewater Treatment and Dispersal Alternatives

Scenario	Alternative No.	Treatment System	Collection System	Dispersal	Figure Reference
Scenario 3: Scenario 1 plus the Town Hall and Post Office (with capacity for large public meetings), library, and the Historical House (1,880 gpd).	3A	New grease trap, septic tank, and pump tank for store/café; existing or new septic tanks and pump tanks for Town Hall, library, and Historical House	Gravity or low-pressure pipe for septic tank effluent, as appropriate	New mound system at Area 6 for store/café; existing in-ground leachfield at Area 2 for Town Hall, library, and Historical House.	Figure 13
	3B		Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 3	Figure 14
	3C		Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 7	Figure 15
Scenario 4: Scenarios 1 and 3 plus eight residential properties and Peacham Congregational Church near the Bayley Hazen Road – Church Street intersection which were identified as potentially limited (4,460 gpd).	4A	New grease trap, septic tank, and pump tank for store/café; existing or new septic tanks and pump tanks for Town Hall, library, Historical House, Church, and residences as appropriate	Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 3	Figure 16
	4B		Low-pressure pipe for septic tank effluent	New at-grade leachfield at Area 7	Figure 17

Notes: gpd = gallons per day

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*Estimated available capacity within existing systems calculated based on narrative in Section 5.3 of this report.
Potential available capacity for undeveloped sites is based on Soil Survey soil texture and estimated land requirements in Table 6.
No site confirmation testing or site-specific capacity analysis was performed during this study.

Source: VT EPRs, Chapter 1, eff. September 29, 2007, and Stone Environmental, Inc. 2010.

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Date/init: 1/19/2010, anm

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 10: Preliminary Estimate of Total Project Costs

Description	Estimated gallons per day[1]	**Total Construction Costs (incl. 15% contingency)[2]**	Engineering Services and Misc. Costs[3]	Legal, Fiscal, Admin, and Short Term Interest[4]	Land Acquisition and Easements[5]	**Total Project Costs[6]**
Alternative 1C	760	$47,000	$20,000	$2,300	$0	$70,000
Alternative 1D	760	$57,000	$23,000	$2,800	$0	$83,000
Alternative 2B	1,180	$81,000	$28,000	$4,000	$10,000	$123,000
Alternative 2C	1,180	$90,000	$30,000	$4,500	$0	$125,000
Alternative 2D	1,180	$97,000	$31,000	$4,800	$10,000	$143,000
Alternative 3B	1,880	$111,000	$35,000	$5,500	$0	$152,000
Alternative 3C	1,880	$114,000	$35,000	$5,700	$10,000	$165,000
Alternative 4A	4,460	$270,000	$71,000	$13,500	$0	$355,000
Alternative 4B	4,460	$275,000	$72,000	$13,700	$10,000	$371,000

Notes: STONE ENVIRONMENTAL, INC

[1] Based on existing needs. Assumes that full design capacity is connected at startup.

[2] Assumes 15% for unforeseen items/construction change orders.

[3] Based on VT State curve estimates for engineering as a percentage of total construction cost.

[4] Based on 5% of construction costs.

[5] Allowance for land purchase or easement for pumping stations, treatment and dispersal locations where applicable.

[6] All costs are rounded to the nearest thousand dollars.

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
TABLE 11: Preliminary Estimate of Annual Costs

	Scenario 1: Store/Café Only		Scenario 2: Store/Café Plus Municipal Facilities, Limited Meeting Capacity			Scenario 3: Store/Café Plus Municipal Buildings, Full Meeting Capacity		Scenario 4: Store/Café Plus Municipal Buildings, Church, And Potentially Limited Residences	
	Alternative 1C	Alternative 1D	Alternative 2B	Alternative 2C	Alternative 2D	Alternative 3B	Alternative 3C	Alternative 4A	Alternative 4B
Total Project Costs (from Table 10)	**$70,000**	**$83,000**	**$123,000**	**$125,000**	**$143,000**	**$152,000**	**$165,000**	**$355,000**	**$371,000**
Grants/Other Project Funds[1]	$0	$0	$0	$0	$0	$0	$0	$0	$0
Local Share (Loan)	**$70,000**	**$83,000**	**$123,000**	**$125,000**	**$143,000**	**$152,000**	**$165,000**	**$355,000**	**$371,000**
Annual Costs									
Annual Payment on Loan (5% For 20 Years)	$5,600	$6,700	$9,900	$10,000	$11,500	$12,200	$13,200	$28,500	$29,800
Annual Operational Costs for Wastewater Systems									
System Inspection by Designer or Engineer	$750	$750	$1,500	$1,500	$1,500	$2,000	$2,000	$3,000	$3,000
Grease Trap Maintenance[2]	$300	$300	$300	$300	$300	$300	$300	$300	$300
Septic Tank Pumping[3]	$60	$60	$240	$240	$240	$240	$240	$780	$780
Total Annual Costs	**$6,710**	**$7,810**	**$11,940**	**$12,040**	**$13,540**	**$14,740**	**$15,740**	**$32,580**	**$33,880**
Total Number of Units to be Connected[4]	1	1	4	4	4	4	4	13	13
Total Project Cost Per GPD Capacity[5]	**$90**	**$110**	**$100**	**$110**	**$120**	**$80**	**$90**	**$80**	**$80**
Total Annual Cost Per GPD Capacity[5]	$8.80	$10.30	$10.10	$10.20	$11.50	$7.80	$8.40	$7.30	$7.60

Notes:

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[1] No specific sources of grant funding have been identified at this time.

[2] Assumes that the grease trap at the store/cafe is emptied once per year at a cost of $300.

[3] Assumes that each septic tank is pumped once every five years at a cost of $300.

[4] Total number of units is based on a count of existing structures to be served.

[5] Based on gallons per scenario as outlined in Table 6.

