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# Wastewater Feasibility Study for South Shaftsbury

## Town of Shaftsbury, Vermont

## FINAL REPORT

Stone Project Number 051624-W

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## EXECUTIVE SUMMARY

The Town of Shaftsbury, Vermont hired the consultant team of Stone Environmental, Inc. and Phelps Engineering, Inc. to conduct a community wastewater feasibility study for the South Shaftsbury area. This area of existing development was identified in the Town Plan for Shaftsbury, Vermont as an area where further appropriate development could be encouraged in support of the Town's overall vision. The Town wished to understand the extent of environmental or public health constraints to sustaining the existing developed parcels, and providing some level of growth in the zoned areas.

The Town of Shaftsbury is located between Bennington and Arlington on the New York-Vermont border in southwest Vermont. The study area includes a total of 787 parcels including single-family residences, commercial and industrial properties; public properties including the Town offices and garage, the Elementary School, and Howard Park, multi-family dwellings, and undeveloped parcels. Property sizes range from less than 0.2 acre to over 90 acres.

The study area is situated in the Batten Kill-Walloomsac-Hoosic watershed, which ultimately drains to the Hudson River in New York State. The study area is entirely within the sub-watershed of Paran Creek, which flows roughly northeast to southwest through South Shaftsbury to Lake Paran. There are also a significant number of wetland areas that are mostly located along stream channels.

Most of the study area south of Daniels Road is served by the Shaftsbury Fire District No. 1 water system, which is a community water system served by the Village of North Bennington. The northern area and outlying development uses individual water supply wells.

There are three permit programs that may currently be involved with construction of an onsite system. The Town has a Sewage Ordinance that requires approval prior to the construction of any new or replacement system. The State of Vermont has Environmental Protection Rules (EPRs) that govern systems with design flows less than 6,500 gallons per day (gpd) and the Indirect Discharge Rules (IDRs) govern systems that are 6,500 gpd or larger. Each of these offices was contacted and reviews were made of existing permit files. The permit requirements and actual permit information were used to confirm soil and site conditions in the study area, determine areas of environmental or public health need, and to help identify potential cluster system sites.

A needs assessment was conducted using Geographic Information System (GIS) datalayers that combine spatial information, such as USGS topography and NRCS soils information, with local information such as parcel boundaries, orthophotographs, and zoning districts. The GIS analysis was confirmed through interviews and discussions with Town staff, state regulators, and local residents. The needs assessment identified limited areas scattered around the study area where existing or future development would be constrained by the use of onsite systems for wastewater disposal. The largest area of need is on Cleveland Avenue in South Shaftsbury Village. Specific wastewater needs were identified in the following areas:

- Route 67 east of Corey Drive and Lamb Road (limited by high groundwater)
- Bank Street (small lot sizes may limit future replacement options or growth)
- Hewitt Drive (large lots, but limiting soil conditions)
- Twitchell Hill Road (lots near central portion of road limited by high groundwater)
- Cleveland Avenue, Meadow Lane, and Holliday Drive (small lots, high groundwater)
- Route 7A / Buck Hill Road (small lot sizes may limit replacement options or growth)
- Route 7A / Daniels Road (provide for expansion of existing uses)
- Route 7A / Bahan Road (provide for potential commercial development)

Main Street ??

The next step in the study was to evaluate possible solutions, including both a central sewer approach and a decentralized approach utilizing limited sewer extensions, onsite systems, and offsite cluster systems.

A centralized approach where all wastewater from identified needs areas is collected through gravity sewers and force mains to a centralized wastewater treatment facility for treatment and disposal was developed. The limit of North Bennington's centralized wastewater collection system is located near Whitman's Feed Store, approximately 1.5 miles from the Eagle plant site. This termination appears to be in a suitable location to receive flow from most of the proposed service areas with minimal pumping. A conventional gravity / manhole collection system is the primary feasible alternative for a centralized sewer option. This collection alternative has flexibility to accommodate future growth, and the area's topography allows for gravity collection to a single point with one pump station.

Project costs were estimated for two centralized sewer scenarios. Scenario 1 presented a full buildout to serve all identified areas of wastewater need with municipal sewer service. Scenario 2 presented an alternative for a scaled down system that serves the village residential and commercial districts based on the density of development and to reduce the high costs associated with crossing topographic features such as streams and the railway. For Scenario 1, estimated user costs are significantly higher than typical rates in rural Vermont villages. For Scenario 2, costs are still high, and wastewater needs outside of the central service area would not be addressed.

The decentralized concept has many advantages for communities that are trying to upgrade existing on-site systems within compact developed areas, including significant reductions in construction costs and local control of the solution. Cluster systems may be used to replace existing systems or to provide new capacity, (for example, to add a new apartment to an existing residence). Potential cluster system sites are located at the town-owned property adjacent to the town offices, at the elementary school, and on several privately-owned properties. The decentralized solution must be combined with a management program that will require the Town to provide for some level of planning, siting, design, installation, operation and maintenance, monitoring, compliance, enforcement, and education for all systems within the service area, and potentially the entire Town.

The main concern in this feasibility study is to determine where and how to mediate public health threats, and secondly to provide the infrastructure necessary for modest growth in the Village center through conversions of existing structures. It appears most of the study area is located on well drained soils suitable for on-site septic systems, especially in outlying areas where there is a lower density of development. Further, the Town's wastewater issues are not confined to a specific area, nor does it appear that the existing established neighborhoods in the Village have a significant need due to immediate public health threats, especially since a public water supply serves many of the small lots in the study area. Thus, review of alternatives that limit infrastructure to only those areas of need may significantly reduce the capital investment needed to properly manage the Town's wastewater needs. Since a reduction in infrastructure also means a significant reduction in the number of properties being served, alternative funding and management options are needed.

Three project cost estimates were developed for decentralized alternatives. In addition to presenting the total cost of providing decentralized services to all wastewater needs areas (Scenario 3), Scenario 4 presents an alternative to only resolve the areas of specific environmental needs, such as shallow depth to groundwater. Scenario 5 includes all areas within Scenario 4 and adds the central Village alternative due to the immediate perception of wastewater need to support future growth in this area.

The costs per ERU for the decentralized alternatives are generally higher than for the centralized solutions. However, assessing the cost effectiveness of the two alternatives by this factor alone is not reasonable, for two reasons:

1. On a total cost basis, the decentralized option provides as much of a benefit at a significantly discounted cost.
2. The decentralized option is coupled with an overall management approach to on-site systems, and in effect, residents in a larger service area will be expected to contribute funds for proper maintenance of the system. Part of these funds will be used to offset the higher unit cost of the system..

A matrix ranking the advantages and disadvantages of each scenario was developed. This included considerations such as public acceptability, complexity, effects on water quality as well as costs. The results indicated Scenario 5, the targeted decentralized solution, ranked the most favorable. Scenario 5 resolves environmental concerns and provides for growth in the South Shaftsbury village growth center. It includes Cleveland Avenue, Route 7A (south), Twitchell Hill Road, and Hewitt Drive, plus a sewer service extension for Lamb Road. This scenario may the considered the first phase of a larger decentralized project, but will give immediate solutions for the areas identified with the highest needs. The estimated construction costs are $1,840,000 to serve an estimated 72 residential or commercial properties.

Financing a municipal wastewater system can be accomplished using several potential revenue streams, depending on local politics and on the public's perception of the direct and indirect benefits of the project to the community and to individual landowners. The DEC and USDA Rural Development (RD) have programs that can provide grants and loans for eligible municipal wastewater projects, providing that various funding program requirements are satisfied.

This study has shown that a decentralized wastewater alternative that has a significant overall project cost savings could meet the environmental, public health, and future growth needs of the study area.

Following are some considerations for next steps in this process.

Committee/Town Work

- Review and decide on favored alternative to move forward, including management and local funding options
- Initiate discussions with the Town of Bennington to develop an Inter-local Agreement
- Initiate discussions and obtain permission for preliminary soils testing on cluster system sites
- Consider developing a survey questionnaire to determine level of interest in increasing onsite wastewater capacity and connecting to a cluster system/sewer
- Develop public outreach plan for building support for construction and funding
- Gain consensus on an appropriate range of user fees for connected and managed users that would be considered reasonable and affordable
- Continue work with consultants on technical issues

Technical Work

- Install groundwater monitoring wells in the Cleveland Avenue area and monitor through the spring of 2007. This effort is to identify the potential extent of this area of need.
- Further specify individual connections to cluster systems, including existing and potential flows. This work could include onsite inspections to identify/confirm properties with need.
- Preliminary soil and site investigations on potential cluster system sites, including locating the Elementary School disposal field, conducting preliminary hand auger tests or backhoe soil test pits, developing hydrogeological considerations, and understanding other technical permit issues relating to specific sites.

# 1. INTRODUCTION

The Town of Shaftsbury, Vermont has chosen to conduct a community wastewater feasibility study for the South Shaftsbury area, located in the southern portion of the Town close to the Bennington-Shaftsbury town line (Figure 1).

