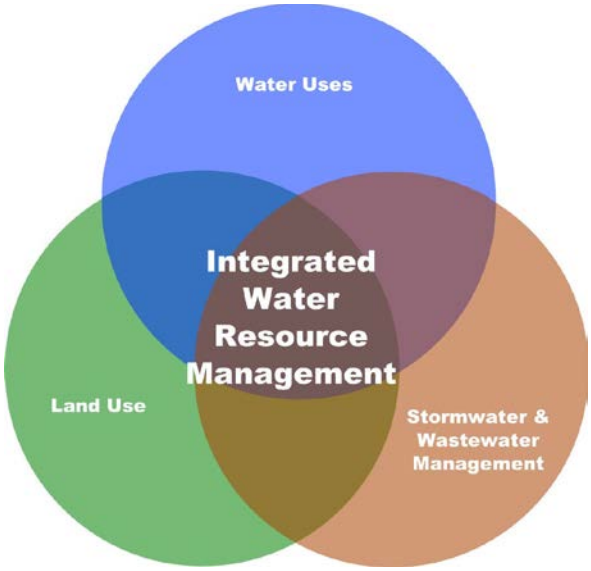
TOWN OF COLCHESTER
INTEGRATED WATER RESOURCES MANAGEMENT STUDY
SUMMARY, RECOMMENDATIONS, AND 2013-2019 ACTIVITY

The Integrated Water Resource Management (IWRM) project was a demonstration project completed with funding from the U.S. Environmental Protection Agency (EPA) in 2009-2013 with the goal of improving overall management of non-point source pollution control infrastructure, resulting in a plan that can be supported by the community at large. The integrated approach considered natural resources together with current and future uses of both natural and built infrastructure, as well as the cumulative impacts of those uses on water quality and on Colchester's development future.



The IWRM project followed a five-year journey. The technical phase lasted from 2009-2012 (initially planned for three years but extended for a year due to the extraordinary lakeshore flooding and storm events of 2011). IWRM Plan development was completed in 2012-April 2013, with community engagement continuing throughout the technical and plan development work. Major elements of the project included:

- Inventory water resources and wastewater, water supply, and stormwater infrastructure, town-wide
- Measure water quality (especially phosphorus and bacteria)
- Conduct detailed investigations where risk to public health and the environment appears highest
- Evaluate the interdependent relationships between land use practices, wastewater, stormwater, and water quality
- Assess the adequacy of current wastewater and stormwater practices to sustain and improve water quality and protect public health
- Develop recommendations for improved management strategies (if justified) to include specific steps for implementation and estimated costs
- Engage the Colchester community to inform them of progress made in each step and prepare them to make informed decisions about Colchester's future management practices

Water Resources Mapping and Inventory

Comprehensive mapping and inventory was completed for the following resources:

- Wetlands,
- Hydrography,
- Watershed Delineation,
- Stream Conditions Assessments,
- Aquifer and Wellhead Protection Areas, and
- Soil Characteristics.

The Town of Colchester is rich in water resources and wetlands. There are approximately 30 miles of shoreline on Lake Champlain, with 10 miles surrounding Inner Malletts Bay. Colchester borders approximately 2.1 miles of the Lamoille River to the north and approximately 7.2 miles of the Winooski River on its southern border.

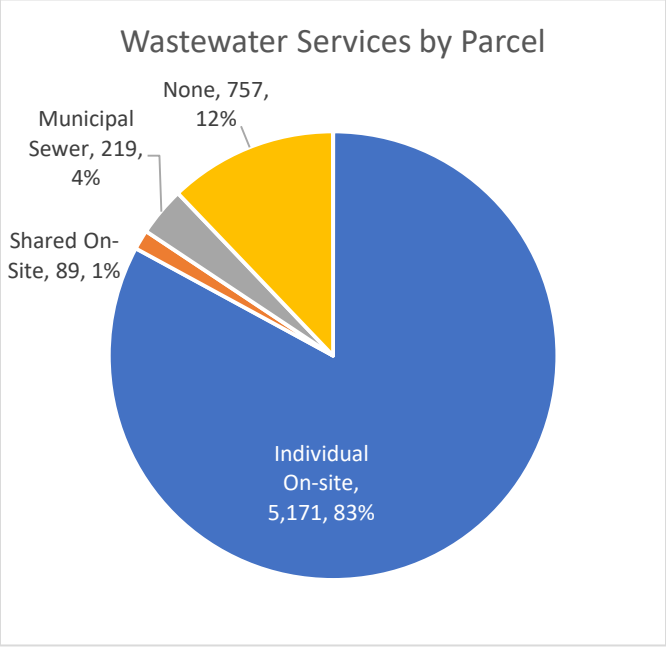
- Wetlands mapping: There are 3,429 acres of Vermont Significant wetlands, which cover 14% of the town's area.
- Hydrologic mapping: There are approximately 107 miles of streams and rivers and approximately 232 acres of water bodies (not considered wetlands).
- Using the most recent LiDAR elevation data, 17 major watershed drainages with 145 sub-drainages were delineated.
- When Vermont's Stream Geomorphic Assessments for Smith Creek; Indian, Pond, Morehouse, and Sunderland Brooks; and Lamoille and Winooski Rivers were summarized in 2009-2010, 59% of the streams assessed had stream bank scouring or incising occurring. This physical process results in more sediment and nutrients flowing into the lake. In addition, 72% of the town's streams assessed had fair to poor habitat conditions.

Water Infrastructure Inventories

The comprehensive infrastructure inventory and mapping effort included stormwater infrastructure (catch basins, culverts, piping, swales, detention basins, and outfalls); wastewater system infrastructure and permitting information; and water supply system locations and status.

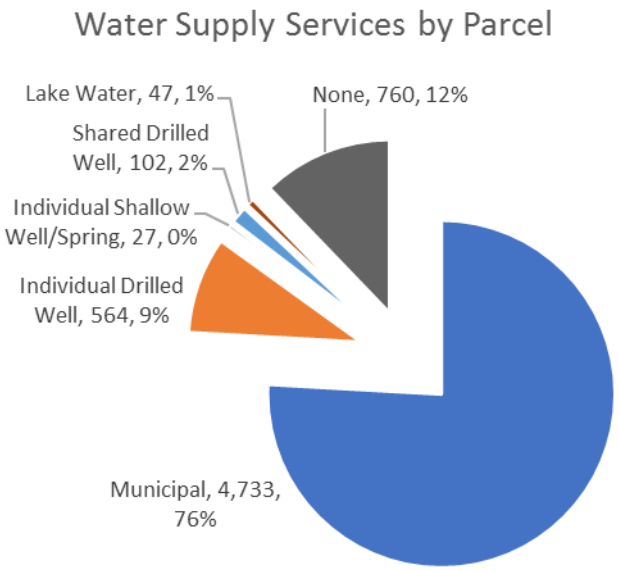
Wastewater System Permits and Inventory

A parcel-by-parcel inventory was developed that included the type of wastewater system serving each property (individual onsite system, shared onsite system, or sewered with centralized municipal service). Permits and information from multiple and sometimes overlapping data sources were combined to create an inventory of permits, legal easements, design plans, and other ancillary electronic records where such information was available. Properties in Colchester are overwhelmingly served by individual, on-site wastewater treatment systems (see chart at right).

