

**TOWN OF COLCHESTER, VERMONT  
PROPOSAL FOR  
INTEGRATED WATER RESOURCES MANAGEMENT GRANT  
February, 2007**

**Background:**

The Community - Colchester, Vermont is a fast growing community just outside of Burlington, the state's largest city, and is itself the second most populated municipality in the state with a population of just over 17,000. The Town of Colchester is rich in natural resources. There are approximately 30 miles of shoreline on Lake Champlain, while the arms of Malletts Bay nearly surround almost 10 square miles of the lake. To the north and south, the Town borders approximately 12 miles of the Winooski and Lamoille Rivers. Inland from the lake lays Colchester Pond, a 186 acre water body. With 165 mapped wetlands, comprising a total of 3,066 acres, and many unmapped wetlands, Colchester has one of the most diversified and valuable collections of habitats in the state. With Chittenden County Vermont continuing to be a popular area to live, work and play, Colchester faces continuing development pressure on its finite natural resources.

Wastewater - Centralized wastewater service areas are limited with the majority of the community currently served by private on-site wastewater disposal systems, including all of the communities' shoreline areas. There are approximately 6,700 systems throughout the community. The Town has conducted surface water quality testing in Malletts Bay for the last decade, and has documented reoccurring problems with coliform pollution of surface waters. Given both economic and environmental factors, it is envisioned that the majority of Colchester will continue to be served by decentralized wastewater systems well into the future.

Storm Water – Due primarily to the absence of municipal sewers, development has generally occurred where soil conditions would support on-site wastewater disposal systems. These soils are typically prone to erosion from surface flows. Additionally, Town ownership of storm water infrastructure has generally been limited to those portions of the system existing along the public transportation system, leaving the majority of the outlet controls and treatment structures under private ownership. With the exception of the Lamoille and Winooski rivers on the boundaries of town, water quality impacts are mostly from within the town. Runoff into Malletts Bay – the sheltered part of Lake Champlain on Colchester's western edge – comes primarily from small streams whose watersheds are largely within Colchester and from direct overland flow. A total of nine watersheds in Chittenden County are currently listed as impaired under the Clean Water Act, Section 303(d) list, with portions of three of these watersheds existing in Colchester.

*The People* - Portions of the community are continuing to show a slow but steady increase in their awareness and concern of the Town's finite natural resources. The Town has noted increases in community participation and involvement in such activities as stream corridor cleanups, storm water structure stenciling projects, participation in storm water watch groups, water quality monitoring efforts and an overall concern regarding the water quality in Malletts Bay and Lake Champlain. Although this trend is encouraging, the number of citizens whose efforts go beyond expressing a concern, and actually are willing to participate and/or financially support water quality initiatives is still quite limited.

As a result of these factors, the Town believes in order to preserve and protect the community's natural resources in the future, it will be necessary to develop a more holistic management approach that effectively integrates land use planning, infrastructure and natural resources, in a manner that can be universally understood and supported by the community at large. From an infrastructure perspective, a more holistic approach will likely involve some form of a user pay system that will result in the assignment of new costs to residents. In order to gain public support for this approach, providing some form of funding assistance such as small grant program to help property owners correct private infrastructure problems is critical to the success of this overall initiative. Over the past several years, the Town has completed several preliminary tasks that serve to build toward this goal. These have included;

- A comprehensive wastewater management plan identifying the preferred alternatives, both centralized and decentralized, for each wastewater management unit within the community.
- A comprehensive storm water management plan identifying all sub-watersheds within the community, their percentage of impervious surface and recommended BMP's.
- A microbial source tracking study of sources of coliform pollution of surface waters.
- Annual tracking of surface water quality during the summer months.
- The development of a pilot onsite wastewater system inspection program for a lakeside neighborhood of 104 seasonal and year-round homes.
- Planning for decentralized wastewater management strategies for a new designated growth center by Interstate 89's Exit 17.
- The development of a Strategic Water Quality Plan

- The Town of Colchester has administered on-site sewage regulations for many years. These regulations require that a permit be obtained for any subsurface sewage disposal system construction or alteration, or change in use. The Vermont Environmental Protection Rules, as last revised in January of 2005, are used as a basis for design review. Colchester is the only town in Vermont that has been delegated to carry out responsibility for the potable water supply permit onsite wastewater permitting program. The Town also currently inspects the construction and alteration of all subsurface sewage disposal systems.
- The Town has been administering a local revolving loan fund to assist homeowners in the process of upgrading failed onsite wastewater treatment systems. The loan fund originates from State of Vermont Department of Environmental Conservation, and does not contain any federal funds. This income-sensitive loan program is critical to the success of a decentralized wastewater management program, as the paradigm shifts toward increased levels of management.