The objectives of the study are:

- To evaluate the environmental and public health issues related to the existing onsite wastewater treatment systems in the Village
- To identify areas where existing conditions might lead to system failures and/or constrain development of existing properties for changes in use which might require increased wastewater flows or treatment
- To identify and address limitations for concentrating growth within the Village area
- To evaluate decentralized and centralized wastewater options to address the identified need
- To estimate anticipated costs and identify options for creating an affordable and manageable project for the Town

Stone Environmental, Inc. (Stone) and Phelps Engineering, Inc. (Phelps) were hired to conduct this study. This Final Report provides information on each of the objectives above.

## 2. STUDY AREA DESCRIPTION

The study area includes parcels in the South Shaftsbury area, located along Vermont Routes 67 and 7A in the southwest part of the town. Shaftsbury is located in Bennington County in the southwest portion of the state. Figure 1 shows the boundaries of the study area in their wider geographical context. After discussions with the Economic Development Committee and Town Staff, the study area was expanded to include the village zoned area just north of North Bennington north to Harvest Hills Drive and Hewitt Drive, the South Shaftsbury village area south to the Bennington town line, east to Howard Park, and north along Route 7A on the commercial district, and including the industrial/commercial zoned districts north of the village to just beyond North Road. Table 1 includes a summary of the properties within the study area by street, including information about property uses, ranges of parcel sizes, and municipal water supply information.

### 2.1. Community Profile

The Town of Shaftsbury is located between Bennington and Arlington on the New York-Vermont border in southwest Vermont. The Town is bordered by Arlington to the north, Sunderland to the northeast, Glastenbury to the east, Woodford to the southeast, Bennington to the south, and New York to the west. South Shaftsbury has primarily residential and small commercial properties with several larger commercial and industrial properties.

The Town of Shaftsbury's population has grown from 3,322 in 1990 to 3,767 in 2000 (US Census). The Town's population increased by approximately 12% in this ten year period. While Shaftsbury's rate of population growth may be slowing somewhat as compared to growth in the 1970s, it appears that the Town's population will continue to grow into the future.

The study area includes a total of 787 parcels including 604 single-family residences; 24 commercial or industrial properties; eight public properties including the Town offices and garage, the Elementary School, and Howard Park, four multi-family dwellings, and 120 undeveloped parcels (Table 1). A small number of properties in this area (24) were listed as having "other" uses, including utility properties.

### 2.2. Natural Resources

Natural features can pose both opportunities for and limits to the construction and successful operation of decentralized wastewater disposal 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 disposal in the South Shaftsbury area. 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 (Figure 1), although there are a few areas in the northeast section of the study area with steeper slopes. Generally, elevations range from around 660 feet above mean sea level (AMSL) in the southern part of the study area near Lake Paran to 1000 feet AMSL on an unnamed hill located at the north edge of the study area west of Route 7A.

### 2.2.2. *Surface Water*

The study area is situated in the Batten Kill-Walloomsac-Hoosic watershed, which ultimately drains to the Hudson River in New York State. The study area is entirely within the watershed of Paran Creek, which flows roughly northeast to southwest through South Shaftsbury to Lake Paran. Paran Creek is considered a Class B surface water, and it is not listed on the Section 303(d) list of impaired water bodies. There are also a significant number of wetland areas (Figure 2) that are mostly located along stream channels. A larger wetland occupies the flat area along Route 67 southwest of South Shaftsbury village.

### 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 Bennington 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.

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 nearby vicinity. Soil characteristics for the study area are summarized in Table 2. A description of key soil limitations and of what type of wastewater treatment system can be sited on soils with varying limitations, along with average area needed for each type of system, is shown in Table 3.

In the area southwest of South Shaftsbury village, much of the densely developed area is underlain by Pittsfield fine sandy loams and Stockbridge loams, which are generally suitable for conventional onsite systems. The area near Lake Drive is also underlain by soils that are generally suitable for conventional systems. Outside of these two areas, the soil conditions pose some limitations for onsite systems; the soils are generally siltier and many have shallow groundwater tables.

In the South Shaftsbury village area, the suitability of the soils for conventional wastewater treatment systems is more variable. Most of the soils underlying the densely developed Village center area are Copake gravelly fine sandy loams, which are suitable for conventional onsite systems. The soils along Cleveland Avenue, however, are Hero gravelly fine sandy loam with a shallow water table. Surrounding the village are some areas of more limited soils, particularly associated with the wetlands immediately to the south and west.

Much of the land in the part of the study area north of South Shaftsbury village is suitable for a conventional in-ground disposal system. The predominant soils in this area are Copake gravelly fine sandy loams and Pittsfield fine sandy loams. These soils all have deep groundwater tables (more than 6 feet below ground surface), are generally gently sloping, and have no limitations due to shallow bedrock. The area near Mountainview and Glastenview Roads is mostly Stockbridge loam which, according to the NRCS soils information, is suitable for conventional in-ground disposal systems. However, test pit and permit information in this area indicates that the soils are somewhat limiting and are better suited to at-grade or mound systems. There are a few pockets of soils of Massena and Raynham silt loams that are not suitable for most wastewater disposal systems located near Route 7A.

### 2.3. Water Supplies

Most of the study area south of Daniels Road is served by the Shaftsbury Fire District No. 1 water system, which is a consecutive water system served by the Village of North Bennington. The Town of Shaftsbury currently performs the administrative functions of the Fire District. The extent of the water system is shown on Figure 1. The network of water mains receives water from a reservoir near Basin Brook that is owned by the Village of North Bennington. The system's water filtration plant is located to the east of the study area. There are approximately 300 metered connections within the water system's service area. The system currently has surplus capacity to serve new connections from existing and potential future development.

Onsite wells can limit onsite wastewater capacity because of the required protective setbacks between water supply wells and wastewater disposal systems. Properties on and north of Daniels Road are served by individual onsite water supplies, consisting of shallow springs or drilled wells. The Vermont DEC's Water Supply Division maintains a GIS dataset of digitized drilled water supplies; this information shows a total of 55 drilled wells serving properties in the northern part of the study area.

The water supply information currently available does not account for a significant portion of the developed properties within the study area. While it is likely reasonable to assume for the purposes of this study that most of the properties in the South Shaftsbury village and southwest village areas are connected to the municipal water system, water supply information was not available for at least 60 of the developed properties in the northern part of the study area. A recent evaluation of the municipal water system indicated the Town is considering the possibility of providing public water to the Mountainview Drive / Glastenview Drive development via Daniels Road; however, the costs appear to be prohibitive at this time.

## 2.4. Zoning Districts

Most of the southwest portion of the study area near Lake Paran is zoned Village Residential. A few parcels near the edges of this area, as well as the parcels in the area of Lake Drive, are zoned as Rural Residential (RR). The purpose of the RR district, according to the Town Plan, is to preserve "the natural rural and scenic qualities of areas which are planned to be predominantly residential and agricultural in character." The zoning bylaws permit appropriate compact development in these areas, but also ensure that development occurs at a density that can be supported without the need for municipal water supplies or sewer systems. The minimum lot size in the RR district is 40,000 square feet per dwelling.

The South Shaftsbury Village area consists of a central area that is mostly zoned Village Residential (VR) surrounded by RR. The former Eagle Square facility and nearby area is zoned Industrial, and the parcels on both sides of Route 7A through the village are zoned Village Commercial (VC). The VC district was recently created to reinforce historical development trends while maintaining the Town's small-scale and rural character. A variety of retail, service, and public uses are permitted in this district. There have been recent wastewater issues in this area that have contributed to the closing of a public Laundromat and prevented a dry goods store from adding food service. The Town is concerned that without resolving wastewater issues, this area will not be available for intended small-scale commercial growth.

The zoning districts in the part of the study area north of the VT Route 67 / VT Route 7A intersection are primarily commercial or industrial in nature (Figure 1). A strip of land following Route 7A north past the northern edge of the study area is zoned Roadside Commercial (RC). Much of the property along Airport Road, including the currently operating sand and gravel extraction facilities, is zoned as Industrial (I) or as Commercial Industrial (CI). The remainder of the property in northern part of the study area is zoned as Rural Residential.

# 3. HISTORIC AND CURRENT WASTEWATER TREATMENT

The South Shaftsbury study area is served predominantly by individual onsite sewage disposal systems. The only exception is in the southwest village along Grandview Street, Corey Drive, and a small portion of Route 67. Properties along these streets are connected to a centralized municipal wastewater treatment facility owned by the Town of Bennington.

This section includes some general information on onsite sewage disposal systems, how they function and need to be maintained, and some information on newer components including advanced systems that can improve wastewater treatment where soils contain limitations.

## 3.1. Onsite System Components and Maintenance

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

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 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.

Treatment of the wastewater occurs in the septic tank, leachfield/soil interface, and in the unsaturated permeable soils below the leachfield. In Vermont, the EPRs require a minimum three foot separation to seasonal high groundwater table and impervious soils (percolation rates slower than 120 minutes/inch), and four foot separation to bedrock. The US EPA Onsite Wastewater Treatment Systems Manual (Feb. 2002) shows that onsite systems under the right design, use and siting conditions, can provide high levels of treatment, for most pathogens, and can reduce wastewater strength (BOD and TSS) by over 90%. The standard system, however, does contribute nitrogen and phosphorus unless special design elements are considered and/or pre treatment components are added.