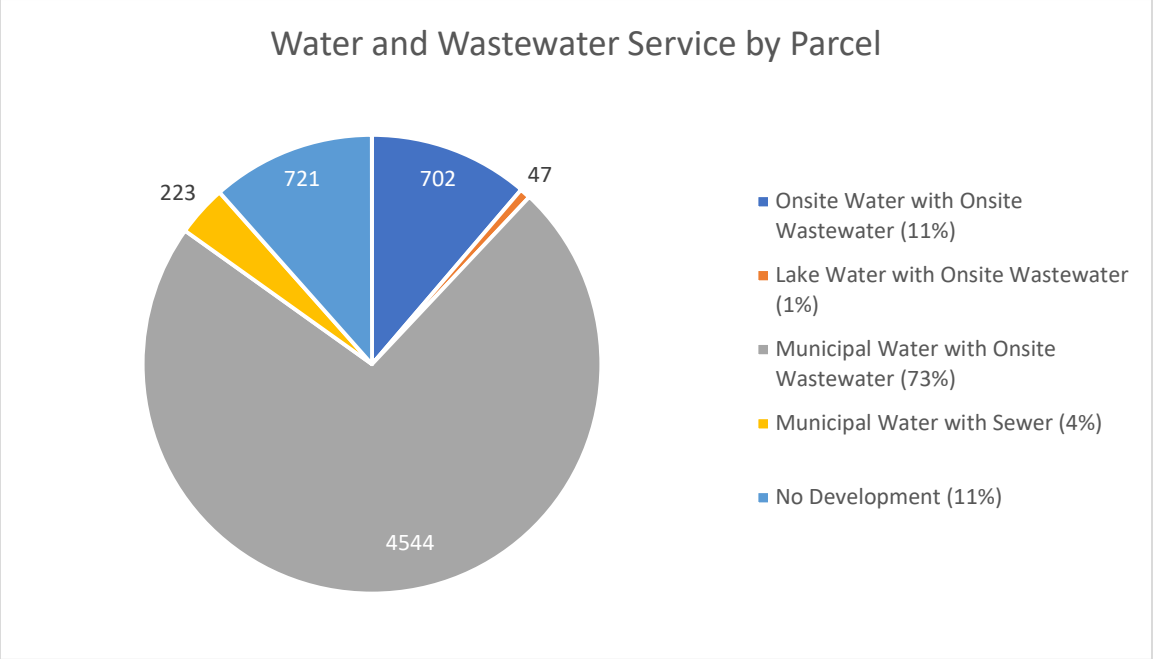


Water Supply Inventory

One of the critical elements of assessing onsite wastewater treatment capacity is making sure enough land exists on a parcel to site both a drinking water supply and a wastewater treatment system under current regulations. Over 75% of the parcels in Colchester are served by municipal water, but about 750 properties had individual or shared private wells, the locations of which were mostly unknown. A field inventory of private water supply sources was conducted on a voluntary basis to fill this data gap. The resulting inventory of water supply service by parcel is summarized in the chart at right.



Finally, the chart below summarizes the inventories of both wastewater and water supply infrastructure by parcel as of 2010. Most developed parcels in Colchester are served by on-site wastewater systems and by municipal water. This finding guided the next phase of assessment to focus primarily on conditions and needs related to onsite wastewater treatment systems--particularly their current and future suitability.

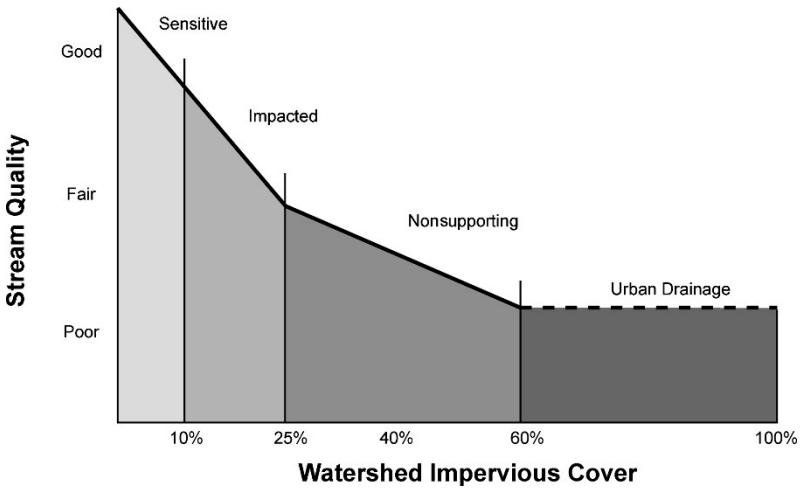


Stormwater System Inventory

Storm water infrastructure was mapped and inventoried, and any Town easements for the infrastructure were identified and associated to the infrastructure in a Geographic Information System database. The Town has made many updates to this infrastructure inventory since the IWRM study ended in 2013 (see the Town-Wide Stormwater Management Recommendations and Program section below).

Storm Infrastructure Component Type	Total (2009)
Outfalls	254
Catch Basins	1,526
Dry Wells	357
Manholes	138
Retention Ponds	44
Other Structures	22

Impervious cover by watershed was also inventoried town-wide in 2009, based on the best available data (a land cover analysis performed by the UVM Spatial Analysis Laboratory based on 2004 LiDAR imagery). Impervious cover in a watershed can impact stream ecosystems in two primary ways: by increasing the quantity and rate at which runoff is delivered to the channel, and by increasing the pollutant load that is discharged. The Center for Watershed Protection has used the impervious cover model (below) since the late 1990s to illustrate and communicate the significant impacts of modern-day development to streams. As watershed imperviousness exceeds 10%, stream ecosystems become negatively impacted and – beyond watershed imperviousness of 25%—actually non-supporting of aquatic life. This impervious cover model assumes few or no stormwater controls in the watershed. The impervious cover inventory (table at right) demonstrated that five Colchester watersheds had over 5% impervious surface, and two (the Winooski River and Sunderland Brook) had well over 10% impervious surface.



Colchester Watershed	Impervious Surface	
	Acres	(%)
Stream 4	15.1	1.2%
Stream 6	3.7	1.7%
Malletts Creek	68.0	2.1%
Stream 8	8.3	2.6%
Stream 7	10.9	2.9%
Stream 5	25.0	4.1%
Lamoille River	75.8	4.3%
Crooked Creek	68.4	4.9%
Pond Brook	133.8	5.0%
Moorings Stream	18.0	5.2%
Allen Brook	83.9	5.2%
Lake Champlain	238.5	6.6%
Smith Hollow Creek	136.6	9.6%
Indian Brook	320.8	9.7%
Winooski River	914.3	17.4%
Sunderland Brook	605.8	18.3%
Total	2,726.9	8.9%

Water Quality Evaluations

Survey of Stream Phosphorus Concentrations

The Town voluntarily initiated a survey of stream phosphorus concentrations in 2010 to help inform its water resources management decisions, and to assist in targeting detailed infrastructure assessments within the IWRM project. Nutrient enrichment is the leading cause of water quality impairment in Lake Champlain and phosphorus is the nutrient of greatest concern. Under most conditions, the supply of phosphorus limits the growth of suspended algae and higher aquatic plants –if the concentration of phosphorus is increased, the productivity of these organisms increases, occasionally forming undesirable algae blooms.