These past efforts serve as the building blocks for the Town's future Integrated Water Resource Management Plan, (IWRMP). The development of an IWRMP is considered a critical step for the community and its water resources. The plan will capitalize on previous efforts and investments, and position the Town to better manage its water resources into the future.

### **Project Goals:**

The overall project goal is to demonstrate the development of an Integrated Water Resource Management Plan which will improve the overall management of non-point source pollution control infrastructure, and can be supported by the community at large. This will require a technical component that includes the development of a sufficient knowledge base to support the creation of a comprehensive plan sufficient to address the community's needs and concerns, an educational component to convince the community that the plan is necessary, and finally the forging of a public private partnership, including a funding strategy to make the plan economically feasible. Failure on the Town's part to provide some form of financial assistance will serve as a road block preventing public support and acceptance of this holistic management approach. These three components are intricately linked and are therefore dependent of one another, and are all critical to the successful implementation of the Town's overall plan. The sub-components of this goal are as follows:

- a. The development of a knowledge base relating to the location, capacity and general condition of the Town's decentralized wastewater and storm water systems, and the Town's natural resources.

- b. The completion of a risk assessment through the identification of known or probable sources of pollution, or circumstances that may lead to pollution problems.
- c. The prioritization of pollution prevention or abatement efforts, to include policy development, regulatory changes or infrastructure improvements.
- d. The development of a comprehensive management plan that recognizes and supports the important relationship between wastewater and storm water infrastructure, natural resources, and land use planning and development.
- e. Education and outreach to citizens and state regulators promoting the understanding and acceptance of an integrated approach to managing water resources.
- f. Promoting community acceptance of an integrated approach to managing water resources through the creation of public private partnerships that provide financial aid for the upgrade or repair of private waste water or storm water infrastructure.
- g. To improve the coordination between planning, design and regulatory review of non-point source pollution control infrastructure, and land use planning.
- h. To enable long-term and sustainable management and protection of water resources in Colchester.

**Objectives:**

*1. Primary and secondary objectives:*

- Locate all non-point source pollution control infrastructure (distributed storm water and wastewater infrastructure)
- Link the above data to watersheds, surface waters, and NRCS soils mapping. Make water resource, non-point source pollution control infrastructure and water quality data accessible to the public, private sector engineers and the Town of Colchester project review staff.
- Develop a knowledge base of the potential and actual failures of wastewater treatment systems throughout the community.
- Perform a detailed lot by lot needs assessment of areas prioritized for special wastewater management attention. Based on the needs assessment, perform an

alternatives analysis to determine the most appropriate and cost effective means of providing wastewater treatment.

- Develop and adopt a town wide management program for existing non-point source pollution control infrastructure. Ensure that financial assistance will be part of the management program.
- Perform an analysis to identify the most appropriate and effective process to distribute assistance funds for repairs/improvements to existing non-point source pollution management infrastructure.
- Continue and expand a surface water monitoring program in Malletts Bay, utilizing microbial source tracking.
- Develop and implement a public education and outreach program.
- Develop and implement a regulatory education and outreach program.

2. *Identify relevant physical, economic, social, financial, institutional or other problems.*

- Colchester is a growing community in the largest and fastest growing region in the state, with an increasing housing shortage. According to the Town's Master Plan, the demand for residential development is expected to remain high.
- The majority of the community is currently served by decentralized onsite wastewater systems, including all properties situated along Colchester's 30 miles of lakeshore. Economic factors will likely result in few changes to this condition.
- Housing shortages are particularly problematic at the low and middle income levels. Many of the shoreline camps have been handed down in families and current owners want to convert to year round residences, yet lack adequate wastewater facilities to do so. Many of these properties will require advanced alternative treatment systems, whereby property owners lack the financial resources to support them.
- Approximately one-half of the septic permits issued in the last few years were for upgrades to existing systems due to failures with surfacing sewage or backing up into the plumbing. In 2006, 137 septic permits were issued in Colchester, with approximately one-half or 60 permits for upgrades and replacement systems.