In coastal areas where nitrogen is a limiting nutrient, some areas (like Massachusetts and Rhode Island) require additional nitrogen removal standards. Nitrogen concentrations in groundwater are another consideration, particularly if the groundwater is a drinking water supply source. The State of Maine has studied their groundwater sources where they allow onsite wells and septic systems on 10,000 square foot lots, and found that the groundwater was not being impacted at that density. Phosphorus is a limiting nutrient for many freshwater lakes, and can contribute to eutrophication if not managed. Many lakeside communities are currently struggling with how to reduce phosphorus from onsite systems near lakes, and design considerations such as placing leachfields in the root zone of plants or reducing contributions coming out of the buildings by changing cleaning detergents and eliminating in-sink garbage disposals.

Some older wastewater treatment systems may use drywells for final treatment and distribution of wastewater. Drywells typically follow septic tanks and consist of concrete cylinders with open bottoms and holes in the sides, surrounded by stone. The drywells hold 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 sited 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.

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

Effluent filters can be added to the outlets of septic 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 disposal field. The filters need to be hosed off usually once a year.

Advanced pre-treatment components can be added after the septic tank to improve wastewater treatment prior to disposal. These treatment devices range from intermittent sand filters and recirculating sand filters, which are described in the EPRs, to Innovative/Alternative technologies receiving special approvals by the state (http://www.anr.state.vt.us/dec/ww/Innovative.htm). These devices include peat filters, geotextile filters, and various other media and fixed film processes. The result is an effluent meeting secondary wastewater treatment plant performance standards for reductions in BOD and TSS to 30 mg/l or less. Vermont DEC's website has a page listing approved technologies. The licensed designer helps the homeowner choose the right components for their situation. Pre-treatment can enable the use of smaller leachfields (up to ½ the area of traditional leach fields), which can be especially useful for the construction of repairs or replacement systems on small lots. Pre-treatment may also eliminate the need for a mound system, since State regulations grant reductions in the vertical separation to limiting soils when using pre-treatment units. Pre-treatment components may also allow for increased capacity of onsite systems, maximizing soil resources, or may allow for the use of sites not previously approved under Vermont's onsite system regulations.

Since August 2002, the Vermont Environmental Protection Rules (EPRs) have contained a process (and incentives) for using these technologies where site conditions are difficult. Since the revised Rules were implemented, several different technologies have been approved by the Vermont Department of Environmental Conservation (DEC) and are available for designers to consider. 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.

Operation and maintenance of conventional septic systems is relatively simple. Operation or use of the system can be enhanced by the use of water conservation devices and by developing appropriate habits, including limiting laundry-washing to one load per day and eliminating in-sink garbage disposals.

Maintenance on conventional systems consists of having someone check the levels in the septic tank and pumping the tank when necessary. For the homeowner, this usually means calling the septic tank pumper and always paying for a pumpout regardless of actual need. 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 also be inspected regularly and pumped when necessary. Any electrical parts should be inspected yearly.

Tank maintenance is a lot easier when access to the tank is not difficult. 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. Lightweight plastic and fiberglass materials for risers are now available, although locks or other mechanisms to ensure child safety should be considered if lightweight materials are used.

Another important maintenance activity is to check distribution boxes and make sure that the outlet pipes are level. If this box is not level (frost heaving can easily move the box out of level in Vermont's freezing climate), one portion of the disposal 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 disposal field itself should be checked for seepage or surfacing of effluent, and for water loving plant growth. If there is untreated wastewater surfacing or discharging into a ditch or surface waters, this constitutes a public health hazard that should be addressed immediately with the help of the town's Sewage Officer. Although not typical in Vermont, some disposal fields (leach fields) include monitoring pipes so that the stone in the disposal 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 effluent may surface or the system may back up.

## 3.2. State and Local Regulations

There are three permit programs that may need to be considered prior to the construction of an onsite system. The Town has a Sewage Ordinance that requires approval prior to the construction of any new or replacement system. The State of Vermont has Environmental Protection Rules (EPRs) that govern systems with design flows less than 6,500 gallons per day (gpd) and the Indirect Discharge Rules (IDRs) govern systems that are 6,500 gpd or larger. Following is a brief description of each of these programs.

### *3.2.1. Town Sewage Ordinance*

The town Sewage Ordinance requires town approval prior to the construction of any new or replacement system. This permit program covers all properties, even those that are currently exempt from the EPRs. The approval process is mostly a submittal of paperwork pertaining to the system design to the Town Sewage Officer.

After June 30, 2007, local ordinances will be superseded by the state rules, and a permit from the state will be needed for all new construction and for replacement systems or repairs. A limited number of towns, such as the Town of Colchester, have the staff to administer the program, while most communities will allow their ordinances to expire and discontinue the local approval process.

After that date, construction of all replacement systems will require complete soils testing and design by a licensed designer. The Regional Office of DEC must be in agreement and issue a permit for the changes prior to construction. Typically these permits require that a designer inspect the system and certify that it was installed in accordance with the EPRs and the permitted design. This change is significant for properties such as those in older, established single family residence neighborhoods where less detailed design and construction may have been allowed in the past. See Section 3.2.2.3 on "Best Fix" situations regarding existing properties where currently a contractor or owner may propose an upgrade with limited soils, site and design information, complete plans will be required for most system upgrades. This situation is part of our consideration of who needs capacity from an offsite system for existing developments, and where the town wishes to increase wastewater capacity for future development and growth.

### *3.2.2. Vermont Environmental Protection Rules (Effective January 1, 2005)*

The Environmental Protection Rules (EPRs) contain legal, site and soils, and design requirements for any system less than 6,500 gpd that is under their jurisdiction. As described in the previous section, after June 30, 2007, all systems will come under one set of regulations and require a permit from either the state or from a community with delegated authority. Water Supply & Wastewater Disposal System (WW) Permits are issued for construction and ongoing use of these systems. The EPRs contain several design requirements that affect the type and size of a wastewater treatment system. Wastewater design flows, minimum setbacks, and system sizing are described in the rules.

Design flows for systems are determined based on a building's use and/or on the number of units connected to a cluster system. A range of design flows are prescribed for single family residences, from 420 gpd for a three bedroom single family residence on an individual system to 245 gpd for the same residence if it is connected to a system serving 20 or more similar units. Design flows for commercial uses such as offices, restaurants, and retail shops are also specified in the EPRs. Consideration must be made for wastewater strength as well as type of wastewater, particularly for restaurants which typically produce higher strength wastewater. Examples of wastewater design flows for differing commercial uses are listed in Table 4.

Mr. Roger Thompson of the DEC indicated that the design flows for residential uses have been adjusted to take into account the standard low flow fixtures and savings when connecting additional houses to one system. There is no current plan to adjust the remainder of the flows, although some of them may be high, such as those for dentist offices, hairdressers and laundromats.

Systems larger than 50,000 gpd (typically municipal wastewater treatment facilities) can receive an automatic 20% reduction in design flows. There are also some cases where metering actual daily flows can be used to allow additional connections to a system. This becomes more problematic the smaller the number of connections, and is not normally allowed for individual or small cluster onsite systems.

#### *3.2.2.1. Low Flow Fixtures*

The EPR design flow figures for residences already take into account standard low flow fixtures currently on the market. Commercial uses can take a 10% reduction when toilets are specified as 3.5 gallons per flush or less and showers and faucets are 2 gallons per minute or less.

The EPRs are silent regarding whether additional credits could be taken for ultra low flow fixtures, or for water-conserving appliances such as clothes washers and dishwashers. Ultra low flow fixtures are not given additional credit, except in remedial situations. This can improve the functioning of existing onsite systems, potentially allow additional flows in cluster systems that have monitored flows, and reduce the amount of new flows from new developments. However, a concern for needing multiple flushes in some toilet fixtures, and overall concentration of the wastewater (strength) may balance out some of the pros to using these fixtures. Since much of the village is served by municipal water service, a water meter study could be performed along with fixture and appliance upgrades in order to establish actual daily and peak flows for each building. This information would be useful both in designing individual system upgrades and for connections to cluster systems.

#### *3.2.2.2. Minimum Isolation Distances*

Another important design component with onsite systems are the minimum isolation distances to certain features, like property lines, building foundations, wells and surface waters. Section 1-503 of the EPRs includes a table with minimum distances listed. A footnote on the table indicates that "These distances may be reduced when evident that the distance is unnecessary to protect an item or increased if necessary to provide adequate protection." An example of the distance is the 25 foot setback to property lines. This distance would not be reduced for mound systems or where there is good potential for breakout in the downslope direction. However, for areas like the elementary school and surrounding properties where the ground contour is generally level, and the soils are sandy and well drained, this distance may be reduced to as little as 10 feet without any special waivers. There are instances where the DEC may require easements from neighboring property owners before allowing a reduction.

The state EPRs no longer include a requirement for a minimum lot size, as they had in earlier versions (pre-1982). In place, they require that if all of the minimum isolation distances discussed above can be met, including a primary and replacement septic system, and water supply, a permit can be given for various size lots. In other states there are similar requirements, particularly for areas near the coast that include multiple lot subdivisions. In those cases, additional science may be required to predict the nitrogen loading and ensure they are within their current standards.