The monitoring study showed that major land uses (forests, agricultural land, and development and impervious cover as reflected by population density) are controlling stream phosphorus concentrations under most conditions. During storm events, though, high total phosphorus concentrations were due to sediment transport; land use had less impact on sediment and total phosphorus concentrations than other factors. In all cases, during storm events, dissolved and total phosphorus concentrations were higher than the in-lake water quality standard for Malletts Bay. Sediment loss is attributable to a combination of land surface erosion and failing stream banks. Stream channel erosion and adjustment may be a major source of peak sediment and phosphorus concentrations under high flow conditions.

Overall, the results were consistent with expected results in Lake Champlain tributaries. They reinforced the prevailing scientific understanding of stormwater processes in the basin:

- Streams draining watersheds dominated by agricultural or higher density residential land uses tend to have elevated phosphorus concentrations relative to reference (forested) conditions.
- Runoff during wet weather events may be mitigated by increased implementation of stormwater treatment systems in developed areas and best management practices for agricultural land.

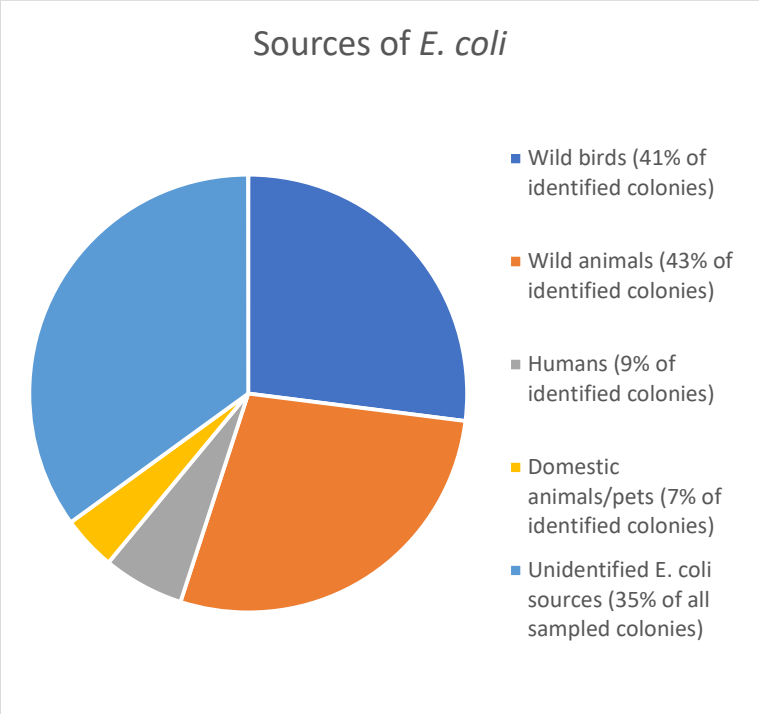
Bacteria (*E. Coli*) Sampling and Microbial Source Tracking

On several occasions over the past 20 years, pathogen levels in various surface water bodies in the Town of Colchester, Vermont have exceeded state water quality standards for contact recreation, such as swimming and wading. In 2001, the University of New Hampshire (UNH) conducted a study in Colchester using a process called ribotyping, where patterns of genetic material extracted from *Escherichia coli* from water quality samples are matched with patterns from *E. coli* associated with known sources. The outcome of ribotyping is a list of known and unknown sources from the sample and an estimate of their relative proportion in the sample. *Escherichia coli* is a bacterial species that normally resides in the intestinal tract of warm-blooded animals. *E. coli's* presence in water indicates fecal contamination and the possible existence of disease-causing organisms, especially bacterial pathogens.

The sampling completed during the IWRM project expanded on Colchester's ongoing beach monitoring program and the 2001 ribotyping study. During the summers of 2009 and 2010, the water quality sampling program at the town's beaches was augmented to include microbial source tracking for 13 sampling events. Selected samples, typically with elevated concentrations of *E. coli*, were processed at Endyne Laboratory in Williston, Vermont to prepare isolates, or individual colonies. These were sent to UNH's Jackson Estuarine Laboratory in Durham, New Hampshire, for preservation and ribotyping in order to characterize the source species associated with the *E. coli* present in the samples. Additionally, samples of fecal matter from known sources were collected and analyzed to provide a local library of source ribotypes to supplement UNH's regional library.

The outcomes of the microbial source tracking study were:

- Over the course of the study, 65% of *E. coli* sources were identified. *E. coli* sources included wild birds, wild animals, pets, livestock, and humans (see pie chart below).
- Wildlife (birds and animals) were the predominant sources of animal *E. coli* identified in Colchester's beaches and streams.
- Domestic pets (dogs and cats) and livestock (cows and horses) each made up a very small proportion of the fecal indicator bacteria sources.
- *E. coli* originating from human wastewater comprised 8.5% of all identified sources.
- The locations where human bacteria were identified included:
    - Beaches
        - Rossetti Beach
        - Moorings Stream Box Culvert
        - Bayside Beach
        - 60 East Lakeshore Drive
        - Smith Hollow Beach
    - Stream Watersheds
        - Smith Hollow Creek (in 2009 and 2010)
        - Crooked Creek (only in 2010)



To supplement the microbial source tracking work, a sanitary survey was completed in Fall 2011 to look for sources of human bacterial contamination along Crooked Creek and Smith Hollow Creek. No clear signs were found of malfunctioning septic systems, and no human-specific fecal contamination was identified as coming from the tributaries flowing into Inner Malletts Bay.

In 2017, an intern working with the Town deployed optical brightener tests in approximately 20 locations in both Smith Hollow Creek (July) and Crooked Creek (August). Optical brighteners are common in detergents; though they are not hazardous themselves, the presence of optical brighteners indicates a possible source of wastewater. A few locations in both creeks tested positive for optical brighteners, and these areas were then tested for E.*coli.* Two areas in Smith Hollow Creek had high levels of E. coli. These areas were re-tested and samples were sent to UNH for source determination, which identified the source as a non-human mammal while also ruling out ruminants, dogs, and birds. Additional testing was performed in the summer of 2018 in two different areas of Smith Hollow Creek that returned the same results (non-human mammal, although this time horses were also eliminated as a potential source).

Town Wide Stormwater Management Recommendations and Program

In April 2013, the IWRM study summarized application of the infrastructure and water resources knowledge bases to an engineering study of whether it is feasible (and necessary) to establish a stormwater utility to manage stormwater infrastructure an expanding requirements for stormwater remediation in Colchester. The earlier work showed that storm runoff, and its direct and indirect impacts on sediment and nutrient concentrations in the Town's streams and Malletts Bay, represents a significant and perhaps the largest source of the degradation of Colchester's water resources.