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TABLE 12: Evaluation of Alternatives

	Scenario 1: Store/Café Only		Scenario 2: Store/Café Plus Municipal Facilities, Limited Meeting Capacity			Scenario 3: Store/Café Plus Municipal Buildings, Full Meeting Capacity		Scenario 4: Store/Café Plus Municipal Buildings, Church, And Potentially Limited Residences	
Criteria	**Alternative 1C**	**Alternative 1D**	**Alternative 2B**	**Alternative 2C**	**Alternative 2D**	**Alternative 3B**	**Alternative 3C**	**Alternative 4A**	**Alternative 4B**
Costs/Funding	• Lowest cost alternative • Potential to finance via foundation grant or local appropriation	• Lower cost alternative • Potential to finance via foundation grant or local appropriation	• Lower cost alternative • Potential to finance via foundation grant or local appropriation	• Lower cost alternative • Potential to finance via foundation grant or local appropriation	• Lower cost alternative • Potential to finance via foundation grant or local appropriation	• Higher cost alternative Potential to finance via foundation grant or local appropriation	• Higher cost alternative • Potential to finance via foundation grant or local appropriation	• Higher cost alternative • Potential to fund with VT DEC SRF or USDA-RD loan	• Highest cost alternative • Potential to fund with VT DEC SRF or USDA-RD loan
Implementation/ Feasibility	• Requires negotiation with Peacham Comm. Housing owners for dispersal field use • Simple project implementation	• Simple project implementation	• Requires negotiation with private property owners for right-of-way from Library • Requires negotiation with Peacham Comm. Housing owners for dispersal field use	• Simple project implementation	• Requires negotiation with private property owner for dispersal site • Simple project implementation	• Potential flexibility to add limited service connections after project implemented	• Requires negotiation with private property owner for dispersal site • Potential flexibility to add limited service connections after project implemented	• Potential flexibility to add limited service connections after project implemented	• Requires negotiation with private property owner for dispersal site • Potential flexibility to add limited service connections after project implemented
Administrative Issues	• Tanks and force main on municipal property ease access issues	• Tanks, force main and dispersal all on municipal property eases access issues	• Tanks and collection systems on municipal property ease access issues	• Tanks, collection systems, and dispersal all on municipal property ease access issues	• Tanks and collection systems on municipal property ease access issues • Access easement or property purchase required for dispersal	• Tanks, collection systems, and dispersal all on municipal property ease access issues	• Tanks and collection systems on municipal property ease access issues • Access easement or property purchase required for dispersal	• Requires creation of management district or expansion of Fire District purpose • Access easement or property purchase required for access to tanks on private property	• Requires creation of management district or expansion of Fire District purpose • Access easement or property purchase required for access to tanks and dispersal on private property
Use of existing resources	• Uses existing dispersal field	• Requires new dispersal field	• Uses existing tanks where feasible • Uses existing dispersal field	• Uses existing tanks where feasible • Requires new dispersal field	• Uses existing tanks where feasible • Requires new dispersal field	• Uses existing tanks where feasible • Requires new dispersal field	• Uses existing tanks where feasible • Requires new dispersal field	• Uses existing tanks where feasible • Requires new dispersal field	• Uses existing tanks where feasible • Requires new dispersal field
Public Acceptability	• Municipally funded solution for a single property may meet resistance	• Municipally funded solution for a single property may meet resistance	• Generally acceptable	• Generally acceptable	• Generally acceptable	• Generally acceptable	• Generally acceptable	• Generally acceptable; inclusion of Church and private properties increases user base	• Generally acceptable; inclusion of Church and private properties increases user base
Complexity	• Relatively low complexity	• Least complex alternative	• Moderate complexity with gravity and pressure collection, multiple pumps	• Moderate complexity with pressure collection and multiple pumps	• Moderate complexity with pressure collection and multiple pumps	• Moderate complexity with pressure collection and multiple pumps	• Moderate complexity with pressure collection and multiple pumps	• Most complex with pressure collection and multiple pumps	• Most complex with pressure collection and multiple pumps
Adaptability to future growth	• Extremely limited capacity for additional connections	• Extremely limited capacity for additional connections	• Focus on existing flows with little growth potential	• Focus on existing flows with little growth potential	• Focus on existing flows with little growth potential	• Focus on existing flows with little growth potential	• Focus on existing flows with little growth potential	• Focus on existing flows with some growth or change-in-use potential	• Focus on existing flows with some growth or change-in-use potential
Effects on environmentally sensitive areas	• Smallest project area/ impact	• Smaller project area/ impact	• Smaller project area/ impact	• Smaller project area/ impact	• Smaller project area/ impact	• Larger project area/ impact	• Larger project area/ impact	• Largest project area/ impact	• Largest project area/ impact
Reliability, redundancy	• Proven, passive treatment system • Pump requires maintenance	• Proven, passive treatment system • Pump requires maintenance	• Proven, passive treatment system • Pumps require maintenance	• Proven, passive treatment system • Pumps require maintenance	• Proven, passive treatment system • Pumps require maintenance	• Proven, passive treatment system • Pumps require maintenance	• Proven, passive treatment system • Pumps require maintenance	• Proven, passive treatment system • Pumps require maintenance • Requires management to maintain public/private infrastructure	• Proven, passive treatment system • Pumps require maintenance • Requires management to maintain public/private infrastructure
Evaluation Results (within each scenario)	**More Favorable**	**Less Favorable**	**More Favorable**	**Favorable**	**Less Favorable**	**More Favorable**	**Less Favorable**	**More Favorable**	**Less Favorable**

Source: Stone Environmental, January 2010.
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Date/Init: 2/2/2010, anm

APPENDIX A: PEACHAM FIRE DISTRICT NO. 1 PRUDENTIAL COMMITTEE MEMBERS

Jerry Senturia

Larry Jensen

R. Gibson “Gib” Parrish

Diana Senturia, Treasurer

APPENDIX B: HANDOUTS FROM PUBLIC MEETINGS

STONE ENVIRONMENTAL INC

Peacham Corner Wastewater Needs Assessment and Feasibility Study

YOU ARE INVITED

What: ***Public Meeting with guests Amy N. Macrellis and Bruce Douglas P.E., onsite wastewater professionals***

Where: ***Peacham Elementary School***

When: ***August 18, 2009 - 6:00 p.m.***

ELEMENTS OF THE FEASIBILITY STUDY

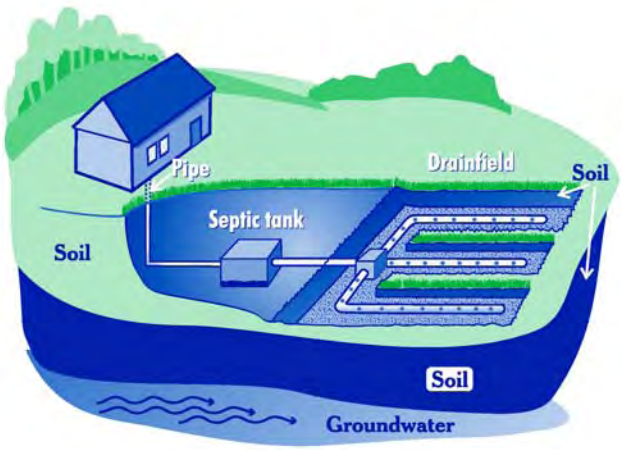
The wastewater feasibility study is being conducted by Peacham Fire District No. 1. The Fire District's Prudential Committee has hired Stone Environmental, Inc. of Montpelier to work on this project in cooperation with the Fire District and the Committee. The study has three main parts:

- Conduct a Preliminary Investigation to evaluate the existing environmental conditions and septic systems, and determine the level of need to replace these systems
- Identify properties that might benefit from upgrades to existing systems, or perhaps from connection to an offsite system (both traditional wastewater treatment facilities and large and small community treatment and disposal systems)
- Prepare preliminary conceptual engineering plans, cost estimates, and an analysis of alternatives appropriate to the need

For the Preliminary Investigation to work, the team needs to know some basic information about your septic system. We will be sending a short survey to all the property owners in Peacham Corner in the coming weeks. The more surveys we get back, the more accurate our assessment of current conditions and potential needs will be. In September, the team will be completing an inspection of the wastewater treatment system that serves the Town Hall, which will be done as a workshop open to the public. We will also be offering free, voluntary septic system inspections to property owners in Peacham Corner.