Typically, lot sizes of less than ¼ acre are not suited for on-site wastewater disposal. Lot sizes between ¼ and ½ acre may be capable of supporting on-site disposal as long as there is a municipal water system; however, there are many other constraints that may impact the suitability of an on-site system. Lot sizes of over ½ acre with municipal water are generally large enough to find a suitable area for a leach field, as long as suitable soils are available.

#### 3.2.2.3. *Best Fix Situations*

When there is an existing building with wastewater flows and a failure occurs, a replacement system must be designed and installed that meets the minimum requirements of the EPRs to the best extent possible. This means that if the soil and site conditions do not meet the minimum standards described in the EPRs, the designer and property owner may need to work at designing an acceptable "best fix." In extreme cases, the DEC may require reductions in design flows and ask that the owner pursue off-site solutions on neighboring properties before approving something onsite. The worst case scenario would include a pretreatment system, a filtrate mound system and subsurface curtain drain. Since these cases are handled individually, there is some discretion on the part of the designer and reviewer. When the DEC is involved, they should be working with the designer on determining the design requirements.

Existing developed properties that want to convert to different uses that would increase wastewater design flows for the building may be constrained by existing soils and site conditions. For example, if a store wanted to add a deli counter and seats for lunches, the wastewater flows would increase. If there is an increase in flows, the designer must determine if the existing system can meet current standards for the increase, or if a new fully complying system and replacement area must be designed before approvals will be given.

### 3.2.3. *Vermont Indirect Discharge Rules*

Since January 1990, cluster 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 disposal systems, all of 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. The IDRs depend on the EPRs for certain design features including wastewater flows. In some cases, there will be an ID permit issued for the major portions of the treatment and disposal system, and individual connections require a WW permit from the DEC Regional Office.

Any flows directed to a cluster wastewater treatment system with design flows of greater than 6,500 gpd constructed in the Shaftsbury study areas to support development that was already complete as of May 17, 1986 will likely be considered an "Existing Indirect Discharge" under the current 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. The Shaftsbury Elementary School system is permitted under this section.

Any new cluster wastewater treatment system constructed in the Shaftsbury study area to support additional development will likely be considered a "System with New Indirect Discharge". If wastewater dispersal sites with design flows of greater than 6500 gpd are located near Paran Creek, 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 Shaftsbury must 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 Town 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 IDRs were revised effective in April 2003. The current revisions are based on a review of the data collected on indirect discharge systems and are also meant to streamline the permitting process and to increase latitude to permittees in the operation of their systems. Following is a brief description of some key changes.

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. This change streamlines the permitting process without any loss of oversight, because the General Permit still requires annual inspections and reporting of system failures. Significant changes were made to the Aquatic Permitting Criteria. Sampling for nutrient parameters (total dissolved phosphorus and nitrate-nitrite nitrogen) is still required, but sampling for other parameters that did not often appear in groundwater near permitted systems (such as total chlorine, biological oxygen demand, and total kjeldahl nitrogen) is no longer required.

Changes have been made to the methods by which an applicant may demonstrate compliance with the Aquatic Permitting Criteria. A new method (the Dilution Method) has been added, and the applicability of the Treatment Index and Modified Site Specific Methods has been expanded to include more potential projects. These alternatives to the more complex and costly Site Specific Method provide a range of options for projects with smaller design flows that do not appear to have the potential for significant environmental impact.

Several important changes were made to the technical design standards in the IDRs. The standards for the design of intermittent and recirculating sand filters were changed to more closely match the standards set forth in the EPRs. A new section was added to clarify requirements for reclaimed water use (including requirements for chlorination and ultraviolet (UV) disinfection, and the possibility for approval of other disinfection systems).

## 3.3. Local and State Permit Programs & File Reviews

There is a significant amount of information in Town and State Department of Environmental Conservation (DEC) permit files for properties in the South Shaftsbury area, although most of it pertains to relatively recent subdivisions and development. Stone conducted a review of the files in the Town Office and at the District 8 Regional Office in Rutland. A summary of the available permit information is shown in Tables 5 and 6.

### *3.3.1. State Permits*

Stone reviewed the DEC permit files in the Rutland 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 66 permits were found for 44 parcels in the study area (Table 5). Three of these permits were for the replacement of failed septic systems, but none appeared to result in a "best-fix" solution. The rest of the permits were for subdivisions, new construction, or modifications to existing permits. About 20% of these permits were examined in more detail to obtain information such as soil conditions used in system design and system components and/or capacity.

#### *3.3.1.1. Shaftsbury Elementary School*

There is an existing Indirect Discharge Permit (ID-9-0165) for the Shaftsbury Elementary School's onsite system. This system was designed for 7,775 gpd based on a student population of 370 (20 gpd per student and 375 gpd for administrative personnel). The system was reportedly constructed based on plans dated March 1956. In 1973, additions and alterations to the school and system were developed, and in 1994 an existing metal septic tank was replaced with a concrete tank. While plans exist that indicate the area of the existing leach field, there are no specific plans on the layout, depth, or details on how the field was constructed. Since this system pre-existed the Indirect Discharge Rules, the system has not had the type of soils and site analysis required for a new system on this site. The permit does require annual inspections by an engineer, and copies of that inspection are included in the state files. The most recent inspection of the system was reported in a letter dated May 3, 2005 from KAS, Inc. The septic tanks were inspected and did not require pumping, and all aspects of the inspection indicate the system is functioning hydraulically.

The current school population generates wastewater flows that are significantly less than the system was originally designed to handle. Thus, there may be capacity in this system for existing flows to be added within the current permit limits. It is not recommended that this be done, since the existing leach field is quite old (approximately 50 years old), and the leach field is of unknown construction. Two key unknown factors include the condition of the pipe, stone and cover material, and the separation to seasonal high groundwater table. If the town proceeds with a decentralized solution, they may want to consider evaluating and potentially upgrading this system at that time.

There is some information on soils on this property provided on the early plans. There are hand-written test pits and printed soil borings listed on one site plan. The test pits and borings indicate coarse sand and gravel to a depth of 6-8 feet, with fine sand and silty sand below. One pit indicated it was wet at 6 feet deep. These plans may have been conducted prior to using mottles and staining to predict seasonal high groundwater table depths. Also coarse gravelly materials may not show reliable indications of groundwater table.

The school property may have potential as a cluster system site for other properties in the village area. Several properties that abut the school property could benefit from additional wastewater capacity by encroaching within 25 feet to the property line, or by allowing systems or replacement systems to be constructed on school property. A part of this consideration should be making sure the school itself has adequate area available for an upgrade if needed. While discussions with John Akielaszek of the Indirect Discharge Section of DEC indicated that he would not require that a replacement area be set aside for the school, he was in agreement that ensuring the existing system's viability and considering its upgrade needs would be prudent.

Another way that capacity may be created with this property is by using pretreatment technologies to effectively double the leach field capacity.

Any changes to the school system itself will require an Indirect Permit amendment. However, if clusters or systems smaller than 6,500 gpd are proposed on this site, that would trigger the Water Supply and Wastewater Disposal permit program under the EPRs only.

### 3.3.2. Town Permits

The Town of Shaftsbury records State DEC permits in their paper files when such permits are required, and issues zoning permits based on the State's permits as issued. Often, older properties are exempt from needing to obtain a State permit for changes in building use or for system construction or repair. In these cases, the zoning permits issued by the Town may contain the only recorded information about a property's wastewater treatment system. During a site visit in November, Stone and Phelps staff reviewed the available Town zoning permit files for properties within the study area, with emphasis on areas of concern. A total of 22 permits for 21 properties within the study area were examined to obtain information about soil conditions and system types (Table 6). Two of these permits were for replacement of septic systems or leachfields. The rest of the permits were for changes in property use, subdivisions, or new construction. Most of the information regarding soil conditions and system types was consistent with the soil conditions mapped in Figure 2. Soil information and system type information from permits along Glastenview Road and Daniels Road suggests that soil conditions in this area are more limiting than the NRCS soils data indicate. Due to the large lot sizes in this area, it appears that any issues with individual septic systems could be dealt with on an individual basis. Extending the municipal water system to this area may be the most cost-effective approach for public health protection should problems arise in the future.

## 4. NEEDS ASSESSMENT

The needs assessment is an overall review of the environmental and public health issues (sustainability) related to onsite wastewater treatment for existing properties. A secondary need is to consider zoning and growth limitations and needs. The amount of area necessary for an onsite wastewater treatment system depends on the building use, design flows, and building lot coverage; site conditions such as soils, slope, and setbacks to features such as streams, foundation drains, and property lines. The amount of area available for an onsite system is also affected by the building's water supply, whether there is a connection to a municipal water system requiring minimal setbacks, or a drilled or shallow well that requires extensive well shield buffers.

The needs assessment portion of this study includes use of Geographic Information System (GIS) datalayers that combine spatial information, such as USGS topography and NRCS soils information, with local information such as parcel boundaries, orthophotographs, and zoning districts. Analysis methods are briefly described, followed by the results of the needs assessment and recommendations for decentralized and centralized wastewater treatment infrastructure in three sub-sections of the study area.