At the time, the Town was already doing substantial stormwater management work. In FY 2005-2012, Colchester completed 16 capital projects directly related to public stormwater systems totaling nearly $1.4M in investment. These capital projects included repairs to failed outfalls, culverts, and stormlines, as well as other measures to alleviate localized flooding. Other stormwater management elements the Town was already completing included:

- Outfall inspections
- Illicit discharge detection and elimination
- Highway maintenance including street sweeping, catch basin cleaning, gravel road maintenance, sand and salt application
- Compliance with Municipal Separate Storm Sewer System (MS4) permit requirements
- Compliance with local stormwater ordinances

In 2013, major regulatory changes were on the horizon. New MS4 permits added flow restoration plan development and implementation for Morehouse and Sunderland Brooks to the Town's responsibilities, and updates were pending related to the phosphorus TMDL for Lake Champlain (not issued until 2016).

It was clear that Colchester would soon be required to do much more to improve stormwater management, at additional annual cost to the community. Creating a comprehensive stormwater management program with a dedicated source of funding would a shift to more proactive management of stormwater infrastructure, would address the Town's most critical sources of sediment and phosphorus to local streams and Lake Champlain, and would ultimately support and result in higher-quality and better-protected surface waters throughout the Town.

At the end of the IWRM study, it was recommended that Colchester consider implementing a hybrid rate model to bill property owners for the cost of the Town-wide stormwater management program. The hybrid funding model proposed was based on existing impervious surfaces and an equivalent user base, where each property would be assigned an equivalent unit based on the type of use and impervious surface.

The Town has made substantial progress in implementing and expanding upon the stormwater recommendations from the IWRM study:

- The Malletts Bay Initiative, beginning in 2014, has initiated and continues to implement a series of projects with the goal of protecting and enhancing the drainages to and waters in Inner Malletts Bay. Some of the stormwater-related components of the initiative include:
    - Malletts Bay Stormwater System (scoping completed in 2017, grant funding for improvements in the Shore Acres neighborhood secured in 2018, design underway)
    - Re-Zoning to include Low Impact Development Standards (effective August 2016)
    - Blakely Road/East Lakeshore Drive/West Lakeshore Drive Intersection (scoping completed in 2017)

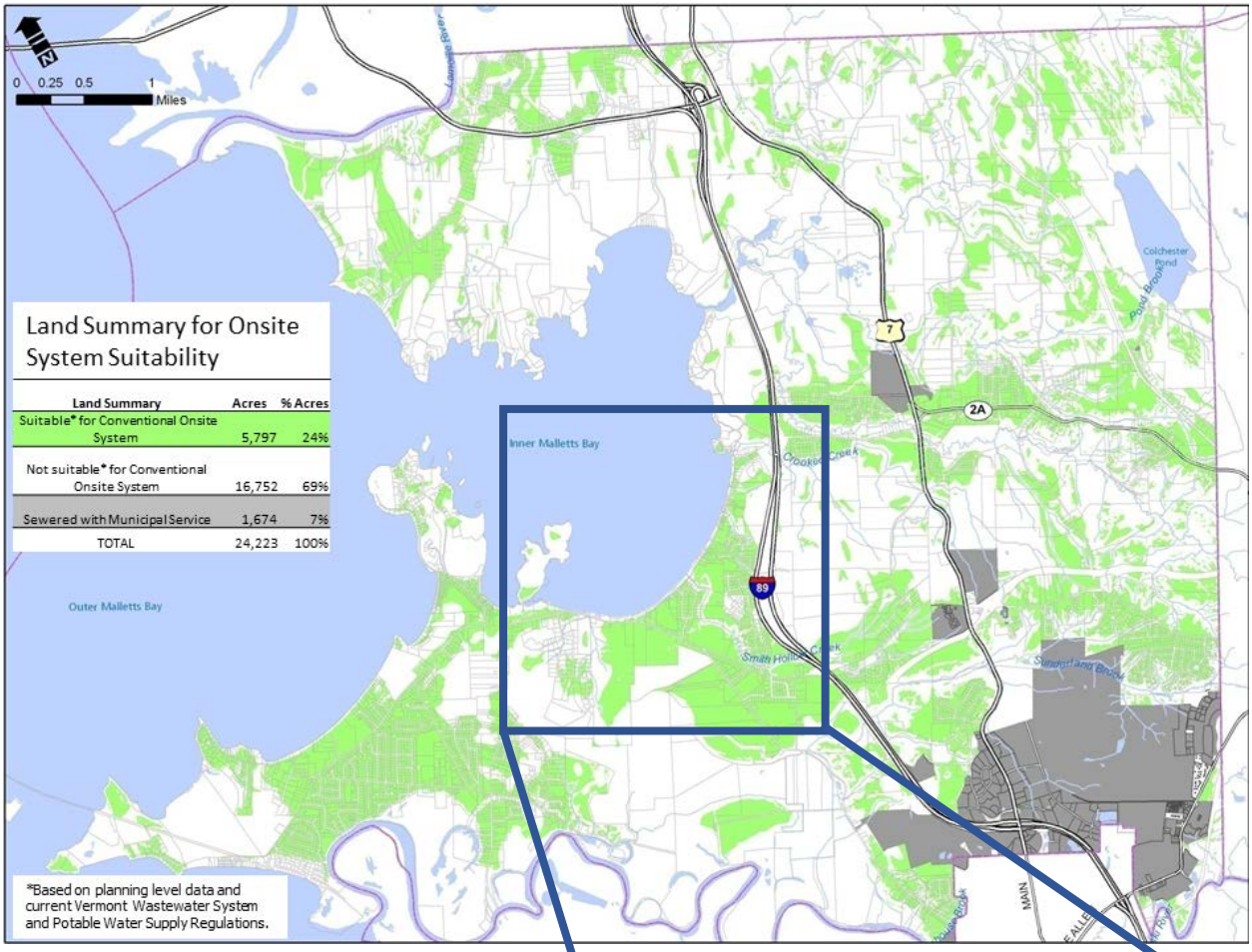
    - West Lakeshore Drive/Prim Road Intersection (design underway)
    - West Lakeshore Drive Pedestrian Improvements (scoping completed in 2017)
- A stormwater utility was adopted effective July 1, 2017 to better address water quality needs. The utility's budget, planned projects, fee credits, and educational information can be found on the Town's website: http://www.colchestervt.gov/1837/Stormwater-Utility.
- The Town was recently awarded grant funding to develop a phosphorus control plan, which is required by the Town's MS4 permit. This plan will identify opportunities to mitigate sources of phosphorus loading to Lake Champlain from municipally owned impervious surfaces, mainly through construction of stormwater BMPs.
- The Town has also received grant funding to perform a condition assessment of all municipal stormwater structures and pipelines. The structural condition of each pipe will be observed through video. The information will be used to develop a stormwater capital program that will assist the utility in planning needed investments in the system.