- Colchester has performed surface water monitoring in Malletts Bay for over ten years, which has documented continued problems with coli form pollution resulting in numerous closings of public beaches. Recent efforts associated with a limited MST program indicate the presence of some level of human waste present in surface waters at these and other locations.
- Many watersheds in Colchester contain highly erodible soils that are subject to erosion due to increased surface flows. In the absence of centralized wastewater systems, development pressure will continue to occur within these areas to capitalize on suitable soils for decentralized on-site wastewater systems.
- Colchester has several sub-watersheds that exceed 10% impervious surface.
- There are several tributaries that discharge to Malletts Bay that are currently on the 303(d) list as impaired waters.

### **Results and Expected Benefits:**

*To recipient* – The Town will be in a position to develop, fund and implement an integrated approach to water resource management. The Town will gain a GIS database map identifying the location of all distributed infrastructure and its relationship to water resources. A detailed lot by lot needs assessment of areas prioritized for special wastewater management and a MST program will complete a thorough understanding of existing conditions and available alternatives for improvement. Based upon this understanding, the Town would develop a plan and gain the ability to comprehensively manage its distributed infrastructure, which would include a component to provide the necessary funding for necessary improvements. An ongoing monitoring program will allow the Town to measure the effectiveness of these efforts.

*To population served* – The project will provide regulatory guidance and technical and financial assistance to property owners to accomplish repairs, improvements and on-going maintenance to non-point source pollution control infrastructure. The revolving loan elements of the project match will continue to reinforce community buy-in to appropriate levels of long-term sustainable management, as the Town partners with members of the community and help homeowners solve specific problems. This in turn will increase stability in the low to middle income housing market, in a manner that contributes significantly to preserving and improving the communities water resources.

*To public* – The project will improve the level of awareness of local residents and both local and state regulators, of new and innovative techniques to manage water resources. The transfer of this information results in these public benefits extending beyond the geographical boundaries of Colchester. Local residents will also benefit from an overall improvement in the quality of life that comes from improved recreational opportunities

and economic stability, created through preservation and improvement to water resources.

*To the environment* – The project will benefit the environment through the reduction in phosphorus and sediment loading into Lake Champlain and its tributaries, through physical repairs and improvements, and improved maintenance and management of non-point source pollution control infrastructure.

## Approach:

### 1. Scope of Work

**Task 1: GIS/GPS Location of Distributed Infrastructure** – Collect, characterize, photograph and map all distributed infrastructure in the Town of Colchester. This distributed infrastructure is comprised of on-site wastewater systems, centralized wastewater collection systems, culverts and storm water collection systems comprised of catch basins, piping, swales, detention basins and outfalls. Colchester has approximately 6,700 decentralized wastewater systems and hundreds of storm water management structures. All distributed infrastructure will be located with GPS and/or from 1:1,250 orthophotos and will be mapped with ArcGIS.

- a. Protocol development for Base Map and Data Collection – Consultant will work with town to develop a detailed protocol for inventory data collection. This will include procedures and standards to be followed.
- b. Data Inventory – Consultant will compile and collect all existing infrastructure data in both digital and paper form to create initial base map. Information will be collected from all available sources including local, state and federal records. Hard copy data will provide the guidance for field reconnaissance to obtain electronic data.
- c. Property Research/Easements - Conduct property records research to determine the status of easements associated with distributed infrastructure.
- d. Field Data Collection - The consultant will field locate all distributed infrastructure and obtain GIS location. Field notations of each located point will be entered in the database.
- e. Data Entry - Data entry of all information and map preparation. The consultant will then develop an ArcMap application that will show the location of the distributed infrastructure.
- f. Data Management Training - The consultant will provide data management training to Colchester staff to properly collect, input, manage and retrieve data.
- g. Identify Software/Hardware Needs - The consultant will work with the Town to define software and hardware needs of sustainable distributed infrastructure management programs. A short list of alternatives will be identified. The advantages, disadvantages and costs of each of the short listed alternatives will be analyzed. Based on that analysis, the consultant will recommend the appropriate software to map and manage a distributed infrastructure database. The consultant will also identify the necessary support hardware to allow the Town to sustain future mapping capability.
- h. Purchase Software/Hardware - The Town will purchase the required software and hardware to support future ongoing mapping capability:
  - New computers
  - Data Management software
  - ArcGIS software