HOW DO SEPTIC SYSTEMS WORK?

A "basic" septic system consists of a septic tank, a distribution box, and a leachfield. The septic tank provides settling of solids and primary treatment of the wastewater. The effluent from the septic tank is then distributed into gravel-lined trenches, where it percolates into the soil.



WHY BE CONCERNED ABOUT WASTEWATER?

Wastewater treatment and disposal in the Peacham Corner area has occurred historically through private individual septic systems. Unfortunately, in densely populated areas, a combination of small lot sizes and difficult soil conditions can create septic system problems that can result in the contamination of nearby groundwater and surface water.

A properly designed, installed, and maintained septic system poses little threat to groundwater or surface water. In fact, these septic systems are beneficial because they recharge water supplies. However, inadequately functioning septic systems can contribute to the contamination of water resources, such as drinking water wells and recreational waters like lakes and streams. Wastewater from septic systems may include many types of contaminants, such as nitrate, harmful bacteria, and viruses.

Through physical, chemical, and biological processes, the soil acts as a natural buffer to remove bacteria and viruses from wastewater in the unsaturated zone. However, various natural conditions like fractured bedrock, clay-rich soils, and shallow groundwater tables may allow these bacteria and viruses to be transported very rapidly and could contaminate nearby drinking water supplies.

WHAT DO STATE REGULATIONS SAY ABOUT SEPTIC SYSTEMS?

Natural conditions like the ones discussed above can also make it difficult for homeowners to successfully repair failing onsite systems, especially if they live on very small lots with clay-rich soils or if there are shallow soils overlying the bedrock.

The Vermont Environmental Protection Rules set minimum site and design standards for new and replacement septic systems. Many existing properties that have been exempt from needing a state permit to replace their system will now require a state permit for that upgrade. In order to obtain a permit, a septic system designer must be able to show that their design meets (as closely as possible) certain separation distances and setbacks that are specified in the rules. These conditions can be sometimes be difficult to meet in, requiring systems with advanced treatment systems or using mound fill material. In very extreme cases, holding tanks may be the only solution.

WHAT IS THE TIMELINE FOR THIS PROJECT?

Most of the work for this study will be completed in the fall of this year. The final report will be published in early 2010, before Town Meeting Day.

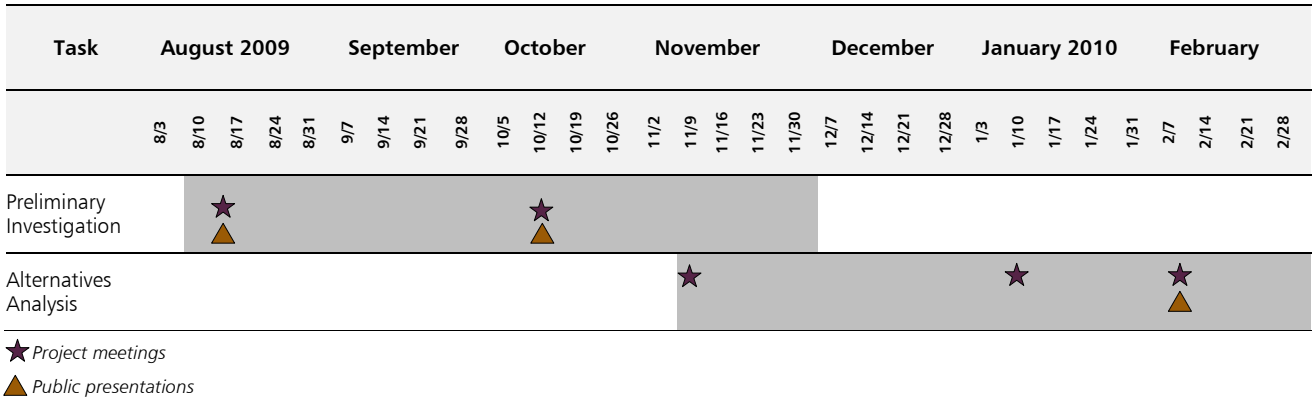
WHAT HAPPENS AFTER THE FEASIBILITY STUDY?

Once the all the results have been presented and the study is completed, the Fire District, the Town, and residents of Peacham Corner will make decisions about how and whether or not to proceed with implementing recommendations made by Stone Environmental.

Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Project Startup Meeting
Tuesday, August 18 at 4:30 PM, at [Location?]
DRAFT AGENDA

1. Introductions and discussion of the reasons for the project
2. Review scope of services and budget
3. Review timeline and report process (revised timeline below)
4. Confirm study area boundaries
5. Finalize outline of public presentation for picnic
6. Discuss survey questions and timing
    - Changes from survey presented at interview?
    - Set timeline for sending intro letter, surveys, collecting responses, tabulating results
7. Review elements of "workshop" inspection of Town Hall system & set tentative date
8. Next steps and other items

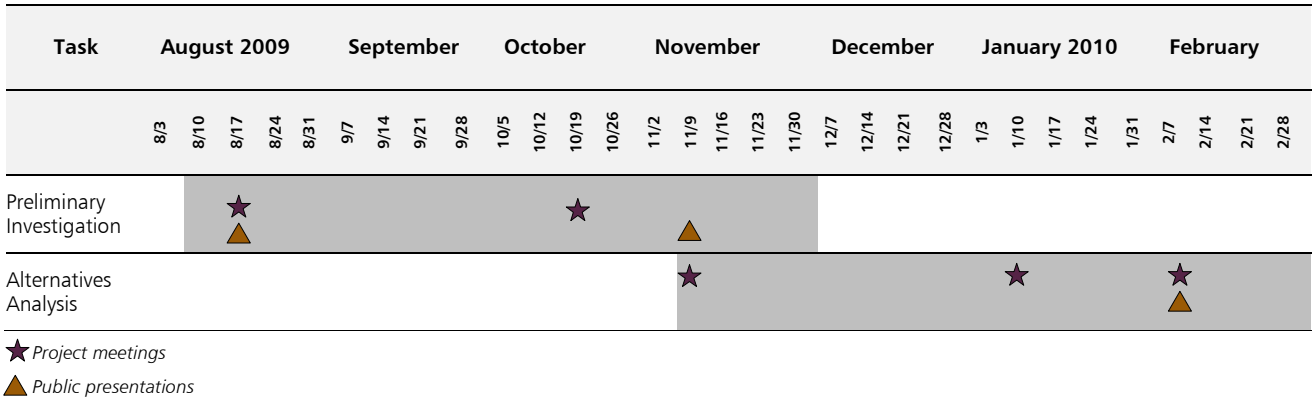
Project Schedule as discussed at interview:

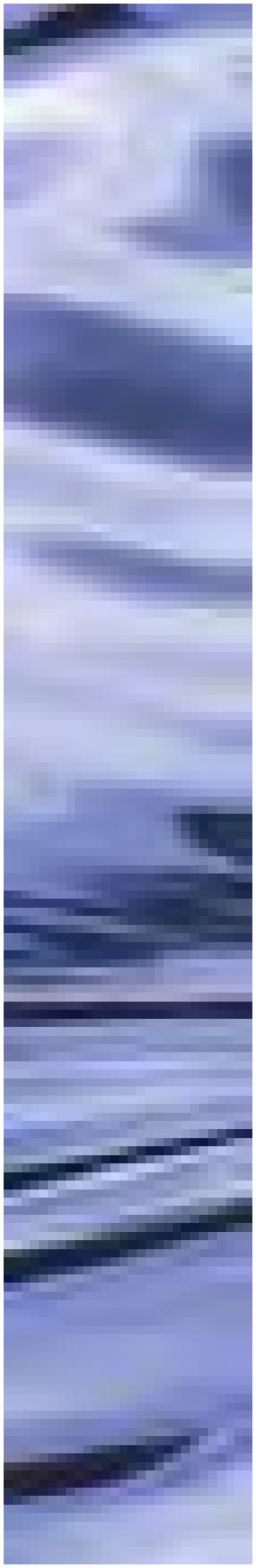


Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Progress Meeting #1
Tuesday, October 20at [Time?], at [Location?]
DRAFT AGENDA

1. Present survey results to date, discuss
2. Present review of DEC permits to date, discuss
3. Report progress on individual property owners' system evaluations
4. Discuss details of "workshop" inspection of Town Hall system on October 29 (as needed)
5. Review timeline (revised timeline below)
6. Next steps and other items

Project Schedule as of October 13:





Town Hall Wastewater System Evaluation Workshop

As part of the community wastewater treatment study now being conducted by the Peacham Fire District No. 1, Stone Environmental, Inc. will be evaluating the wastewater system that serves the Peacham Town Hall. You are invited to join Stone and the Fire District's Prudential Committee to learn about the Town Hall system, about how septic systems work in general, and to sign up for a free evaluation of your own system.

Date: Thursday, October 29, 2009

Time: 3:00 PM, rain, shine, or snow

Location: Peacham Town Hall

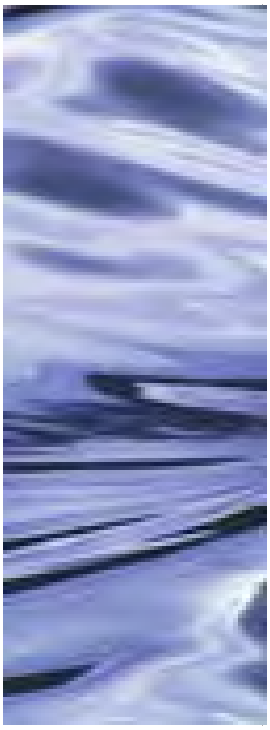
For more information, contact:

Peacham Fire District No. 1, 802-592-3989
Amy Macrellis, Stone Environmental, 802-229-1884

STONE ENVIRONMENTAL INC

535 Stone Cutters Way
Montpelier, Vermont
05602 USA

Phone / 802.229.4541
Fax / 802.229.5417
Web Site / www.stone-env.com



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Date: Thursday, October 29, 2009

Time: 3:00 PM, rain or shine (or snow)

Location: Peacham Town Hall

For more information, contact:

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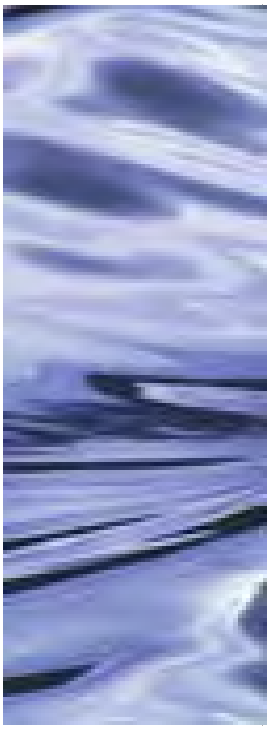
PLEASE PLACE STAMP HERE

You Are Invited—Peacham Town Hall Wastewater System Evaluation Workshop



Public Meeting—Report on Preliminary Investigation

As part of the community wastewater treatment study now being conducted by the Peacham Fire District No. 1, Stone Environmental, Inc. will be presenting a snapshot of current conditions in Peacham Corner related to wastewater treatment. You are invited to join Stone and the Fire District's Prudential Committee to learn about the first phase of this ongoing wastewater planning effort.

Date: Tuesday, November 10, 2009

Time: 7:15 PM

Location: Peacham Library (downstairs)

For more information, contact:

Peacham Fire District No. 1 at 802-592-3989
Amy Macrellis of Stone Environmental at 802-229-1884

STONE ENVIRONMENTAL INC

535 Stone Cutters Way
Montpelier, Vermont
05602 USA

Phone / 802.229.4541
Fax / 802.229.5417
Web Site / www.stone-env.com

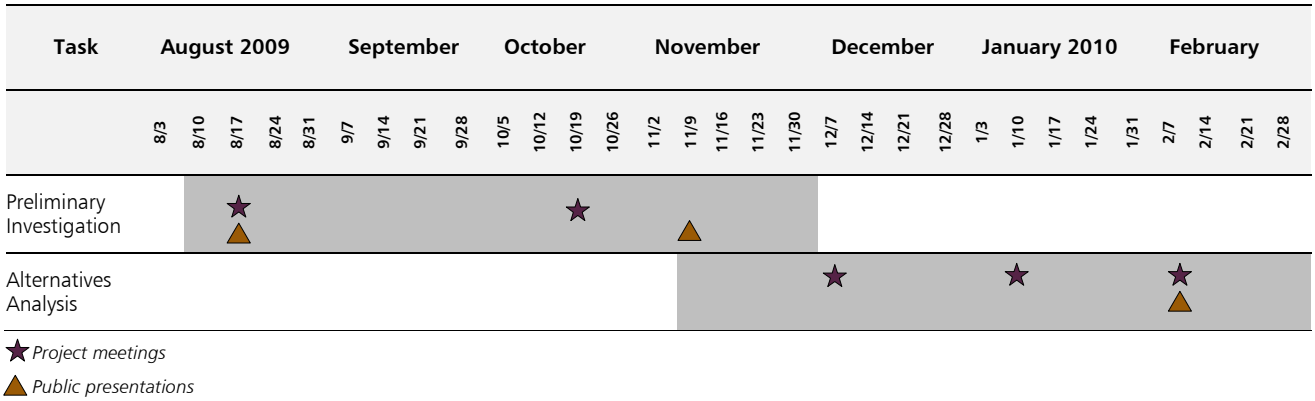
PLEASE PLACE STAMP HERE

You Are Invited—Results of Peacham Corner Preliminary Wastewater Treatment Investigation

Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Public Meeting #2/Progress Meeting #2
Tuesday, November 10 at 7:15 PM, at the Peacham Library
DRAFT AGENDA

1. Present results of workshop / Town Hall system evaluation, Store / bus barn evaluation; review the Marsh / Community Housing system evaluation findings
2. Report progress on individual property owners' system evaluations
3. Present draft Preliminary Investigation Report with findings to date and GIS analysis
4. Review timeline (revised timeline below)
5. Next steps and other items

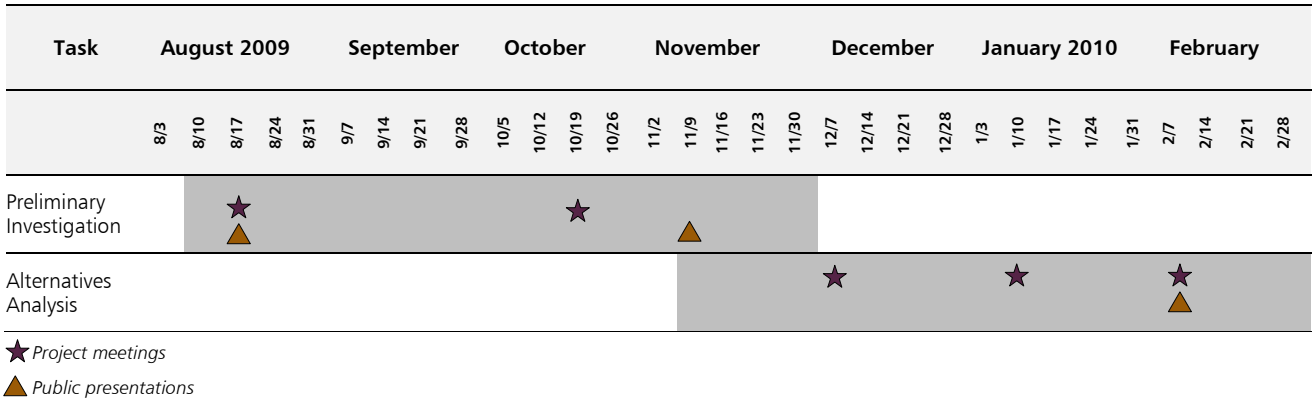
Project Schedule as of November 10:



Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Progress Meeting #3
Tuesday, December 8 at 7:15 PM, at the Peacham Library
DRAFT AGENDA

1. Discuss findings of Preliminary Investigation report, answer questions/receive comments from Committee
2. Report progress on outstanding items from last meeting
    - Test pits, perc tests, and/or other design basis for Peacham Community Housing system (original design or from Marsh's recent evaluation)
    - Test pits, perc tests, and/or other design basis for Town Hall (former Elementary School) system; original plans with location of leachfield for this system
    - Water quality testing results/well construction log for Elementary School well
3. Describe process for evaluating alternatives
    - What rules apply, and how do they affect the range of potential solutions?
    - Determine water use/wastewater flows for properties to be served by an alternative
    - Determine potential locations for wastewater dispersal
    - Describe range of potential treatment and dispersal components, and advantages/disadvantages of each
    - Create a preliminary cost estimate for the alternatives that appear to be most feasible and are acceptable to the Committee
4. Discuss range of alternatives to be evaluated
    - Convert bus barn/former Town offices to year-round café
        - With connection to an existing leachfield
        - With construction of new leachfield
    - Include Library, properties with limitations in immediate 4-corners area?
    - Include properties within School well's protective shield?
    - Others?
5. Next steps and other items

Project Schedule as of December 7 (no changes from November):

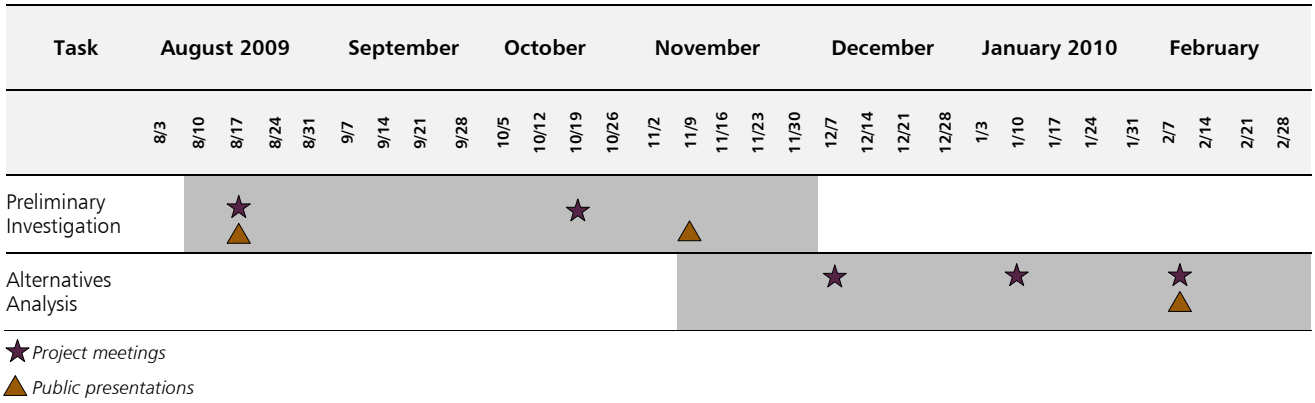


Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Progress Meeting #4
Tuesday, January 12 at 7:15 PM, at the Peacham Library
DRAFT AGENDA