Wastewater System Assessments

The infrastructure inventory created in 2010-2011 was used to evaluate onsite wastewater treatment opportunities, limitations, and needs—both under current conditions and under potential future or "build-out" conditions. This information would be used in 2011-2012 to help identify areas of Colchester that are low, medium, and high risk areas for onsite wastewater.

A series of rankings were applied to the Natural Resource Conservation Service (NRCS) soil data for Colchester, based on the type of leachfield that could be sited under the Wastewater System and Potable Water Supply Rules (effective September 2007) given soil texture, hydric status, depth to groundwater, and depth to bedrock. The best-suited soils for on-site leachfields are well-drained with sandy to loamy texture (coarse-grained), and with no shallow groundwater or bedrock (often five feet or more of vertical separation between the ground surface and any groundwater or bedrock). Only about 37% of the soils in Town were suitable for conventional, passive septic tank / absorption field onsite wastewater systems. Almost half of the soils in Town would be considered unsuitable for onsite wastewater dispersal, meaning that they have very fine texture (clay) or that there are limiting conditions like shallow groundwater or bedrock very close to the ground surface (see map below).

Once environmental limitations (such as wetlands, flood zones, steep slopes, and streams) and development-based limitations (like horizontal setbacks between wastewater systems and property lines, structures, roads) are accounted for, only 24% of the land area in Colchester is suitable for conventional onsite wastewater systems. Most historic development in Colchester has closely followed areas of soils suitable for conventional onsite wastewater systems, facilitated by the availability of municipal water supply. These areas are now fairly densely developed and thus have little capacity for future new development.

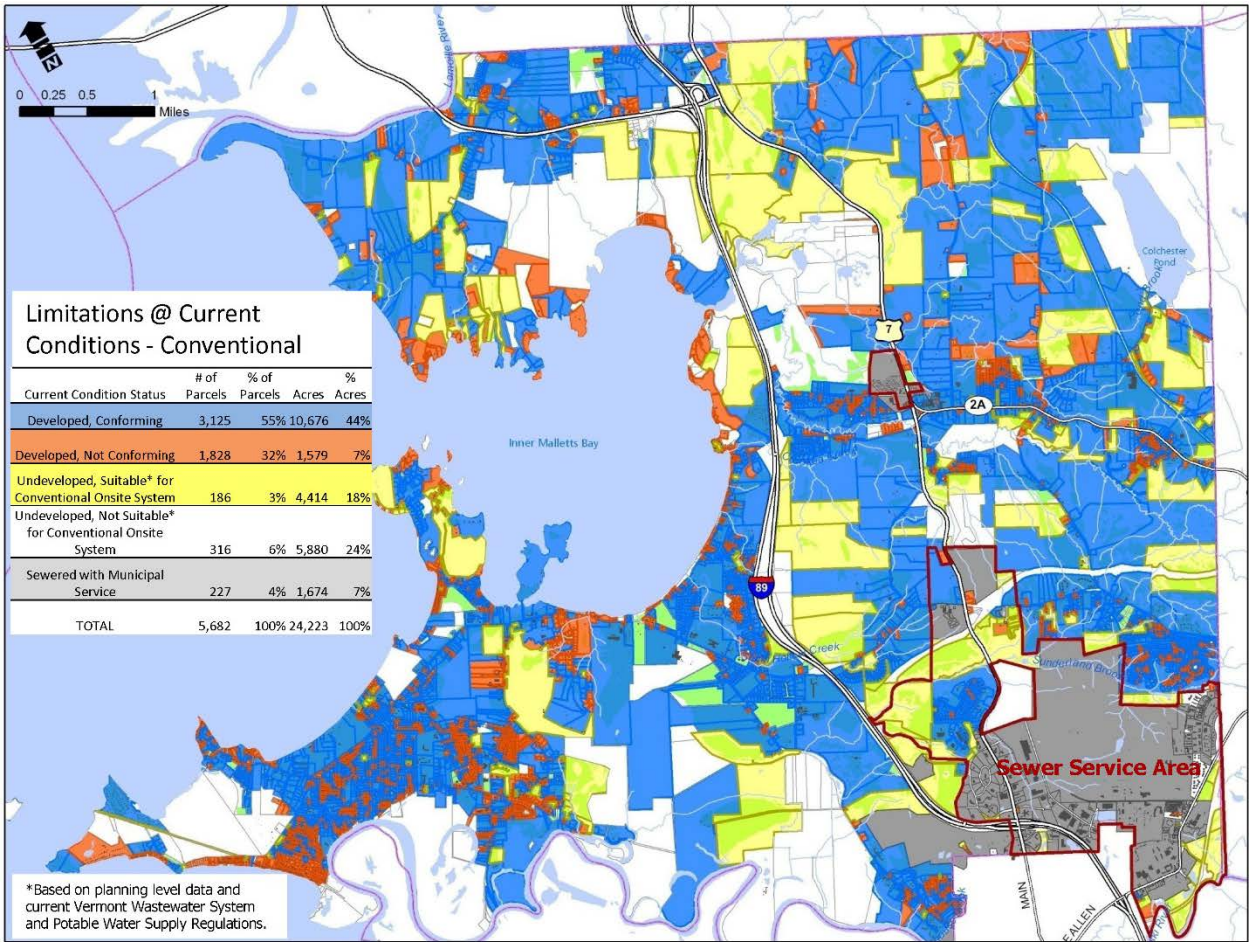


Town-Wide, Planning Level Needs Assessment

The Town-wide wastewater needs assessment used a data-driven Geographic Information System (GIS) analysis that compared the land area available on each developed, unsewered parcel, after subtracting areas occupied by environmental limitations and development-based limitations, to the land area that would be required to successfully build a replacement leachfield to serve the existing development on that same parcel. Each parcel with sufficient land available was characterized as conforming to regulations in effect at that time. If the available area analysis on a parcel showed that the parcel did not have adequate area for a conventional trench or mound system, a second screening assessment was completed to determine whether the addition of advanced treatment might allow the siting of a 'filtrate

system' on the property. Filtrate systems can be sized up to 50% smaller, since some of the treatment that normally occurs in the unsaturated soil occurs in a pre-treatment unit.