- PDA units
  - GPS units
  - Digital camera
  - ARCPAD software
  - ARCPAD builder software
  - Software Scripts for Easy Retrieval and Display of Information
  - Web Hosting
  - Software Training.
- i. Consultant Progress Meetings - The Town will hold a total of six progress meetings with the consultant during the development of this task.
  - j. Final Report - The consultant will develop a final report with documentation of all work including written descriptions of protocols for data collection and management.

**Task 2: Water Resources Mapping** – Map the boundaries of Class I, II, and III wetlands utilizing existing digital parcel data, field verification of wetland boundaries with GPS coordinates; providing general descriptions of types and functions of wetlands; mapping streams from existing digital data bases; providing general descriptions of the streams condition by field reconnaissance; providing digital photographs of stream conditions including GPS points; mapping known aquifer and wellhead protection areas from existing digital databases; and mapping of soil conditions. The hydrographic information will be presented on 1:1250 scale orthophotos to be provided by the Town. Various Colchester organizations, such as the Planning Commission, Water Quality Committee, and the general public will be involved in the project at multiple points.

- a. Protocol Development - Town staff will meet with the selected consultant to discuss project scope. A protocol will be established for type of data and format to be collected for data entry. The Town’s requirements for use and retrieval of the mapped data will also be determined. A checklist will be developed identifying the required information for each water resource feature.
- d. Wetlands Base Map Layer – Prepare a base map layer of Colchester wetlands utilizing existing NWI maps, topographic maps, soils surveys, color infrared aerial photography and digital orthophotos. Existing mapped wetlands from the Town’s project files will be provided to the consultant. The base map layer will be in GIS format conforming to VCGI standards.
- e. Field Data Collection – Wetlands – Field checks of sites will be performed where digital data conflicts or no data exists. The collected data will be incorporated into the base map wetlands layer.
- f. Rivers & Streams Base Map Layer – Prepare a base map layer of Colchester streams and rivers utilizing existing VCGI digital data.
- g. Stream Inventory – Conduct inventories through field checks, of Colchester’s twelve major streams, and the portions of the Lamoille and Winooski Rivers located in Colchester. Inventories will include a general

description of the stream bank condition. The inventory will include digital photographs and GPS locations of all notable features. The inventory will be produced in a digital format that is GIS compatible meeting VCGI standards. The collected information will be incorporated into the stream base map layer.

- h. Aquifer and Wellhead Base Map Layer – Create a base map layer of wellhead protection areas and aquifers utilizing existing VCGI and topographic maps. The base map will be annotated with available wellhead and aquifer information. The base map layer will be produced digitally in GIS format to VCGI standards.
- i. Final Report – The consultant will develop a final report with documentation of all work including written descriptions of protocols for data collection and management. The report will attempt to identify those resources that may have been impacted by poorly designed or failed distributed infrastructure, or would be impacted by any potential failures.
- j. Digital Data – The consultant will deliver all data in a format that will be use in the ArcGIS application with metadata for any new datasets.

**Task 3: *Needs Assessment for Onsite Wastewater Treatment Systems*** – Through a town wide needs assessment, using planning level data with limited field verification, complete a parcel level inventory of all on-site wastewater treatment systems, in a database importable to GIS. Include information such as the presence of a system, the properties use, and factors effecting design flows such as number of bedrooms for residential properties.

The information would allow the assessment of the potential for lots to support well-functioning onsite wastewater treatment systems, where existing systems may be in need of upgrading, where an off-site wastewater treatment solution is likely to be needed, where advanced/innovative systems may be required, and where the highest priority areas are for system management.