### 4.1. Analysis of Soil Properties

The NRCS soils data were reviewed and ranked by Stone according to the appropriate wastewater treatment system type given any limitations for each soil type (such as shallow groundwater, bedrock, or excessive slope) (Figure 2, Tables 2 and 3). The results of that analysis were shown on a GIS base map to identify potential areas of concern. Permit information, particularly where test pits, percolation tests, and system designs were available, was used to confirm or dispute the initial rankings. The preliminary results were discussed with several local residents and professionals, as well as staff at the DEC Rutland Regional Office. This review resulted in an overall recommendation for each area by street location either for maintaining and upgrading systems onsite, or for connecting to an offsite decentralized or centralized wastewater treatment system. The results of this assessment are summarized on Table 7 and on Figure 2.

### 4.2. Area-By-Area Review and Identification of Need

Once the results of the GIS analyses were produced, an area-by-area 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. However, there were some properties where indications from permits, surveys, and site visits led us to make recommendations for offsite solutions where no constraints are shown on the figures.

## 4.3. Needs Assessment Results

The results of the needs assessment divide the study area into three general areas: the Southwest Village area, the main South Shaftsbury Village, and the northern commercial and industrial district. Table 7 summarizes the specific wastewater needs as described below.

### *4.3.1. Southwest Village Area*

The Southwest Village area is located just north of North Bennington and already has municipal sewer service along Grandview Street and part of VT Route 67. The extent of municipal sewer service is presented in Figure 1. The properties are mostly residential with municipal water, with a few commercial properties located along Route 67. This area includes White Creek Road/Bank Street, Elm Street and Dunham Avenue, Grant and Grandville Streets, and Harvest Hills Drive and Hewitt Drive to the north. Lamb Road east to Route 67 and just beyond is also included in the Southwest Village area, as is the Paran Acres subdivision.

The village zoned properties in the center of this area (Figure 1) are relatively small lots with soils indicating well-drained sands where conventional leach fields will work well (Figure 2, Table 2). There are a few properties east of Corey Drive mapped as having shallow water tables and thus could benefit from connection to off-site sewer. There are approximately 5 houses on Lamb Road that are also located on soils that have limited suitability for onsite systems. This area of need is shown as Area SW-1 on Figure 2.

There are several small developed lots along Bank Street. Although these properties are served by municipal water and the soils are mapped as suitable for a conventional system, the small lot sizes may restrict the lots' abilities to meet minimum setbacks in the EPRs. If the municipal sewer were to be extended along White Creek Road to Elm Street, this could alleviate the potential for future problems and provide an avenue for growth in this designated village growth center. This area is shown as Area SW-2 on Figure 2.

The area from Grant Street north to Harvest Hills Drive and Hewitt Drive contains a mix of both suitable and poorly suited soils for onsite systems. Since municipal water service extends along part of Harvest Hills Drive and many developed properties contain some area of suitable soils, we do not recommend off-site sewage disposal for these properties. There are several homes on Hewitt Drive that may benefit from a small cluster system located nearby in better suited soils. This area is shown as Area SW-3 on Figure 2.

Two newer subdivisions are located east of the railroad tracks in an area just north of Paran Lake. McCarthy Acres is a small subdivision on well drained soils with no reported problems. Paran Acres includes McGuire Street, Southview Drive, and Lake Drive, and is also mostly located on soils that are suitable for conventional leach fields. There is an area at the southeast end of the Paran Acres subdivision that contains soils that are shallow to bedrock. A review of state permits in this area indicated that most properties contain suitable soils for an onsite system. Since the lots are relatively large and are served by municipal water, the lots appear suitable for onsite wastewater disposal.

#### *4.3.2. Main South Shaftsbury Village Area*

The South Shaftsbury Village area includes the residential and small commercial area near VT Route 7A, Main Street, and Church Street, and continues south to include Cleveland Avenue, Meadow Lane, Sycamore Lane, Holiday Drive, and Colvin Avenue. The area extends south to the Bennington town boundary on VT Route 7A, including the Ledgely Drive area and East Street past the elementary school to Howard Park. Along Route 67, properties include a small mobile home park and the former Eagle Square plant. Twitchell Hill Road and Daniels Road, as well as Mountainview Drive, Eastview Drive, and Glastenview Drive, are located in the northern part of the South Shaftsbury Village area.

Twitchell Hill Road has several very small lots located near the southern end of the road. This road is served by municipal water. The soils for the first several properties at the south end of the road appear to be suitable for onsite wastewater disposal. The north end of Twitchell Hill Road also contains larger lots and more suitable soils for onsite wastewater disposal. Much of the central part of this road (6-17 properties) passes through an area of Georgia loam soils with a high seasonal groundwater table 18-36 inches below ground; these lots may have difficulty upgrading or replacing their systems in the future. This area is shown as Area V-1 on Figure 2.

Daniels Road is mostly mapped as Stockbridge loam, with some Georgia loam to the west of Mountain View Drive. State and local permits in this area indicated that mound and at-grade systems have been successfully installed in recent years.

The Mountainview/Glastenview Drive area is rather perplexing in terms of its potential need for onsite or off-site wastewater solutions. This area was originally subdivided into many very small lots that were subsequently reorganized into 0.9 acre or larger residential lots. The properties are served by individual onsite water supplies, so water supply buffer areas needs to be considered in addition to the area required for any onsite wastewater system. Although the soils are mapped as suitable for conventional systems, interviews and permit information indicate siltier soils with high seasonal groundwater tables such that mound or at-grade systems were necessary. While the original systems on some of the older lots may not be constructed to today's standards, upgrades on difficult sites in this area are likely possible using the performance-based portion of the EPRs. This approach allows systems to be designed in areas where there may only be 6-10 inches of separation between the ground surface and the seasonal groundwater table. Naturally steeper slopes in this area may also enable the use of subsurface curtain drains to lower the groundwater table near a mound system. Prior to pursuing wastewater alternatives in this area, it is recommended that the Town develop the potential for a water system extension to relieve the properties from water supply well isolation distance issues.

The former Stanley Tools plant, currently called the Eagle Plant, is used as a mannequin factory. This facility originally contained a workforce population of approximately 300 employees, and now contains about 100 employees. The leach field for the system serving the plant is reported as being located in front of the building in the lawn in sandy, well drained soils. No test pits or specific information regarding system design were found. Several state permits refer to the property, but these permits were mostly for changes in use or other non-wastewater related purposes.

The small mobile home park along VT Route 67 across from the plant is reported to have a large septic tank. No additional information is known about the property, but the area is surrounded by wetlands and may be limited in terms of onsite wastewater treatment capacity.

The area east of the Eagle plant along VT Route 67 contains mostly residences. Although these residences are located on suitable soils, there is a steep dropoff in the rear of the lots on the north side that may limit the area available for onsite wastewater treatment. Several commercial properties on Route 7A and at the intersections of Church Street and Route 67 have been reported as being limited in terms of onsite wastewater capacity. In these cases, the difficulty appears to be large building and parking area coverages on small lots, particularly when uses with higher flows such as Laundromats and restaurants are proposed. Town staff interviewed during this study indicated that the Town would like to create wastewater treatment capacity in the South Shaftsbury Village area to meet the needs of commercial enterprises such as restaurants and to facilitate the conversion of buildings from residences to multi-family apartments or small businesses, particularly along VT Route 7A. This area is shown as Area V-2 on Figure 2.

The central neighborhood near Sycamore Lane and Cleveland Avenue contains a mix of soil and onsite conditions, ranging from very suitable sands to wet silts. Figure 2 shows an area from Meadow Lane south along Cleveland Avenue to Holliday Drive with Hero gravelly fine sandy loam and a seasonal high water table of 18-30 inches below ground. This area is shown as Area V-3 on Figure 2. If most existing systems are in the ground 2-3 feet deep or more, these systems are likely not treating wastewater adequately before it enters the groundwater table. This condition could impact approximately 24 properties in this area. It may be helpful to install groundwater monitoring wells along road rights of ways and measure actual water table depths, particularly during the spring. A procedure for conducting springtime groundwater monitoring is described in the EPRs. One or several cluster wastewater treatment systems could be located close to this area to serve the impacted properties. Another potential option may be to lower the groundwater table in the area so that adequate separation to groundwater and thus adequate treatment can occur in the existing systems (or at least in replacement systems that conform to current regulations).

There is a small mobile home park located off VT Route 7A just south of the cemetery. This area is mapped as having suitable soils, although it is apparent that wetlands exist off the bank behind the homes. The property extends to the north and appears to have an area available for onsite system replacement if needed.

### *4.3.3. Northern Commercial and Industrial Districts*

The northern portion of the study area includes Route 7A from Daniels Road north along the commercial strip, Airport Road, and Bahan Road and North Road east to the railroad tracks. This area also includes the industrial district located just northeast of North Road.

Much of the area on the east side of VT Route 7A north of VT Route 67 has been altered during many years of sand and gravel excavation and earth moving operations. It is unknown whether enough suitable undisturbed soil remains to site individual or cluster onsite systems. However, if the remaining soils are predominantly sands and gravels, significant wastewater treatment capacity could be gained in a small area.

The area south of Airport Road contains a small number of existing commercial buildings, some of which are unoccupied. It appears that suitable wastewater treatment capacity could provide flexibility in the future use of these buildings. This area is shown as Area N-1 on Figure 2.