1. Review process for evaluating alternatives
    - Determine water use/wastewater flows for properties to be served by an alternative (Table 6)
    - What rules apply, and how do they affect the range of potential solutions?
    - Determine potential locations for wastewater dispersal (Table 7)
    - Describe range of potential treatment and dispersal components, and advantages/disadvantages of each
    - Create a preliminary cost estimate for the alternatives that appear to be most feasible and are acceptable to the Committee
2. Discuss range of dispersal site options (new Figure 4)
3. Discuss range of alternatives developed to date and review preliminary layouts
    - Scenario 1: Conversion of former Town Offices and bus barn building to co-op store and café (760 gpd).
        - Alternative 1A: Septic tank and pump tank; pump to Area 6; dispersal in mound system (Figure 5)
        - Alternative 1B: Septic tank and pump tank; pump to Area 6; advanced treatment and filtrate dispersal in mound system (Figure 6).
        - Alternative 1C: Septic tank and pump tank; pump to Area 2 siphon/flout tank, dispersal in existing leachfield (Figure 7).
        - Alternative 1D: Septic tank and pump tank; pump to Area 3 with at-grade pressure-dosed leachfield (Figure 8).
    - Scenario 2: Scenario 1 plus the Town Hall and Post Office (with capacity for public meetings), library, and the Historical House (1,880 gpd).
        - Alternative 2A: 2 systems: co-op/café as in Scenario 1A (760 gpd); Municipal buildings septic tank-effluent gravity (STEG), or septic tank-effluent pump (STEP) to Area 2 siphon/flout tank, dispersal in existing leachfield (1,120 gpd) (Figure 9).
        - Alternative 2B: Existing or new septic and pump tanks; effluent pumped to Area 3 with at-grade pressure-dosed leachfield (Figure 10).
        - Alternative 2C: Existing or new septic and pump tanks; effluent pumped to Area 7 with at-grade pressure-dosed leachfield (Figure 11).
    - Scenario 3: Scenarios 1 and 2 plus eight residential properties and Peacham Congregational Church near the Bayley Hazen Road – Church Street intersection which were identified as potentially limited (4,460 gpd).
        - Alternative 3A: Existing or new septic and pump tanks; effluent pumped to Area 3 with mound dispersal areas (Figure 12).
        - Alternative 3B: Existing or new septic and pump tanks; effluent pumped to Area 7 with mound dispersal areas (Figure 13).

4. Decide which alternatives should have cost estimates developed
5. Next steps and other items
    - Schedule for delivery of draft final report, Committee review
    - Meet or teleconference before Annual Meeting to review presentation outline?

Project Schedule as of January 12 (no changes from November-December):



Needs Assessment and Feasibility Study of Wastewater Treatment for Peacham Fire District #1
Final Public Meeting
Tuesday, February 9 (7 p.m.) at the Peacham Library
PRESENTATION AGENDA

1. Introduction, background of the study, objectives of study
2. Overview of the methods/process for the study
3. Natural resources conditions in Peacham Corner Village (Figure 2)
4. Wastewater treatment and water supply conditions
    - Property owner survey
    - Municipal wastewater system evaluations
    - Private wastewater system evaluations
5. Planning level wastewater needs assessment: process and results (Figure 3)
6. Wastewater system design criteria
7. Applicable state regulations
8. Wastewater flow projection scenarios
    - Scenario 1: Convert former Town Office and bus barn to a store and café
    - Scenario 2: Scenario 1 store/café plus Town Hall and Post Office (limited meeting size), library, and Historical House
    - Scenario 3: Scenario 1 store/café plus Town Hall and Post Office (large meeting capacity), library, and Historical House
    - Scenario 4: Scenario 3 by adding the Peacham Congregational Church and 8 potentially limited residential properties
9. Potential shared system sites (Figure 4)
10. Development of wastewater collection, treatment, and dispersal alternatives
11. Costs and potential project financing (if time allows)
12. Recommendations

APPENDIX C: OPINIONS OF PROBABLE COST FOR EACH ALTERNATIVE

Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 1: Alternative 1C: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
2000 gallon STEP package	1	LS	$4,100.00	$4,100.00
15 amp breaker	1	ea	$50.00	$50.00
20 amp breaker	1	ea	$50.00	$50.00
Wiring	0.8	CLF	$258.00	$206.40
2000 gallon concrete tank	1	ea	$2,849.50	$2,849.50
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
24" riser	3	ea	$170.00	$510.00
Rock excavation	75	CY	$100.00	$7,500.00
Driveway repair	12	SY	$45.00	$540.00
Water main crossing	1	LS	$1,000.00	$1,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
2" PVC pressure pipe - straight	835	LF	$20.00	$16,700.00
2" PVC pressure pipe - bends, fittings	8	ea	$65.00	$520.00
2" PVC pressure pipe - tee	1	ea	$100.00	$100.00
Subtotal				$40,388.90
15% Contingency				$6,058.34
Total Estimated Cost				$46,447.24

STONE ENVIRONMENTAL, INC

Notes: Stone Environmental Inc. (SEI) has no control over the cost of labor, materials, equipment, or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions. SEI's opinion of probable Total Project Costs and Construction Costs are made on the basis of SEI's experience, qualifications, and resources; but SEI cannot and does not guarantee that proposals, bids, or actual Total Project or Construction Costs will not vary from Opinions of probable Cost. This Opinion of Cost was calculated *prior to* the selection or design of a specific project plan, therefore all unit quantities and costs are estimates for planning purposes only and will vary based on the actual design, site conditions, and regulatory requirements.

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 2: Alternative 1D: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
2000 gallon STEP package	1	LS	$4,100.00	$4,100.00
15 amp breaker	1	ea	$50.00	$50.00
20 amp breaker	1	ea	$50.00	$50.00
Wiring	0.8	CLF	$258.00	$206.40
2000 gallon concrete tank	1	ea	$2,849.50	$2,849.50
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
24" riser	3	ea	$170.00	$510.00
Rock excavation	60	CY	$100.00	$6,000.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	1	LS	$1,000.00	$1,000.00
2" PVC pressure pipe - straight	1100	LF	$20.00	$22,000.00
2" PVC pressure pipe - bends, fittings	12	ea	$65.00	$780.00
2" PVC pressure pipe - tee	1	ea	$100.00	$100.00
6" Tilling/Site Prep	3.65	MSF	$2.72	$209.93
6" Stone media	20	CY	$51.50	$1,030.00
6" Stone layer spreading	20	CY	$12.70	$254.00
Common fill, borrow & spread 6"+	100	CY	$26.05	$2,605.00
Topsoil fill, borrow & spread 6"	68	CY	$43.10	$2,930.80
1 1/2" PVC distribution pipe, drilled	190	LF	$3.70	$703.00
Maintenance caps	5	ea	$25.00	$125.00
Orifice shields	60	ea	$2.00	$120.00
Seeding	3.65	MSF	$58.90	$214.99
Straw spreading after seeding	3.65	MSF	$154.00	$562.10
1 1/2" PVC ball valve	1	ea	$84.50	$84.50
Subtotal				$49,433.21
15% Contingency				$7,414.98
Total Estimated Cost				$56,848.19