- a. Project Kick-off Meeting - Town staff will meet with the selected consultant to discuss project scope. A protocol will be established for type and format of data to be collected for data entry, including a field verification protocol. The Town’s requirements for use and retrieval of the data will also be determined. A checklist will be developed identifying the required information for each on-site wastewater treatment system.
- b. Initial Data Collection – Using existing Town records and using protocol priority system, establish which parcels are served by on-site wastewater treatment systems. Estimate which parcels have limitations, based on soils, lot size, flood plains, surface waters, wellhead protection areas, and setbacks.
- c. Build-Out Analysis – Consultant will work collaboratively with the Town of Colchester, and the Chittenden County RPC to perform a build-out analysis under existing zoning to identify the level of development and the types of land uses that the current land use plans will allow. A 20-year

planning period will be used for decentralized wastewater infrastructure system cost estimating.

- d. Failure Rates- Using existing Town records and collected information, estimate the probable failure rate of on-site wastewater treatment systems in Colchester. If feasible, examine water consumption records to determine whether there are systems that may be significantly overloaded.
- e. Final Report - The consultant will develop a final report with documentation of all work including written descriptions of protocols for data collection and management.

**Task 4:**        ***Detailed Needs Assessment of Priority Areas*** - Using planning level data, and actual field data collected from a lot by lot assessment, complete a parcel level inventory of all on-site wastewater treatment systems in areas previously prioritized for wastewater management within the Town’s Strategic Water Quality Plan. Enter information into a database importable to GIS and complete a build out analysis, alternatives analysis and benefit to cost analysis to determine the most appropriate decentralized wastewater treatment systems for priority areas, including innovative/alternative on-site or off-site cluster systems.

- a. Project Kick-off Meeting - Town staff will meet with the consultant to discuss project scope. The boundaries of the previously identified study area for the detailed needs assessment will be confirmed at this meeting. A protocol will be developed for type of data and format to be collected for data entry and methodology/criteria for assessment of wastewater management needs. The Town’s requirements for use and retrieval of the data will also be determined. A checklist will be developed identifying the required information for each on-site wastewater treatment system.
- d. Build-Out Analysis – The build-out analysis from Task 3 will be used to estimate distribution of residential and commercial growth potential in priority areas. A projection of growth over a 20-year period will be used for analysis of alternatives.
- e. Site Inspections – Physically inspect all on-site systems and their soil conditions within 300 feet of Malletts Bay for the entire length of Lakeshore Drive, and determine how much additional on-site and offsite wastewater treatment is required to protect public health and the environment, based upon the requirements of the Environmental Protection Rules.
- f. Identify Capacity Needs – Investigate how much additional on-site and required off-site wastewater treatment needs can be met by cluster systems, alternative/innovated systems, where they would be located, and the cost of building and operating them.
- g. Final Report-The consultant will develop a final report with documentation of all work. The final report will identify additional wastewater treatment needs, and the preferred alternatives for decentralized wastewater treatment within the areas prioritized for wastewater management.

**Task 5: Town Wide Management Program for Distributed Infrastructure –**

Using existing file and field data, conduct a feasibility study of a town wide management program for existing non-point source pollution control infrastructure to protect drinking water supplies and improve surface and groundwater quality. Include the development of a knowledge base of existing infrastructure importable to GIS and draft local ordinances to provide the regulatory framework for infrastructure management. Long term goals of the management program include improvements in permitting and construction oversight, operation of systems, inspection and reporting, maintenance, correction of public health hazards, timeliness of addressing problems, and the costs of upgrades. This task will be conducted with the long-term goal of municipal utility/responsible management entity based approach for decentralized/ distributed infrastructure management

- a. Decentralized Wastewater Management Feasibility Study In designing and selecting a management model, the Town will evaluate the *Voluntary Guidelines for Management of Onsite and Cluster (Decentralized) Wastewater Treatment Systems*. (USEPA 2003), focusing on management models 4 and 5. Examples of existing decentralized wastewater management programs, Colchester Town Master Plan, Colchester By-laws and ordinances, and the State of Vermont Potable Water and Wastewater Disposal Rules (Environmental Protection Rules, Chapter 1).
  1. Literature Search – Research existing information and data to guide the development of the program. Evaluate case studies and experiences in other communities around the United States, review the recommendations and relevant information within the Town’s Strategic Water Quality Plan, and utilize the data collected under tasks 3 and 4 of this overall project. Focus on existing examples of decentralized wastewater management by responsible management entities (USEPA models 4 & 5).
  2. Purpose and Need Statement – Prepare a description of the current decentralized wastewater management program elements currently in Colchester. Working through the public input process, develop a Purpose and Need Statement clearly defining the problems the program is intended to address, and, why it is important that the program be developed.
  3. Alternatives Analysis – Develop several alternatives, including responsible management entity approaches, aimed at addressing the purpose and needs statement created for the program. Evaluate the alternatives on criteria such as, 1) how well does the program satisfy the purpose and needs statement, 2) what are the program costs to residents, 3) can the program be successfully implemented and managed by the Town.
  4. Evaluate implementation costs based on a limited set of methods of service charge billing, collection, and accounting options. Prepare