North of Airport Road along VT Route 7A, there are indications of both well drained and poorly drained soils. Much of the area west of Route 7A contains suitable soils for onsite systems. However, a steep slope exists near the main road and many of the lots are relatively narrow. Paran Creek and its related wetlands are located along the eastern side of VT Route 7A and limit growth potential in this area. This area is shown as Area N-2 on Figure 2. There is an existing motel on the east side of VT Route 7A; the owners recently upgraded their system to a filtrate, and performance-based mound system, while possibly losing some rental units. There appears to be an area immediately east of this property with suitable soils that might be considered a potential cluster system site.

There are several recent residential subdivisions along Bahan Road and Grove Road, where soils appear to be suitable for conventional systems. This area is not served by municipal water, but larger lot sizes in this area and the recent nature of the subdivisions both mean that individual water supplies are likely to be adequately protected from potential contamination. The developed area along North Road also contains larger lots with generally suitable soils and conditions for onsite systems, and the industrially zoned areas are also located on generally suitable soils. This should make future development relatively straightforward, with few restrictions for onsite wastewater disposal.

## 5. ALTERNATIVES ANALYSIS

Section 4 identified specific wastewater needs within the study area. This section evaluates alternatives to address those needs, based on the following methodologies:

- Review a centralized approach where all wastewater from identified needs areas is collected through gravity sewers and force mains to a centralized wastewater treatment facility for treatment and disposal. This approach is presented in Figure 3.
- Review a decentralized approach, including the feasibility of reducing wastewater infrastructure by allowing for the collection of small "clusters" of buildings, with treatment and disposal in a suitable small system close to the source. This approach is presented in Figure 4. This approach will also review possible management and administrative options available to resolve wastewater issues, such as allowing increased wastewater flows on individual on-site systems or reviewing the potential for flow reductions in the book value capacities.

Each of the options described above will be reviewed, with costs presented for two reasonable scenarios per option. In the next section, these scenarios will be compared based on economic and non-economic criteria.

### 5.1. Centralized Wastewater System Options

When wastewater needs are identified in a village center, the typical approach in the past has been to provide centralized sewer service and to require mandatory connections within the service area. This approach generally works in large, compact village centers where a high density of development can significantly reduce the cost per connection. As the South Shaftsbury village is typical of Vermont communities, evaluation of a centralized sewer system is warranted.

#### *5.1.1. Disposal Options*

For new community wastewater systems, finding a cost-effective disposal alternative is usually the critical factor in determining the feasibility of a project. The variability in costs of collection and treatment alternatives is significantly less than that of the treatment and disposal portion, since the location and soil conditions of the disposal site(s) will strongly influence costs.

The service area for the Town of Bennington's centralized wastewater system is adjacent to the study area. The limit of North Bennington's collection system is located near Whitman's Feed Store, approximately 1.5 miles from the Eagle plant site. This termination appears to be in a suitable location to receive flow from most of the proposed service areas with minimal pumping. It is clear that the most cost-effective centralized disposal option for the South Shaftsbury area is collection and pumping to the North Bennington sewer system, for the following reasons:

1. A centralized solution will require approximately 75,000 gpd of design capacity, based on an estimated 350 equivalent residential units (ERUs) within the proposed collection system areas shown in Figure 3. Regardless of the disposal method (indirect discharge, spray disposal, or direct discharge), a treatment system would be required at an initial cost of approximately $2.5 to $3 million, plus annual operation and maintenance costs. Without significant sources of grant funding, this approach would be cost prohibitive. These options would require a significant effort to secure appropriate land necessary for disposal and gain the necessary permits with near-certain opposition from environmental groups and concerned nearby landowners. For instance, in order to implement a spray disposal alternative, an area of 5-10 acres of moderate to steeply sloping (10-30% slope) wooded land would be needed for disposal, as well as approximately 1 acre for a storage lagoon that would hold treated effluent during certain times of the year.
2. The Bennington Wastewater Treatment Plant (WWTP) has an uncommitted reserve capacity of approximately 500,000 gpd, based on ANR's Capacity Report dated August 2005. There may be political challenges associated with this alternative, particularly because Shaftsbury was approached by Bennington during their last WWTP upgrade and did not elect to participate. In addition, we have experienced situations where this option appears viable but the town with municipal infrastructure is reluctant to accept a force main connection from a neighboring village, fearing that it will provide "competition" for residential and commercial growth. However, initial discussions with Town of Bennington staff have been favorable. We trust that political boundaries can be overcome because this solution can be mutually beneficial with respect to the environment as well as providing a larger user base to further stabilize utility rates. It is recommended that the Selectboard approach the Town of Bennington to initiate discussion towards an Inter-local Agreement for wastewater service, as either a centralized or decentralized alternative will recommend new connections to the North Bennington sewer system.
3. The proposed force main route would run through areas with potential wastewater needs, allowing the infrastructure to be used for current and/or future connections and minimizing the potential contentions that long force mains promote sprawl.

At this time, evaluation of large scale in-ground disposal sites and the feasibility of providing a direct discharge to an area receiving stream are not warranted.

### *5.1.2. Collection System Options*

The proposed collection system for the centralized sewer alternative is presented in Figure 3. The proposed service area is based on providing service to most of the Village Residential and Village Commercial zoned properties where development density would support the infrastructure, and includes most of the Roadside Commercial zoned properties for future development purposes. The proposed system is divided into sub-areas based on features such as stream crossings, railroad crossings, or breaks in grade that may require a pumping station. These divisions allow the Town to gauge the impact of adding or removing sub-areas on overall project costs.

There are a number of alternatives for collection systems for small rural communities, including:

- Conventional gravity/manhole collection systems
- Septic tank effluent pumping (STEP) systems
- Septic tank effluent gravity (STEG) systems
- Small diameter low-pressure sewer systems with grinder pumps
- Vacuum sewer systems

Table 8 presents the advantages and disadvantages of each alternative listed above. A conventional gravity/manhole collection system is noted as the primary feasible alternative for a centralized sewer option. This collection alternative has flexibility to accommodate future growth, and the topography of each sub-area allows for gravity collection to a single point with one pump station. This approach is generally more reliable than providing several individual pump stations, as with the STEP, low pressure, or vacuum sewer options.

### *5.1.3. Preliminary Costs*

A range of project costs for the centralized sewer alternative is presented in Table 9. Scenario 1 presents a full buildout to serve all identified areas of wastewater need as shown on Figures 2 and 3. Scenario 2 presents an alternative for a scaled down system that serves the village residential and commercial districts based on the density of development and to reduce the high costs associated with crossing topographic features such as streams and the railway. Detailed opinions of probable construction costs are presented in Appendix A.

Project costs consist not only of construction costs, but other technical services such as preliminary and final engineering, environmental reviews and permitting, purchases of land or permanent easements, legal expenses such as attorney review of inter-municipal agreements, bond warnings, assistance with development of ordinances, and administrative expenses such as public notices, income surveys, and mass mailings. These costs are difficult to pinpoint at the feasibility stage; however, allowances are included based on general industry guidelines for each major item as a percentage of the estimated construction costs.

### *5.1.4. Permitting and Environmental Issues*

Aside from the construction disturbance, a centralized solution provides a direct benefit to the immediate area by removing much of the potential pollutant loading due to wastewater from an area upstream from Lake Paran. It is difficult to determine whether this method provides an overall environmental benefit, since the pollutant loading is redirected to the Town of Bennington WWTP, where it is treated and discharged at one location.

At this time the following permits and environmental reviews are assumed to be needed for the centralized alternatives:

- The area of disturbance would probably be over 10 acres, which is the threshold for municipal infrastructure projects to require an Act 250 permit.
- With receipt of federal loans or grants, a National Environmental Policy Act (NEPA) environmental review process will be required. Based on the area of disturbance, it is expected that an Environmental Assessment (EA) will be needed, 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. Ultimately, the desired outcome is a "Finding of No Significant Impact (FONSI)" from the federal agency providing the funding.
- Due to proximity to wetland areas along Route 67, it is anticipated that both federal and state wetland permits will be needed for the project. The U.S. Army Corps of Engineers administers the federal wetland program and the ANR Water Quality Division administers the state program, which requires a Conditional Use Determination (CUD) for all impacts within and up to a 50-foot buffer zone outside of Class II wetland areas.
- With the potential for Act 250 permit and with the potential for federal loans and/or grants, a project Archeological Resource Assessment (ARA) is usually conducted in the early stage of a project to assess the likelihood of finding significant historic and archeological resources within the proposed disturbed areas.

- Construction along State routes will require a Permit to Work within the State Right-of-Way from the Agency of Transportation.
- Stream Alteration Permits for each stream crossing will be needed from the ANR Water Quality Division.
- An Erosion and Sediment Control General Permit will be needed from the ANR Water Quality Division.
- Normally, when pre-existing buildings connect to a public sewer, a State Water Supply and Wastewater Permit would be required. This requirement is waived for projects of this type, where an entire service area is being connected and there is State funding associated with the project.
- Any local permits that would be required.

For the full buildout scenario (Scenario 1), estimated user costs are significantly higher than rates in rural Vermont villages, which are targeted to be within 1½% of median household income (MHI). For the village center scenario (Scenario 2), costs are still high, and wastewater needs outside of these areas would still need to be addressed.