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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 3: Alternative 2B: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
2000 gallon STEP package	1	LS	$4,100.00	$4,100.00
1000 gallon concrete tank	2	ea	$1,558.00	$3,116.00
Orenco EasyPak	1	LS	$2,750.00	$2,750.00
15 amp breaker	2	ea	$50.00	$100.00
20 amp breaker	2	ea	$50.00	$100.00
Wiring	1.2	CLF	$258.00	$309.60
2000 gallon concrete tank	1	ea	$2,849.50	$2,849.50
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
24" riser	4	ea	$170.00	$680.00
Rock excavation	100	CY	$100.00	$10,000.00
Driveway repair	25	SY	$45.00	$1,125.00
Water main crossing	2	LS	$1,000.00	$2,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
4" PVC gravity line - straight	538	LF	$20.00	$10,760.00
4" PVC gravity line - bends, fittings	3	ea	$65.00	$195.00
1 1/2" PVC pressure pipe - straight	1265	LF	$20.00	$25,300.00
1 1/2" PVC pressure pipe - bends, fittings	8	ea	$65.00	$520.00
1 1/2" PVC pressure pipe - tee	2	ea	$100.00	$200.00
Subtotal				$70,368.10
15% Contingency				$10,555.22
Total Estimated Cost				$80,923.32

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 4: Alternative 2C: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
2000 gallon STEP package	2	LS	$4,100.00	$8,200.00
15 amp breaker	3	ea	$50.00	$150.00
20 amp breaker	3	ea	$50.00	$150.00
Wiring	1.4	CLF	$258.00	$361.20
2000 gallon concrete tank	2	ea	$2,849.50	$5,699.00
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	2	ea	$1,558.00	$3,116.00
Orenco EasyPak	1	LS	$2,750.00	$2,750.00
24" riser	4	ea	$170.00	$680.00
Rock excavation	60	CY	$100.00	$6,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	2	LS	$1,000.00	$2,000.00
1 1/2" PVC pressure pipe - straight	1370	LF	$20.00	$27,400.00
1 1/2" PVC pressure pipe - bends, fittings	12	ea	$65.00	$780.00
1 1/2" PVC pressure pipe - tee	4	ea	$100.00	$400.00
6" Tilling/Site Prep	4.84	MSF	$2.72	$213.16
6" Stone media	35	CY	$51.50	$1,802.50
6" Stone layer spreading	35	CY	$12.70	$444.50
Common fill, borrow & spread 6"+	162	CY	$26.05	$4,220.10
Topsoil fill, borrow & spread 6"	90	CY	$43.10	$3,879.00
1 1/2" PVC distribution pipe, drilled	294	LF	$3.70	$1,087.80
Maintenance caps	7	ea	$25.00	$175.00
Orifice shields	90	ea	$2.00	$180.00
Seeding	4.84	MSF	$58.90	$285.08
Straw spreading after seeding	4.84	MSF	$154.00	$745.36
1 1/2" PVC ball valve	1	ea	$84.50	$84.50
Subtotal				$78,191.20
15% Contingency				$11,728.68
Total Estimated Cost				$89,919.88

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 5: Alternative 2D: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
2000 gallon STEP package	2	LS	$4,100.00	$8,200.00
15 amp breaker	3	ea	$50.00	$150.00
20 amp breaker	3	ea	$50.00	$150.00
Wiring	1.4	CLF	$258.00	$361.20
2000 gallon concrete tank	2	ea	$2,849.50	$5,699.00
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	2	ea	$1,558.00	$3,116.00
Orenco EasyPak	1	LS	$2,750.00	$2,750.00
24" riser	4	ea	$170.00	$680.00
Rock excavation	60	CY	$100.00	$6,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	2	LS	$1,000.00	$2,000.00
1 1/2" PVC pressure pipe - straight	1650	LF	$20.00	$33,000.00
1 1/2" PVC pressure pipe - bends, fittings	13	ea	$65.00	$845.00
1 1/2" PVC pressure pipe - tee	4	ea	$100.00	$400.00
6" Tilling/Site Prep	4.84	MSF	$2.72	$213.16
6" Stone media	35	CY	$51.50	$1,802.50
6" Stone layer spreading	35	CY	$12.70	$444.50
Common fill, borrow & spread 6"+	162	CY	$26.05	$4,220.10
Topsoil fill, borrow & spread 6"	90	CY	$43.10	$3,879.00
1 1/2" PVC distribution pipe, drilled	294	LF	$3.70	$1,087.80
Maintenance caps	7	ea	$25.00	$175.00
Orifice shields	90	ea	$2.00	$180.00
Seeding	4.84	MSF	$58.90	$285.08
Straw spreading after seeding	4.84	MSF	$154.00	$745.36
1 1/2" PVC ball valve	1	ea	$84.50	$84.50
Subtotal				$83,856.20
15% Contingency				$12,578.43
Total Estimated Cost				$96,434.63

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 6: Alternative 3B: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
Orenco Pro STEP package	3	LS	$4,100.00	$12,300.00
15 amp breaker	4	ea	$50.00	$200.00
20 amp breaker	4	ea	$50.00	$200.00
Wiring	1.8	CLF	$258.00	$464.40
2500 gallon concrete tank	1	ea	$2,650.00	$2,650.00
2000 gallon concrete tank	3	ea	$2,849.50	$8,548.50
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	2	ea	$1,558.00	$3,116.00
Orenco EasyPak	1	LS	$2,750.00	$2,750.00
24" riser	4	ea	$170.00	$680.00
Rock excavation	60	CY	$100.00	$6,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	2	LS	$1,000.00	$2,000.00
1 1/2" PVC pressure pipe - straight	1430	LF	$20.00	$28,600.00
1 1/2" PVC pressure pipe - bends, fittings	12	ea	$65.00	$780.00
1 1/2" PVC pressure pipe - tee	6	ea	$100.00	$600.00
6" Tilling/Site Prep	7.15	MSF	$2.72	$219.45
6" Stone media	55	CY	$51.50	$2,832.50
6" Stone layer spreading	55	CY	$12.70	$698.50
Common fill, borrow & spread 6"+	235	CY	$26.05	$6,121.75
Topsoil fill, borrow & spread 6"	135	CY	$43.10	$5,818.50
1 1/2" PVC distribution pipe, drilled	480	LF	$3.70	$1,776.00
Maintenance caps	9	ea	$25.00	$225.00
Orifice shields	120	ea	$2.00	$240.00
Seeding	7.15	MSF	$58.90	$421.14
Straw spreading after seeding	7.15	MSF	$154.00	$1,101.10
1 1/2" PVC ball valve	1	ea	$84.50	$84.50
Subtotal				$95,815.33
15% Contingency				$14,372.30
Total Estimated Cost				$110,187.63