the cost of developing the decentralized wastewater utility under a short list of alternatives.

5. Preferred Alternative – Working through the public input process, and based on the alternatives analysis, select a preferred alternative for program development.
  6. Ordinance Development – Draft a local ordinance to provide the regulatory framework necessary to implement and manage the selected preferred alternative for program development.
  7. Final Report – The Town will develop a final report including a wastewater management program implementation strategy and documenting all work associated with the feasibility study of the program.
- b. Distributed Stormwater Utility Feasibility Study. In evaluating and recommending one or more feasible utility management models, the Town will evaluate the MS-4 program in Colchester, the Town Master Plan, Colchester by-laws and ordinances, and the State of Vermont Stormwater Management Rule and Stormwater Management Rule for Impaired Waters (Environmental Protection Rules, Chapters 18 and 22). Existing models of stormwater utilities from similar sized communities will be evaluated relative to Colchester’s needs. The project team will take the following steps:
1. Identify Stormwater Management Problems and Needs. Describe and evaluate existing stormwater management program, and identify the problems and needs that a new utility-based stormwater management program would be intended to address.
  2. Program Objectives and Priorities Statement – Develop a Objectives and Priorities Statement clearly stating the objectives of the program, why it is important that the program be developed, and listing the priorities that need to be addressed in a stormwater management utility.
  3. Projected Stormwater Program – Develop a recommended long-term projected stormwater utility program, aimed at addressing the objectives and priorities statement created for the program. Develop the program and answer the following questions:
    - a. Are the problems and needs adequately addressed?
    - b. How well does the program satisfy the objectives and priorities statement?
    - c. What are the program costs to residents?
    - d. Can the program be successfully implemented and managed by the Town?
  4. Funding Feasibility Evaluation – Develop and evaluate alternatives for funding a stormwater utility for the Town of Colchester. Rate-setting methodologies focused on the user-fee concept, rate modifying factors, and secondary funding methods that are potentially suitable for the Town of Colchester will be evaluated.

5. Cost Estimates – Evaluate implementation costs based on a limited set of methods of service charge billing, collection, and accounting options. Prepare the cost of developing the Stormwater Utility under a short list of alternatives.
6. Action Plan Report – The Town will develop an action plan report including an utility implementation strategy and documenting all work associated with the feasibility study of the stormwater utility program.

**Task 6: *Funding Assistance Program for Private Distributed Wastewater Infrastructure*** – Develop a mini-grant program to complement the Town of Colchester’s existing local onsite wastewater treatment system revolving loan program. Criteria will be developed to determine the award of funds which would include such considerations as environmental risk, and income sensitivity.

- a. Selection Criteria – Develop and analyze criteria to determine the award of funds. Consider such criteria as environmental risks, and income sensitivity.
- b. Record Keeping – Develop a record keeping system to track program activities and to maintain program records, data and information.
- c. Final Report - The Town will develop a final report documenting all work associated with the funding assistance of decentralized wastewater management program.

**Task 7: *Microbial Source Tracking Program*** – Conduct a Microbial Source Tracking program using DNA Ribotyping to determine the sources of *E-coli* contamination in Malletts Bay, and to assist in determining the best approach to managing water resources in this area. This task will complement the evaluations of existing infrastructure in Tasks 3 through 6. Along with data collected in tasks 1-6, this task will help establish a baseline of data to measure the effectiveness of increased efforts in managing water resources.