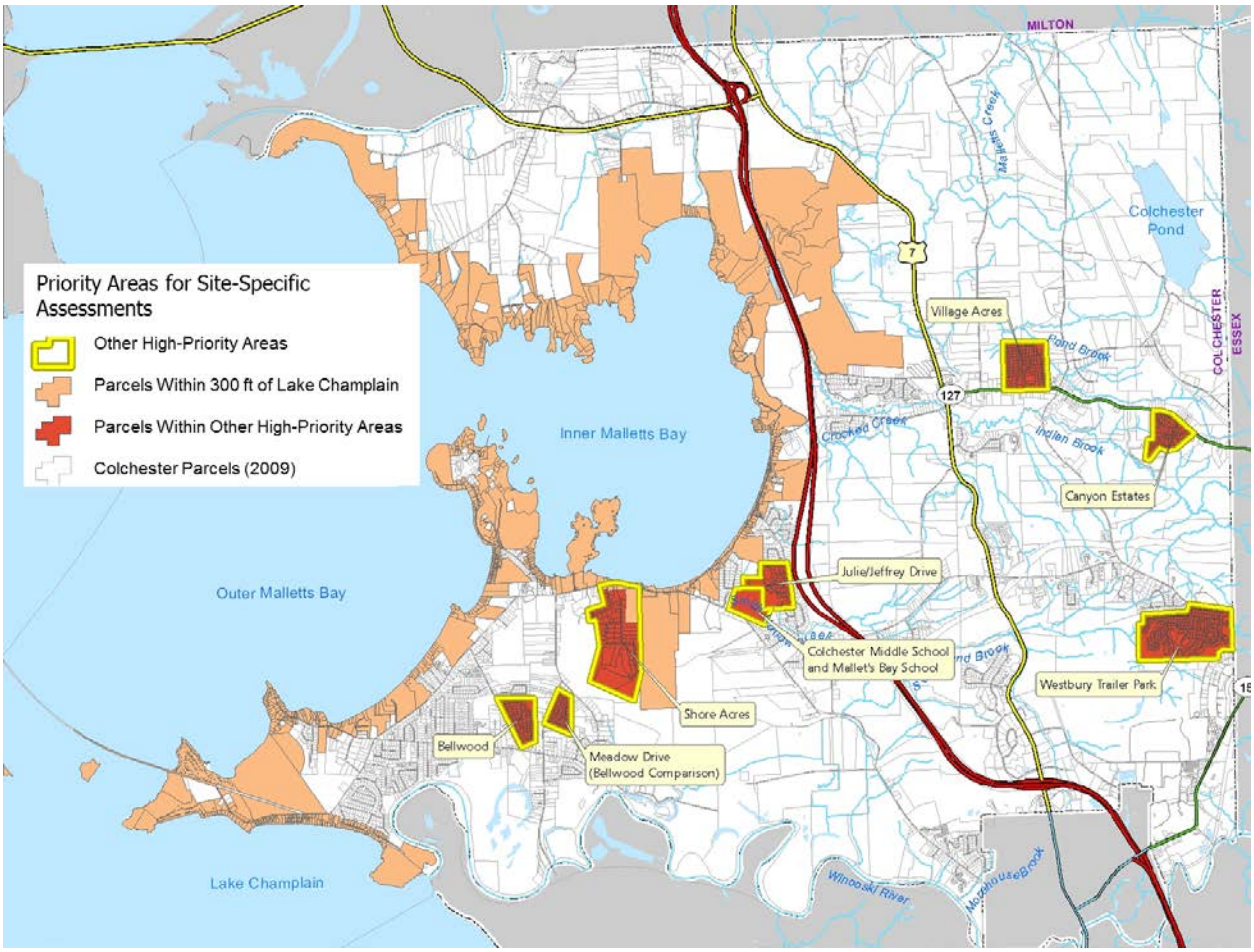
Of the 5,682 parcels in the screening level needs assessment, there were 3,125 developed parcels (55%) that can support a conforming onsite wastewater treatment system under current conditions and regulations (see map below). Another 1,828 parcels (32%) could not support an onsite wastewater dispersal system that fully complies with current regulations and environmental conditions and, therefore, are developed but potentially non-conforming. There were 502 undeveloped parcels in Town. Of these, 186 (3%) appeared to be suitable for some amount of future development served by onsite wastewater treatment systems, or are located within Sewer Service Areas but are not yet sewered. The remaining 316 undeveloped parcels either did not have sufficient suitable soil area to support development or are restricted from development in some other way (steep slopes, conserved lands, etc.). Finally, 227 parcels (7%) were served by a centralized sewer system; these parcels were not assessed for potential on-site wastewater treatment capacity or compliance with on-site wastewater regulations.



If a parcel is developed but identified as non-conforming, future septic system repairs or replacement may require a "best fix" or "advanced" replacement onsite wastewater treatment system. Changes in use or other increases in wastewater flows may be prohibited. Such systems can be more costly to maintain, with requirements for more frequent maintenance or more rigorous monitoring than conventional on-site wastewater systems.

The onsite wastewater needs assessment was combined with a build-out analysis performed by the Chittenden County Regional Planning Commission (CCRPC) to analyze the implications of current zoning, soil conditions, and onsite wastewater management practices on the prospects for future development in Colchester. At build-out, 3,311 developed parcels can support their existing wastewater treatment systems and uses. The 1,828 parcels that are developed but potentially non-conforming are unlikely to support changes in use, redevelopment, or expansion. A large portion of the additional development projected for limited parcels at build-out falls within existing Sewer Service Areas. Full build out under zoning in place in 2010-2011 may occur as soon as2038.

Based on the results of the onsite wastewater needs analyses, there was reason to suspect adverse environmental impacts from current land use and development practices. While many "non-conforming" parcels were located in relatively close proximity to the shoreline, there were scattered pockets of "non-conforming" parcels in other areas throughout Colchester. The highest priority for further, more detailed assessment was all parcels within 300 feet of the Malletts Bay and Lake Champlain Lakeshore (map below). Areas of priority parcels not on the lakeshore recommended for more detailed assessment were Meadow Drive, Shore Acres, Julie/Jeffrey Drive, Malletts Bay School, Colchester Middle School, Westbury Trailer Park, Village Acres, and Canyon Estates.