In addition, there are private homeowner costs required to extend the public sewer to individual building services, and typically there is an impact or connection fee charged to the homeowner for the opportunity to connect. There may be local opposition for a project of this magnitude requiring all landowners to make a significant investment for wastewater infrastructure on properties where there is no awareness of public health threats, especially in areas with well draining soils and a public water supply.

### 5.2. Decentralized Wastewater Options

A decentralized program is one which utilizes a number of on-site 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 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 disposal 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, a combination of centralized collection and cluster systems may make sense. In Shaftsbury's case, two potential service areas are close to the North Bennington sewer system, and in any decentralized concept, a central collection sewer to serve these areas may be the most cost-effective solution.

The decentralized concept must be combined with a management program that will require the Town to provide for some level of planning, siting, design, installation, operation and maintenance, monitoring, compliance, enforcement, and education for all systems within the service area, and potentially the entire Town.

Through discussions with Town officials, it appears that the main concern in this feasibility study is to determine where and how to mediate public health threats, and secondly to provide the infrastructure necessary for modest growth in the Village center through conversions of existing structures. It appears most of the study area is located on well drained soils suitable for on-site septic systems, especially in outlying areas where there is a lower density of development. Further, the Town's wastewater issues are not confined to a specific area, nor does it appear that the existing established neighborhoods in the Village have a significant need due to immediate public health threats, especially since a public water supply serves many of the small lots in the study area. Thus, review of alternatives that limit infrastructure to only those areas of need may significantly reduce the capital investment needed to properly manage the Town's wastewater needs. Since a reduction in infrastructure also means a significant reduction in the number of properties being served, alternative funding and management options are needed.

### *5.2.1. Disposal Options*

Figure 2 presents the specific areas of need, and also provides potential areas of suitable soils near each of these areas of need. These areas have not been field tested for soil suitability, and it is unknown if they are available for use as cluster type disposal systems. The areas are identified to show that cluster systems are feasible, and to provide a basis for cost estimating for comparison to the centralized sewer alternatives.

The cluster system areas include two town-owned properties: the town hall/public works property and the Elementary School, and several privately-owned properties as noted on Figure 2. These locations are very preliminary and owners of the private properties have not been contacted at this stage. Once the town decides which alternative to pursue, contacts can be initiated.

Properties along VT Route 7A that also abut the elementary school property may have opportunities to increase their onsite wastewater treatment capacity by identifying replacement system areas on the school property, or by extending into the 25 foot setback to property lines through the use of easements. The setback from property lines is intended to keep any failed system within the bounds of the property and to allow the use of construction equipment around the system. This setback can be reduced, particularly in cases where the site is relatively flat, if easements are granted for the encroachment.

Another means of increasing wastewater capacity in this area is through the construction of cluster systems. Cluster systems may be used to replace existing systems or to provide new capacity, for example, to add a new apartment to an existing residence. Potential cluster system sites are located at the town-owned property adjacent to the town offices and at the elementary school property. Howard Park was also reviewed as a potential cluster site. Although the soil is mapped as suitable, information gained during interviews and local reconnaissance indicates that the park is likely limited by shallow groundwater. It may be worthwhile to install a few groundwater monitoring wells on this site to determine its potential capacity.

### *5.2.2. Collection System Options*

Similar to the discussion presented in Section 5.1, it is recommended that gravity sewers and pump stations are utilized for the decentralized options as well, for the following reasons:

- Individual service areas identified are conducive to a gravity fed collection system.
- The proximity of the North Bennington wastewater system provides the potential for a phased approach, whereby if conditions were to change in the future which requires the Town to reconsider a centralized solution, it would be advantageous to have collection system infrastructure that would be able to accommodate this change without major modifications.

### *5.2.3. Preliminary Costs*

A summary of estimated project costs for a decentralized sewer solution is presented in Table 10. This table is formatted differently from the centralized sewer alternatives, because each of these "service areas" or clusters can be considered a separate project on its own, as opposed to the centralized solution where many service areas are dependent on downstream service areas to deliver the waste to the North Bennington system. Therefore, total project costs including the technical services and other project costs are broken down for each service area for comparison.

For each service area, a cost per Equivalent Residential Unit (ERU) is calculated to assess the cost effectiveness of each individual cluster system. This value is beneficial in evaluating areas that are of lower priority where on-site solutions can be made to work. If the cost per ERU for these areas exceeds the perceived cost of fixing individual on-site systems, then other management solutions are recommended, such as discussion of reduction of setbacks or other approaches to make individual on-site solutions workable.

In addition to presenting the total cost of all service areas (Scenario 3), Table 10 presents two additional scenarios. Scenario 4 presents an alternative to only resolve the areas of specific environmental needs, such as shallow depth to groundwater. Scenario 5 includes all areas within Scenario 4 and adds the central Village alternative due to the immediate perception of wastewater needs in this area.

### *5.2.4. Permitting and Other Environmental Concerns*

As discussed in the centralized alternative section, it is difficult to assess the comprehensive impact of private, on-site systems to the health and viability of the watershed without extensive study and costs. However, it has been shown that a decentralized management approach to wastewater has benefited a number of communities throughout the country, particularly in areas of older construction that are compactly developed and located within sensitive watershed areas. There do not yet appear to be water quality issues in the Paran Creek watershed, even with modest development in the area in recent years. Therefore, it is assumed that a decentralized solution with a management component will not negatively affect the watershed. Additionally, by treating wastewater close to the source and returning it to the groundwater via nearby septic systems, decentralized systems do not result in the export of water from the watershed. Areas of New England where this practice has been ongoing for a number of years, such as the area surrounding Boston, Massachusetts, are now experiencing falling groundwater tables, reduced stream baseflows, and other adverse watershed-wide impacts.

It is expected that with a reduction in the construction disturbance, an Act 250 permit process may be avoided. All other permits and environmental concerns related to the centralized system will probably be needed for the decentralized solution. Continued discussions with ANR Wastewater Management Division personnel will be needed regarding the potential for utilizing existing disposal sites such as the Elementary School, as well as coordination with preliminary testing of potential disposal sites. These investigations will in turn lead to small-scale Water Supply and Wastewater Disposal permits. Each of the proposed cluster systems is less than 6,500 gpd, so the Indirect Discharge Permit program may not be involved except if upgrades or connections to the Elementary School system are proposed in the future (none are recommended at this time).

## 6. COST/BENEFIT ANALYSIS

The costs per ERU for the decentralized alternatives are generally higher than for the centralized solutions. However, assessing the cost effectiveness of the two alternatives by this factor alone is not reasonable, for two reasons:

1. On a total cost basis, the decentralized option provides as much of a benefit at a significantly discounted cost.
2. The decentralized option is coupled with an overall management approach to on-site systems, and in effect, residents in a larger service area will be expected to contribute funds for proper maintenance of the system. Part of these funds will be used to offset the higher unit cost of the system.

In order to properly review and compare alternatives, annual costs must be compared to what Town officials view as "reasonable" and "affordable" in this community.

Annual costs for the centralized alternative will include:

- Repayment of debt service for construction costs
- A cost of service paid to the Town of Bennington for transmission, treatment, and disposal of wastewater
- Operation and maintenance costs for facilities within the Town of Shaftsbury's service area, such as electrical usage, general pump station maintenance, and periodic repair of sewer blockages. It may be beneficial to contract these services out to the Town of Bennington, who has trained personnel on staff to perform these functions.
- General administration costs, including billing (which could be tied to water system billing), fulfillment of permit reporting requirements, and additional administrative functions such as accounting and budgeting. These functions may be undertaken by existing Town staff or could provide the potential for a part-time staff position.

For the centralized alternative, system costs are usually covered by system user charges; however, there have been cases where a portion of the debt service for construction is covered through a Town-wide tax.

Annual costs for the decentralized alternative will include:

- Repayment of debt service for construction costs
- Operation and maintenance costs for the public facilities within the Town of Shaftsbury's service area
- In addition to general administration, there will be management of on-site systems, including periodic inspections and periodic septic tank pump-outs. These functions will

- probably require part-time personnel, preferably one who is knowledgeable in the construction and maintenance of on-site systems, such as a local septic designer.

System costs for decentralized alternatives are usually covered by several revenue sources as part of an area wide management approach.

Annual costs for each alternative were estimated based on a per-ERU estimate utilizing engineering judgment. Table 11 summarizes each of the five alternative scenarios, utilizing several different funding and financial possibilities, such as the level of grant funding to offset project costs, the level to which a Town-wide tax to support the system affects the affordability of the option, and the level of fees for management of on-site systems. The various funding solutions are discussed in the next section.

Each scenario is presented together with a level of funding that appears to be reasonable based on projects of similar scope and size in recent history. Each line item in Table 11 will have an effect on the end user costs – including the level of grant funding, the interest rate for debt service, O&M costs, number of ERUs, and the level of Town support through tax assessments. A sensitivity analysis of each of these criteria is beyond the scope of this report. Our methodology for presenting the scenarios is as follows:

1. Present the scenario without any assumption of grant funding.
2. Present the effect of 25% and 50% of project costs provided as grant funds. Scenario Nos. 4 and 5 do not include 50% grants because at that level of funding, user costs would fall below the normal range that would justify the funding agencies from providing that level of funding.
3. If user costs were still above an acceptable range, an additional scenario was added to include a Town-wide tax assessment in order to bring the annual connected user costs to approximately $600 per ERU.