- a. Develop Water Quality Sampling Program – Develop a sampling program in consultation with Dr. Stephen Jones of the University of New Hampshire. Include protocols for sample collection and preservation. Determine necessary scope of testing and analysis to produce statistically significant results. Designate water quality sampling locations to maximize the effectiveness of the sampling program. Design host-specific fecal matter sampling program to enhance UNH’s existing library of *E.coli* from local humans, wildlife, domestic birds and animals. Develop the necessary quality and assurance programs for data collection and management.
- b. Modify Quality Assurance Project Plan (QAPP) - For this task, quality assurance practices will be developed and implemented. These practices will sufficiently produce quality data to adequately meet the project objectives, and will minimize data loss due to uncontrolled conditions and malfunctions, as outlined in EPA regulation 40 CFR 31.45. A QAPP was

developed in 2005 for this project. This plan will be modified for the proposal MST work proposed under this task.

- c. Develop Benchmark Data – Integrate new data and testing results with previously collected microbial source tracking data, and surface water quality monitoring data from the Town’s files. Establish a benchmark of comparison for future ongoing monitoring to measure the effectiveness of water quality improvement efforts.
- d. Sample Collection – Collect water and fecal samples at designated sampling locations in accordance with established protocols and procedures.
- e. Ribotyping analysis – A local laboratory will isolate *E.coli* from samples, and prepare samples for transport. Transport water quality samples with confirmed concentrations of *E. Coli* to the University of New Hampshire. Ribotyping will be used, in conjunction with a previously established DNA library, to identify the sources of *E. Coli*.
- f. Final Report - Produce a final report outlining the results of the analysis, the establishment of benchmark data for future measurement, and a protocol and plan for future monitoring efforts.

**Task 8: *Municipal Building, Decentralized Wastewater and Storm Water Systems*** – Design and construct de-centralized wastewater and storm water management systems in conjunction with the development of a new municipal office building. These model systems shall demonstrate to the community the municipality’s leadership in advancing these technologies.

- a. Site and Design De-centralized Wastewater and Storm Water Systems – A Civil Site Design Engineer currently under contract for a planned municipal building will design both a de-centralized wastewater and storm water system for the proposed building. Close coordination will take place with the Building and Landscape Architect to fully integrate the overall project features into the system designs.
- b. Construct De-centralized Wastewater and Storm Water systems – Detailed technical specifications and standards will be developed to allow the construction of the de-centralized system improvements in conjunction with the municipal building project.

**Task 9: *Public Education and Outreach*** – Develop an awareness and understanding of the nature of the Town’s water resource challenges and the solutions available. Engage the public in discussion in the development of programs, projects and local ordinances relating to the management of water resources.

- a. GIS/GPS Location of Distributed Infrastructure - Conduct three public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.

- b. Water Resource Mapping - Conduct three public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.
- c. Needs Assessment of On-Site Wastewater Treatment Systems - Conduct three public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.
- d. Detailed Needs Assessment of Priority Areas - Conduct up to six public information meetings throughout the duration of this task to explain the purpose of the project, gather input from the area landowners and gain public support. Post project information on Town web-sites.
- e. Town Wide Management Programs for Distributed Infrastructure – Develop a public input process that allows Town residents to play a primary role in the development of the program. Include as basic steps; 1) broad representation on an advisory committee, 2) a clear decision making process for critical parts of the program, 3) several updates provided to the general public, and 4) consideration for oversight and monitoring of implementation. At a minimum, conduct six public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.
- f. Funding Assistance Program for Private Distributed Infrastructure - Conduct three public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.
- g. Microbial Source Tracking Program - Conduct three public information meetings throughout the duration of this task to explain the purpose of the project and gain public support. Post project information on Town web-sites.
- h. Case Study – Develop a Case Study for dissemination, based on a model to be determined by the EPA.

**Task 10: *Regulator Education and Outreach*** – Increase understanding of the principles of integrated water resource management, and encourage the support of using innovative/alternative technologies and funding mechanisms.

- a. Introduce EPA Grant/Workplan goals to upper level regulators at Vermont Agency of Natural Resources. (ANR)
- b. Invite ANR representatives to participate in tasks contained in work plan, including mapping and field assessment of distributed infrastructure and natural resources.
- c. Meet with ANR representatives to discuss the details of a funding mechanism to fund improvements to privately owned distributed infrastructure.
- d. Promote the continuation and expansion of the state’s revolving loan fund for purposes of funding privately owned on-site wastewater treatment systems.