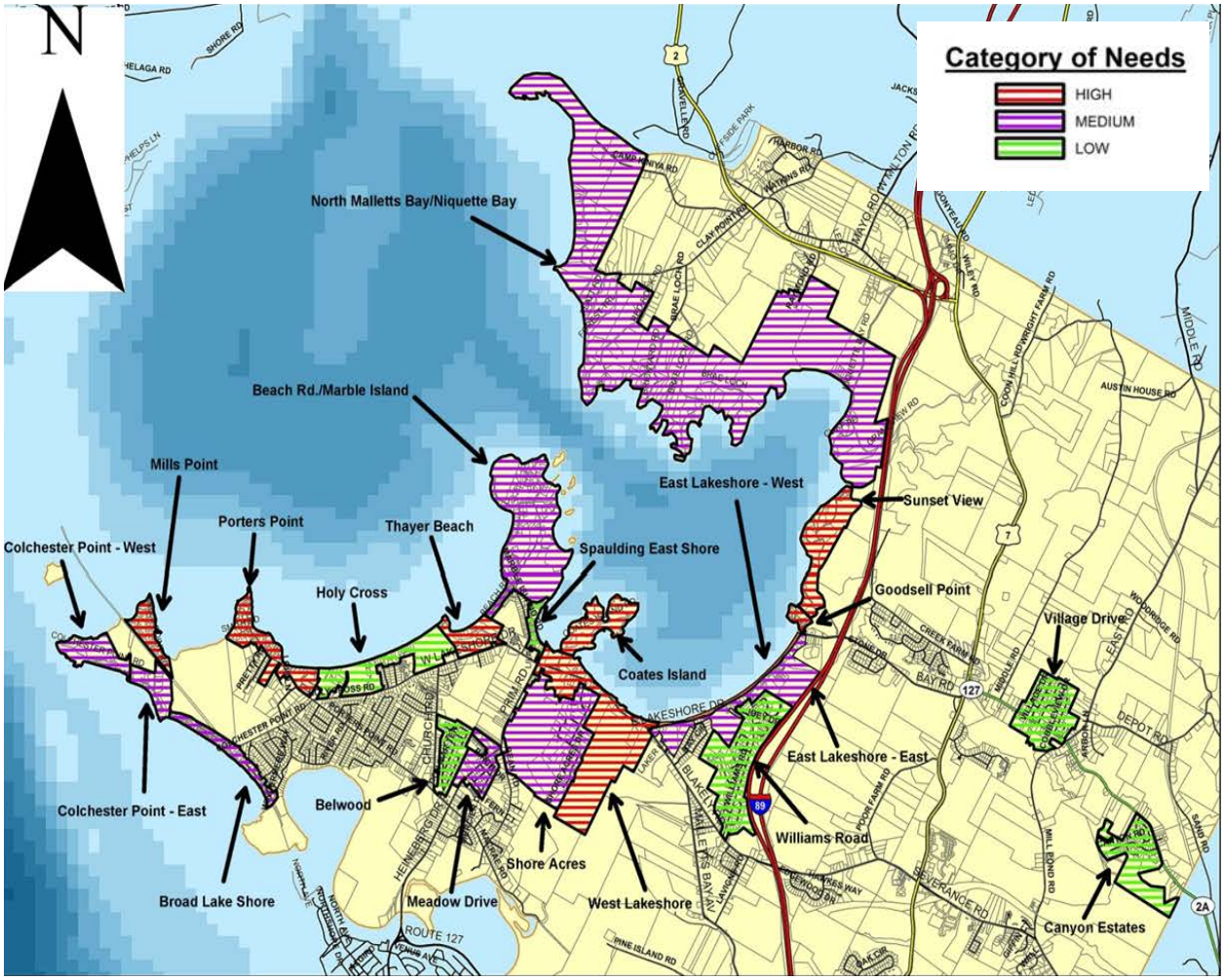
Detailed Wastewater Needs Assessment of Priority Areas

Building off the wastewater inventory and planning level needs assessment, site-specific onsite wastewater evaluations were undertaken in 2011-2012 of a sub-set of the existing developed and non-conforming properties identified as “priority areas” for wastewater evaluation. These priority areas underwent additional on-site field investigation to better understand and characterize the condition of on-site wastewater treatment systems. The information obtained in the field inspections was analyzed and used to rank each “priority area”, identifying where enhanced management strategies and/or wastewater system improvements are justified to protect public health and surrounding natural resources.

Where a field investigation was conducted, a detailed assessment of the characteristics of that specific property to support an on-site wastewater system was completed. A representative sample of parcels was investigated in each priority area. Watershed boundaries and the results of the microbial source tracking study were used as part of the overall assessment. Priority areas were evaluated based on how well they complied with the five most critical environmental factors:

- Area Limitations
- Distance to Surface Waters
- Soils Suitability
- Depth to Groundwater
- Depth to Bedrock

Where a need for improved wastewater treatment and management was identified, an alternatives analysis of methods to better address the wastewater needs was conducted. Based on scoring for the five key criteria listed above, each of the priority needs areas was given an environmental needs assessment rating and was ranked from highest to lowest need (see map and lists below).



Seven areas ranked "**high**" based on the detailed field investigations and analysis:

- Goodsell Point
- Sunset View Road
- Mills Point
- East Lakeshore Drive– West
- Porters Point
- West Lakeshore Drive
- Coates Island
- Thayer Beach

High-needs areas were each along the lakeshore and were comprised of both year-round and seasonal dwellings and some commercial uses. Each of these areas ranked severe or moderate-severe for area limitations and severe for at least one other criterion.

Seven areas were ranked "**medium**" based on the detailed field investigations and analysis:

- North Mallets Bay/Niquette Bay
- Beach Road / Marble Island
- Meadow Drive

- East Lakeshore Drive – East
- Colchester Point – West
- Colchester Point – East
- Broad Lake Shore
- Shore Acres

Medium-needs areas were also along the lakeshore (with the exception of Meadow Drive and Shore Acres) and were comprised of both year-round and seasonal dwellings and some commercial uses. Each area was rated high for area limitations because of small lots. Some were ranked high for poor soils, bedrock and seasonal high groundwater. One ranked high for distance to surface waters.

The remaining six priority needs areas were ranked "**low**" based on the detailed assessment.

Town Wide Wastewater Management Program Recommendations and Updates

The Town of Colchester has more shoreline on Lake Champlain than any other community in Vermont. It is also, by far, the largest community that relies primarily on decentralized wastewater systems to support current land use. Earlier work in this study evaluated ways in which Colchester could do more to protect public health and the environment concerning how onsite wastewater systems are managed, maintained, and regulated. In April 2013 the IWRM study evaluated options for improved wastewater management and their relative costs, advantages and disadvantages, and made recommendations for a Town-wide wastewater management program.

With on-site wastewater regulations dating back to 1967, in 2005, Colchester became one of only two municipalities state-wide to take delegation of administration of the Wastewater System and Potable Water Supply Rules (WSPWSR) from the State of Vermont. Colchester did this, in part, to not recognize the new State "clean slate" allowance for non-conforming properties. New wastewater regulations that went into effect State-wide in 2007 exempted many existing violations from enforcement for wastewater permitting. In taking "local control" of permitting, Colchester was able to continue to enforce wastewater violations. While permit authority is a good measure for ensuring environmental health, engaging property owners about the proper operation and maintenance of their systems was identified as an opportunity for additional protection.

The IWRM study recommended that Colchester develop a town-wide property owner awareness program, with improved inventory of all onsite systems. A town-wide strategy to promote improved operation and maintenance is justified given the sheer number of onsite wastewater systems (~5,260) located throughout Colchester. In 2014 Colchester created an online program with existing wastewater permit data that is accessible to the general public. Property owners, engineers, and service professionals can look up properties for information on maintenance requirements, location, and size of systems. Making information about existing septic systems readily available was a first step in outreach. The Town created a first-in-the-state revolving loan and grant program for septic system replacements that has since been superseded by a State-wide program. The Town has also published a guide for septic systems online (http://Colchestervt.gov/161/Guides) and in print. Newsletter articles online and in the Colchester Sun highlight septic care and funding opportunities.

Development and implementation of an operation and maintenance (O&M) permit program was recommended for the fourteen areas rated "high need" or "medium need" in the detailed, priority area needs assessment (roughly 1,100 systems). The conditions for each O&M Permit would be tailored to

each property: a property with a conventional system in good working order would have minimal requirements, while a property with an innovative/alternative, "best fix", or otherwise unknown system on a difficult site could have more conditions in its O&M permit. The overall wastewater management strategies and recommendations for each of the high and medium-priority areas are summarized below.