For centralized alternatives, both scenarios are presented without any grant funding for comparison purposes, and to show (as with most other communities without existing community infrastructure) that annual costs per user are not feasible without some level of grant funding. Similar community wastewater projects of this size have been able to secure between 25-50% of project costs through some type of grant funding – through the State Dry Weather Flow program, Rural Development grant/loan packages, Community Development Block Grants (CDBG) or special appropriations. At this stage in a centralized wastewater project, it is not always clear where grant funding will be coming from; this report is to provide guidance as to how much grant funding is necessary in order to make a project affordable. Given the current climate in Washington, grant funding is becoming significantly more competitive. Searching for and securing project grants will be the top priority if a community is determined to pursue a project, and efforts will probably need to continue through all stages of the project.

Acquiring grant funding for decentralized alternatives is more problematic because there is no specific mechanism or vehicle for evaluating and funding projects at the State level. Some communities are enlisting area legislators to modify these processes. For instance, Representative Carol Hosford of Waitsfield (co-sponsored by Representative Miller of Shaftsbury) has introduced a House bill to expand the criteria for communities to be considered for the ANR's Priority List to obtain pollution abatement grants. Currently these grants are only available to communities that can demonstrate a violation of water quality standards through documentation of failed systems with discharges to waters of the State. It should be noted that these grant funds are very competitive, and the State has already extended its reach for the next several years on a couple of major projects, but this is a first step in allowing communities like Shaftsbury to even be considered for ANR grant funding. ANR officials have acknowledged that the current system seems to discourage (or at least not encourage) preventative measures to prevent future wastewater problems, which end up costing significantly more in the longer term.

Fortunately, the total costs associated with a decentralized project are significantly lower than for a centralized project, which allows for a greater impact with assistance from the "managed user base" and from Town-wide tax support, so that a project is not "held hostage" waiting for grant funding to become available. Additional financing options, such as creation of a "Tax Incentive Financing (TIF) District" and development of a Reserve Fund are also methods of local financing that should be considered during the project development stage.

Table 12 presents a matrix which ranks the advantages and disadvantages of each alternative.

It appears in order to make the project "affordable" for those properties who are receiving off-site treatment and disposal, a general tax subsidy will be needed from the community. This "subsidy" is justified because the entire community benefits from the investment in wastewater infrastructure. Examples include the improved quality of the Paran Creek watershed and the potential for the Village to support existing and new businesses and residents, thus helping to strengthen the tax base.

There is a line item for all properties within the Service Area that are not connected to the municipal system to be charged a management fee of $200 per ERU per year. For this fee, all users will have an annual inspection and septic tanks pumped when needed. This provides revenue and also helps insure the healthy operation of the on-site systems not connected to an offsite system. This fee could be expanded town-wide and create additional revenue (and potential buy-in) for this option.

## 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, preliminary engineering. However, the Town has already begun involving the Vermont Department of Environmental Conservation (DEC), Facilities Engineering Division in the Town of Shaftsbury project. Mr. Robisky is currently working with Town's consultant team. The DEC and USDA Rural Development (RD) have programs that can provide grants and 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 many 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.

#### *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 disposal treatment and disposal 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 Shaftsbury's 2000 census median household income is $45,139, which is above RD's intermediate rate.* Being above the intermediate rate, the wastewater project does not qualify for RD grants funding. However, an income survey of households in the

*Income Survey of Project Area may show lower medium income.

area will provide additional and more specific information regarding incomes in the service area. The project still may 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~~ 45 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. The Town of Shaftsbury has received a "planning advance" loan for funding the wastewater portion of this 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, it is likely the source of planning funds will be 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 the public's 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 Town's project are discussed below.

### 7.2.1. *Service Connections, Connection 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.

### 7.2.2. *Connection Fees*

Vermont communities use a wide range of fees at the time of sewer hookup; fees may be as low as $100 to as much as $8,000 or more. If the connection to a system is mandated by the community, the fee is generally more reasonable, because a high fee will cause an undue hardship on many property owners. In that case, a connection fee of $500 to $1,000 would be considered fair. If connections are voluntary, there is often an economic benefit to the property. Potential benefits include an increase in property value with the addition of public sewer service and elimination of the need to build or rebuild an onsite system. In that case, a reasonable connection fee may be in the range of $3,000 to $5,000. These fees can provide an excellent revenue source at the time of system startup, with the funds used to defray project costs, to create a reserve fund, or both.

### 7.2.3. *User Fees*

User fees are usually the primary means for covering the ongoing expenses of the system, including debt service repayment, capital replacement, and operating and maintenance costs. Generally, this fee is computed by estimating total "equivalent residential units", or ERUs, and dividing that value into the sum of debt service and operating costs. In Vermont, the current range of annual sewer use charges is from about $200 to $1,000 per year, with the normal charge for a new system in the vicinity of $600 per year.

### 7.2.4. *Service Connection Fees*

Although local practices vary, the customary practice is that property owners pay to install the service connection from their building(s) to the edge of the right-of-way, where connection is made to the public system. The range of expense for the owner to do this is about $1,000 to $5,000, depending on the route of the pipe and whether interior plumbing needs to be revised. It is advisable to set up a means for owners to obtain financial assistance and/or low interest loans to facilitate this expense.

### 7.2.5. *Special Management District Fees*

Communities which choose not to serve the entire service area with public sewers should seriously consider establishing a "Wastewater Management District". Within the district, those properties which are not connected to public sewer would be required 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 public system

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

### 7.2.6. *Town-Wide Tax*

Many communities include a town-wide tax to augment the required revenues to support a system. 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. Therefore, 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, that town-owned properties are improved, that the town's overall tax base will improve due to the values of connected properties rising, and that the project will result in environmental enhancement. Usually, when implemented, the tax provides about 10% of the overall revenue needed, and may be about 1 to 2 cents on the tax rate.

### 7.2.7. *TIF District*

Creation of a "Tax Incentive Financing" (TIF) District is an alternative financing option when there is development growth potential in the area. The District is created and the taxes (or a portion thereof) derived from newly developed properties are directed back to reduce the debt burden of new infrastructure, such as sewer or water system(s). By statute, a TIF District is only active for 10 years after startup; therefore, the benefit of this financing option is maximized when there are already projects in the planning stages for development or expansion and the infrastructure is needed for those projects to proceed.

### 7.2.8. *Reserve Fund*

Another financing option is to invest the money retained from connection fees in a designated Wastewater Reserve Fund. This fund is drawn on during the early years to reduce and stabilize annual user charges until the user base increases to the point that average user fees are lower. A model can be developed to estimate the effect on system rates based on assumptions such as the invested interest rate, increases in annual costs, new connections, and other factors.

### 7.2.9. *Financing Options for Service Connections*

There are several options available to homeowners for economic assistance for hooking up to the public system:

1. Eligible owners who meet criteria for elderly and/or low income, may use grants/low interest loans through USDA Rural Development; usually the regional office representative is available to meet with those in need, or attend a public meeting to explain the details of the program.
2. The Town could establish its own low interest loan program, which could be set up as a "revolving loan program", such that payments for prior loans can provide the principal to assist new applicants. The original capital to establish the program can be obtained from a similar loan fund from the Agency of Natural Resources. This program could also be used for other property owners throughout the Town.
3. Home improvement or "home equity" loans through local bank(s). Frequently local banks will assist the Town by setting up a simple procedure for owners to access these loan funds, as these improvements usually have a very favorable impact on property values and ease of future property sales.
4. In certain circumstances, the State has allowed Towns to obtain easements on private property up to each home's building foundation to facilitate funding of service connections as part of the construction project. This method is discouraged at the State level but may be considered a potential option if the Town can demonstrate there will be a significant negative financial impact on the majority of homeowners, and other options are not considered reasonable.

## 8. RECOMMENDED PLAN OF ACTION

This study has shown that a decentralized wastewater alternative that has a significant overall project cost savings could meet the environmental and public health needs of the study area. These options can also be considered a first phase of a long-term centralized alternative, if in the future the interests of the community are better served by this option. This report contains information that can now be considered by the Selectboard and town staff, the Economic Development Committee, and the citizens for implementation. While the consultant team 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 centralized or decentralized wastewater project, with a possible time schedule for completion.

Committee/Town Work

- Review and decide on favored alternative to move forward, including management and local funding options
- Initiate discussions with the Town of Bennington to develop an Inter-local Agreement
- Initiate discussions and obtain permission for preliminary soils testing on cluster system sites
- Consider developing a survey questionnaire to determine level of interest in increasing onsite wastewater capacity and connecting to a cluster system/sewer
- Develop public outreach plan for building support for construction and funding
- Continue work with consultants on technical issues

Technical Work

- Install groundwater monitoring wells in the Cleveland Avenue area and monitor through the spring of 2007. This effort is to identify the potential extent of this area of need.
- Further specify individual connections to cluster systems, including existing and potential flows. This work could include onsite inspections to identify/confirm properties with need.
- Preliminary soil and site investigations on potential cluster system sites, including locating the Elementary School disposal field, conducting preliminary hand auger tests or backhoe soil test pits, developing hydrogeological considerations, and understanding other technical permit issues relating to specific sites.