- e. Organize a field trip to the University of New Hampshire to visit and observe the Ribotyping laboratory facilities.
- f. Share all project information with relevant regulators within the ANR.
- g. Invite the appropriate ANR regulators to all public meetings relating to projects within this grant project.
- h. Arrange meeting with ANR, EPA and State legislators to promote project goals.

## **2. Available Facilities**

The Town's Administrative Building shall serve as the central facility for carrying out this project. The departmental offices of Public Works, Planning and Zoning and Finance will be made available for the project. The Town will also provide meeting spaces for all project and public meetings associated with the project. Local laboratories will be used for initial e-coli testing of water samples. All DNA Ribotyping will be performed at the University of New Hampshire.

## **3. Non-Federal Funds Sources**

The Town has received a total of \$320,000 in loans from the State's Revolving Fund (SRF). The loans have been secured by the Town through approved bond votes since March of 2003 and will be repaid on the schedule determined by the ANR. Additional non-federal funds sources consist of the Town's administrative time associated with managing the projects within this grant, and are further outlined in the budget and project schedule sections of this application.

## **4. Project Schedule**

See the project schedule

## **5. Responsible Parties**

The Town of Colchester, Vermont is the responsible party for this project.

## **6. Sampling and Data Collection Procedures**

All sampling and data collection procedures will be developed in consultation with consultants retained to perform each task within this work plan. An MST program will be used to supplement existing water quality data to establish a baseline for future comparison. Ongoing surface water quality sampling, with testing of e-coli will be used to evaluate the projects results along with the improvements to distributed infrastructure throughout the community.

## General Project Information

The project will collect and maintain data and information relating to the location and characteristics of distributed infrastructure and natural resources within the community. Within Task 3 and Task 4, information and data will be collected relating to site conditions and limitations, build out analysis, failure rates and capacity needs. In Task 7, information and data will be collected and maintained relating to the levels of *E. coli* in surface water quality samples and the apparent groups of source organisms of the contamination. The project results will be evaluated through a water quality monitoring program and the implementation of physical improvements to distributed infrastructure. No human subjects or research animals are involved in this project.

The Town has been active in developing plans to better manage water resources throughout the community and has taken concrete steps for their preservation and improvement. The work to date has included the following.

- A comprehensive wastewater management plan identifying the preferred alternatives, both centralized and decentralized, for each wastewater management unit within the community.
- A comprehensive storm water management plan identifying all sub-watersheds within the community, their percentage of impervious surface and recommended BMP's.
- The design and installation of storm water outfall treatment structures designed to decrease sedimentation in Malletts Bay.
- The use of under drain systems to lower the water table thus enhancing performance of onsite wastewater systems, and improve storm water management.
- A microbial source tracking study of sources of coli form pollution of surface waters.
- Annual tracking of surface water quality during the summer months.
- The development of a pilot onsite wastewater system inspection program for a lakeside neighborhood of 104 seasonal and year-round homes.
- Planning for decentralized wastewater management strategies for a new designated growth center by Interstate 89's Exit 17.

These past efforts serve as the building blocks for the Town's future management of natural resources. These efforts have been recently brought together through the development of a Strategic Water Quality Plan, (SWQP) which was funded under a previous EPA Assistant grant. (No. X98144801-0) The development of the SWQP links these past efforts to the Town's land use planning, as well as the development of technical design standards, policies and regulations. The SWQP also outlines several recommendations, many of which, have been incorporated into this Integrated Water Resources Management Plan, (IWRMP),

The development of an IWRMP is considered a critical step for the community and its water resources. The plan will capitalize on previous efforts and investments, and position the Town to better manage its water resources into the future.

### **Quality Assurance**

Within Task 7 of this project, the work elements will involve environmentally related measurements or data generation. For this task, quality assurance practices will be developed and implemented. These practices will sufficiently produce quality data to adequately meet the project objectives, and will minimize data loss due to uncontrolled conditions and malfunctions, as outlined in EPA regulation 40 CFR 31.45. A Quality Assurance Plan A QAPP was developed in 2005 for this project, and submitted to EPA. This plan will be used for the MST work proposed in this work plan under Task 7