Priority Needs Ranking	Area	Recommendations
High	Goodsell Point	Cluster system or central sewer
	Sunset View Road	Manage with O&M permits
	Mills Point	Manage with O&M permits
	East Lakeshore Drive– West	Central Sewers
	Porters Point	Manage with O&M permits
	West Lakeshore Drive	Central sewers
	Coates Island	Manage with O&M permits
	Thayer Beach	Manage with O&M permits
Medium	North Mallets Bay / Niquette Bay	Inspect systems every 5 years
	Beach Road / Marble Island	Inspect systems every 5 years
	Meadow Drive	Inspect systems every 5 years
	East Lakeshore Drive – East	Connect to central sewer if extended to East Lakeshore Drive
	Colchester Point – West	Inspect systems every 5 years
	Colchester Point – East	Inspect systems every 5 years
	Broad Lake Shore	Inspect systems every 5 years
	Shore Acres	Inspect systems every 5 years

While Colchester has "delegated authority" to administer wastewater permits on behalf of Vermont DEC, the permits must be administered strictly following the Environmental Protection Rules. At the end of the IWRM study, it was unclear whether the Town could impose O&M conditions on every property, or whether areas of higher risk could be identified and more stringent O&M conditions imposed in the higher risk area.

As the Town continued dialogue with Vermont DEC in 2014-2015, it became apparent that an operating permit program was not allowed. Changes to State law and to the State-wide Environmental Protection Rules would be required to enable an operating permit program. As these changes would increase the level of oversight of all small-scale septic systems in Vermont, requiring substantially more staffing, the State was not supportive of amendments. Only newly issued permits could be considered for specific O&M activities when proven to be warranted (for example, because of increased risk due to use of a "best-fix" system) or where already required in rule (as is the case for innovative/alternative systems). The results of the detailed onsite wastewater evaluations completed during the IWRM study indicated that the majority of environmental issues are with existing systems, including some with existing permits and some that pre-date either State or local permitting. Creating an O&M program only for new systems

would not go far enough to address environmental concerns. The Town's desired management strategy also included function checks in high-needs areas for systems and parcels where there were no existing permits, or where existing permits had no O&M conditions. Unfortunately, it was made very clear to the Town that this was not obtainable.

A comprehensive re-write and overhaul of the state-level WSPWSRs was just completed, and the new Rules were effective April 12, 2019. There were no new provisions in the rule that changed delegated authority or allowed implementation of any requirement more stringent than contained in State regulation. The Town is evaluating how the changes to this rule will impact permitting for new systems, expansions, and replacement of onsite wastewater systems going forward. The net effect of some of the changes may effectively make it harder for property owners to successfully implement replacement systems, particularly in high-needs areas of Town where there are substantial existing limitations. Colchester continues to place maintenance and operating requirements on new wastewater systems as warranted under the State regulations.

Without the ability to provide increased oversight for medium and high risk areas, there are few alternatives for the Town to use to address wastewater needs comprehensively. While the IWRMP recommended "cluster" (shared leachfield) systems or centralized sewers for Goodsell Point, it was recommended that sewering the area may not be substantially different in cost. The IWRMP recommendation to provide sewer service for the lakeshore side of East Lakeshore Drive and both sides of West Lakeshore Drive is more notable now, since the Town cannot exercise any increased O&M oversight for existing septic systems. The IWRMP recommended that these areas should be sewered as the most cost effective and environmentally effective solutions. The following extract from the 2019 *Colchester Town Plan* (https://issuu.com/colchestervt/docs/2019_town_plan, page 137) describes the status of the recommendations related to centralized sewers:

> With East Lakeshore and Goodsell Point residences experiencing repeated system failures, and with high *E.coli* counts seen in water quality samples, it is apparent that the existing on-site wastewater infrastructure is not adequate for existing needs, and central sewers in this area remain the best option to address these issues. While centralized sewers are generally a catalyst for development, this Plan calls for existing density along East Lakeshore Drive to remain, as it already exceeds the density allowed under the current zoning. The Lakeshore 1 and Lakeshore 2 Districts were developed after years of land use study and community input and call for the Inner Bay neighborhood to remain a Village Mixed-Use area into the future, with central sewers allowing for redevelopment of existing sites, with slight increases in density possible if environmental and resource protection mechanisms allow.
>
> In 2018, the Town continued the work of Colchester Fire District Two in evaluating a sewer service area for the Inner Bay: the Malletts Bay Sewer Project. The project is proposed to serve West Lakeshore Drive from the corner of Prim Road to Blakely Road and East Lakeshore Drive through to Goodsell Point, via a force main extension from the Town's existing sewer service area at Severance Corners. This is a high priority-project for the Town of Colchester...

The Malletts Bay Sewer Project was brought before the voters in March 2019. If approved, this project would have been implemented within about five years and was anticipated to address the historic high-risk areas along the inner Malletts Bay shoreline.

With the defeat of the March 2019 proposal, few alternative wastewater management solutions are evident. Other high-needs areas, such as Sunset View and Coates Island, are restricted to summer seasonal use due to emergency vehicle access restrictions. Seasonal access restrictions do not exist in the Lakeshore Drive and Goodsell Point areas, and the State EPRs, though administered by the Town, allow for the conversion of seasonal residences to year-round residences with "best fix" solutions. Incremental expansion of residential uses using systems that cannot completely comply with existing regulations within these high risk areas will increase nutrients, bacteria, and other wastewater pollutants entering inner Malletts Bay.

With no centralized wastewater service, existing and possible future development along the southern shore of inner Malletts Bay must rely on soil-based treatment systems for onsite wastewater and stormwater management. The Lakeshore zoning responded to community input that existing stormwater problems need to be addressed and new development needs to do more to protect water quality by requiring particular consideration of stormwater management, using soil-based treatment practices where possible, when properties are redeveloped and building footprints or impervious surface areas are increased. Soil-based stormwater treatment practices need the same conditions as onsite septic systems for sustainable function. Conflicts between stormwater and wastewater treatment will severely constrain precisely the types of high-quality land development and flexibility for retrofit of previously developed sites encouraged in the zoning.

Summary

At the end of the IWRM study, there was a clear sense that pollution from stormwater and wastewater represented threats to water quality in Malletts Bay and to streams in certain areas of Colchester, and that action was required on multiple fronts to restore and enhance the Town's water resources. Since 2013, through a series of deliberate and sustained Town actions, and through changes in stormwater-related regulations and policy at the State level, substantial progress has been made in advancing stormwater management recommendations from the IWRM work.

In contrast, and despite the Town's continued efforts, only limited progress has been made in implementing the IWRM's wastewater management recommendations. Aside from implementing the homeowner awareness program components, Town-wide strategies for improving O&M for onsite wastewater systems are stalled due to existing State statutes. Recommendations for implementing centralized wastewater management along Lakeshore Drive and Goodsell Point, the highest-need and most limited areas of Town for onsite wastewater management, are also stalled following the defeat of the wastewater bond vote in March 2019. The Selectboard requested the Planning Commission review and analyze options to address the lack of effective wastewater disposal capacity for properties on inner Malletts Bay. The problem of inadequate human waste disposal in this concentrated area remains unsolved and affects those that live along the Bay, as well as the larger community that enjoys recreation opportunities the Bay offers. The Planning Commission will solicit the community for input and, following substantial community dialogue and review, is anticipated to provide the Selectboard with its recommendations in the fall of 2019.