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 7: Alternative 3C: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
Orenco Pro STEP package	3	LS	$4,100.00	$12,300.00
15 amp breaker	4	ea	$50.00	$200.00
20 amp breaker	4	ea	$50.00	$200.00
Wiring	1.8	CLF	$258.00	$464.40
2500 gallon concrete tank	1	ea	$2,650.00	$2,650.00
2000 gallon concrete tank	2	ea	$2,849.50	$5,699.00
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	2	ea	$1,558.00	$3,116.00
Orenco EasyPak	1	LS	$2,750.00	$2,750.00
24" riser	4	ea	$170.00	$680.00
Rock excavation	60	CY	$100.00	$6,000.00
Horizontal road boring	30	LF	$33.00	$990.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	2	LS	$1,000.00	$2,000.00
1 1/2" PVC pressure pipe - straight	1710	LF	$20.00	$34,200.00
1 1/2" PVC pressure pipe - bends, fittings	12	ea	$65.00	$780.00
1 1/2" PVC pressure pipe - tee	6	ea	$100.00	$600.00
6" Tilling/Site Prep	7.15	MSF	$2.72	$219.45
6" Stone media	55	CY	$51.50	$2,832.50
6" Stone layer spreading	55	CY	$12.70	$698.50
Common fill, borrow & spread 6"+	235	CY	$26.05	$6,121.75
Topsoil fill, borrow & spread 6"	135	CY	$43.10	$5,818.50
1 1/2" PVC distribution pipe, drilled	480	LF	$3.70	$1,776.00
Maintenance caps	9	ea	$25.00	$225.00
Orifice shields	120	ea	$2.00	$240.00
Seeding	7.15	MSF	$58.90	$421.14
Straw spreading after seeding	7.15	MSF	$154.00	$1,101.10
1 1/2" PVC ball valve	1	ea	$84.50	$84.50
Subtotal				$98,565.83
15% Contingency				$14,784.87
Total Estimated Cost				$113,350.71

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 8: Alternative 4A: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
Orenco Pro STEP package	10	LS	$4,100.00	$41,000.00
15 amp breaker	12	ea	$50.00	$600.00
20 amp breaker	12	ea	$50.00	$600.00
Wiring	4.3	CLF	$258.00	$1,109.40
6000 gallon custom concrete tank	1	ea	$8,983.68	$8,983.68
2000 gallon concrete tank	3	ea	$2,849.50	$8,548.50
1500 gallon concrete tank	8	ea	$2,291.25	$18,330.00
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	3	ea	$1,558.00	$4,674.00
Orenco EasyPak	2	LS	$2,750.00	$5,500.00
24" riser	5	ea	$170.00	$850.00
Rock excavation	120	CY	$100.00	$12,000.00
Horizontal road boring	60	LF	$33.00	$1,980.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	3	LS	$1,000.00	$3,000.00
1 1/2" PVC pressure pipe - straight	2,716	LF	$20.00	$54,320.00
1 1/2" PVC pressure pipe - bends, fittings	32	ea	$65.00	$2,080.00
1 1/2" PVC pressure pipe - tee	16	ea	$100.00	$1,600.00
1 1/2" 6 zone sequencing valve	1	LS	$905.16	$905.16
6" Tilling/Site Prep	14.75	MSF	$2.72	$240.12
9" Stone media	125	CY	$51.50	$6,437.50
9" Stone layer spreading	125	CY	$12.70	$1,587.50
Mound sand	650	CY	$38.00	$24,700.00
Sand spreading	650	LCY	$3.24	$2,106.00
Common fill, borrow & spread 8"+	370	CY	$26.05	$9,638.50
Topsoil fill, borrow & spread 4"	185	CY	$43.10	$7,973.50
1 1/2" PVC distribution pipe, drilled	1125	LF	$3.70	$4,162.50
Maintenance caps	25	ea	$25.00	$625.00
Orifice shields	300	ea	$2.00	$600.00
Seeding	14.75	MSF	$58.90	$868.78
Straw spreading after seeding	14.75	MSF	$154.00	$2,271.50
1 1/2" PVC ball valve	5	ea	$84.50	$422.50
Subtotal				$234,112.14
15% Contingency				$35,116.82
Total Estimated Cost				$269,228.96

STONE ENVIRONMENTAL, INC

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Wastewater Needs Assessment and Feasibility Study for Peacham Corner
Town of Peacham, Vermont
APPENDIX TABLE 9: Alternative 4B: Opinion of Cost

Item Description	Estimated Quantity	Unit	Unit Price	Item Total
1.5K/2K gallon STEP package	10	LS	$4,100.00	$41,000.00
15 amp breaker	12	ea	$50.00	$600.00
20 amp breaker	12	ea	$50.00	$600.00
Wiring	4.3	CLF	$258.00	$1,109.40
6000 gallon custom concrete tank	1	ea	$8,983.68	$8,983.68
2000 gallon concrete tank	3	ea	$2,849.50	$8,548.50
1500 gallon concrete tank	8	ea	$2,291.25	$18,330.00
1000 grease interceptor	1	LS	$1,823.00	$1,823.00
1000 gallon concrete tank	3	ea	$1,558.00	$4,674.00
Orenco EasyPak	2	LS	$2,750.00	$5,500.00
24" riser	5	ea	$170.00	$850.00
Rock excavation	120	CY	$100.00	$12,000.00
Horizontal road boring	60	LF	$33.00	$1,980.00
Horizontal road boring mob fee	1	LS	$3,450.00	$3,450.00
Driveway/Pavement repair	25	SY	$45.00	$1,125.00
Water main crossing	3	LS	$1,000.00	$3,000.00
1 1/2" PVC pressure pipe - straight	2,963	LF	$20.00	$59,260.00
1 1/2" PVC pressure pipe - bends, fittings	32	ea	$65.00	$2,080.00
1 1/2" PVC pressure pipe - tee	16	ea	$100.00	$1,600.00
1 1/2" 6 zone sequencing valve	1	LS	$905.16	$905.16
6" Tilling/Site Prep	14.75	MSF	$2.72	$240.12
9" Stone media	125	CY	$51.50	$6,437.50
9" Stone layer spreading	125	CY	$12.70	$1,587.50
Mound sand	650	CY	$38.00	$24,700.00
Sand spreading	650	LCY	$3.24	$2,106.00
Common fill, borrow & spread 8"+	370	CY	$26.05	$9,638.50
Topsoil fill, borrow & spread 4"	185	CY	$43.10	$7,973.50
1 1/2" PVC distribution pipe, drilled	1125	LF	$3.70	$4,162.50
Maintenance caps	25	ea	$25.00	$625.00
Orifice shields	300	ea	$2.00	$600.00
Seeding	14.75	MSF	$58.90	$868.78
Straw spreading after seeding	14.75	MSF	$154.00	$2,271.50
1 1/2" PVC ball valve	5	ea	$84.50	$422.50
Subtotal				$239,052.14
15% Contingency				$35,857.82
Total Estimated Cost				$274,909.96

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