Lake Champlain Sea Grant Stormwater Regional Utility Research Fellowship: Final Report

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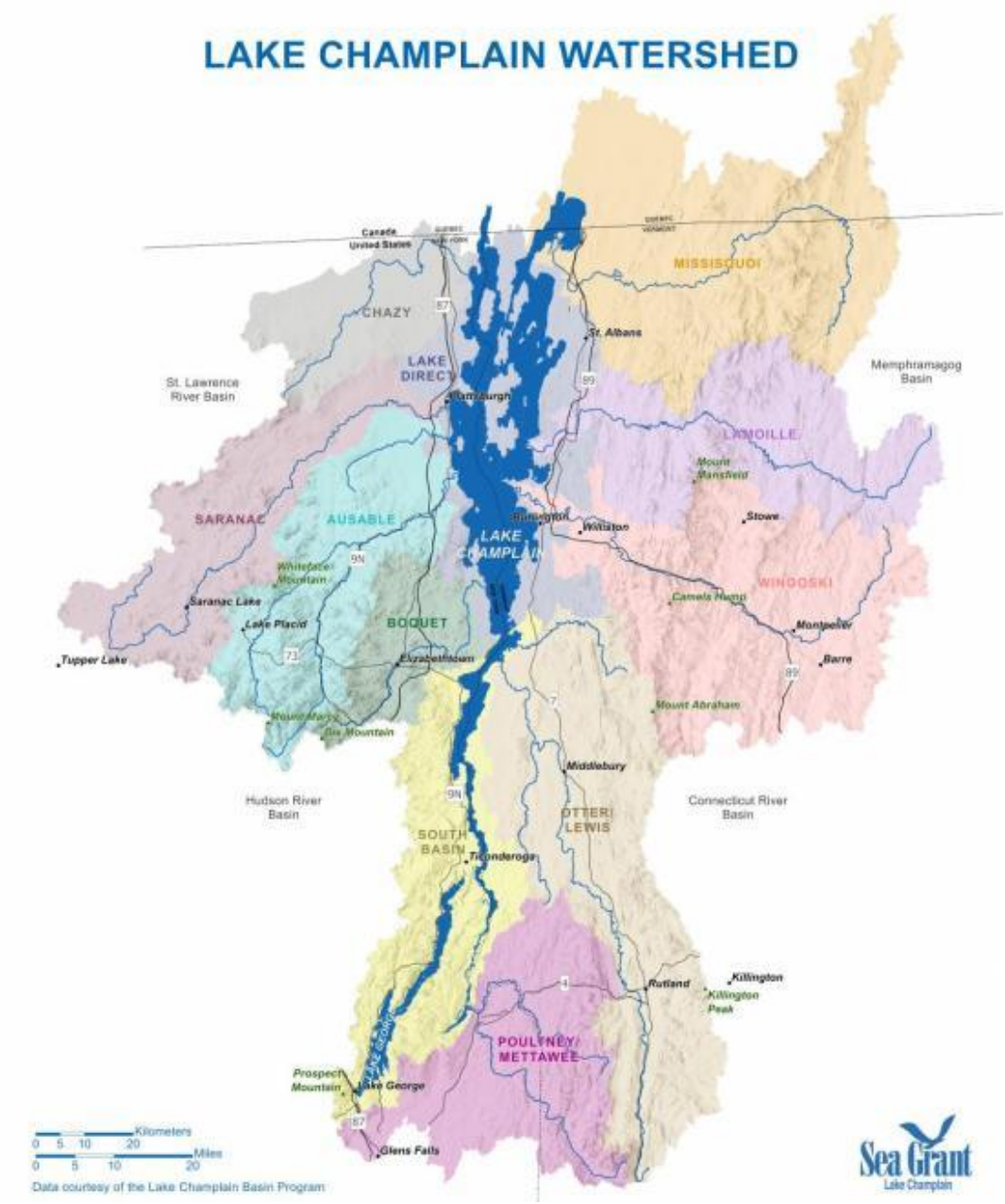

Map of the Lake Champlain watershed, by Lake Champlain Sea Grant (https://www.uvm.edu/seagrant/about/lake-champlain-watershed)

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Executive Summary

This report presents the findings of the Lake Champlain Sea Grant Stormwater Regional Utility Research Fellowship, a one-year collaborative initiative funded by Burlington, Colchester, Essex, Essex Junction, Shelburne, South Burlington, and Lake Champlain Sea Grant. The fellowship was established to assess whether a regional approach to Municipal Separate Storm Sewer System (MS4) compliance could improve efficiency, reduce costs, and enhance service delivery for the six participating Vermont municipalities.

The research directly addresses the four objectives outlined in the project's Scope of Work:

1. Identify the minimum measures and municipal operations most appropriate for regional compliance.
2. Understand whether certain communities stand to benefit financially or otherwise more than others from regionalization.
3. Evaluate the impacts of a regional compliance approach on program delivery costs.
4. Determine the most appropriate level of regionalization (full, partial, or phased).

To meet these objectives, the fellow reviewed Vermont's MS4 permit requirements, each municipality's Stormwater Management Plan, and the history of existing collaborative efforts, particularly for Minimum Measures 1 and 2. The work also included national case study reviews, meetings with each community to understand current program design and resourcing, cost analysis from detailed time-tracking spreadsheets, and scenario modeling to assess three cost-sharing frameworks: equal share, population-based, and current-cost-based.

Key findings reveal that regionalizing the agreed-upon tasks could conservatively reduce total combined costs by approximately 15%—equivalent to an annual savings of $134,088 for the region—while improving consistency in inspections, public outreach, and administrative processes. Smaller municipalities, such as Shelburne, Essex Junction, and Essex Town, are likely to realize the most significant proportional benefits, though all partners stand to gain from improved service resilience and reduced duplication.

The report provides detailed scenario comparisons, identifies time-saving opportunities, and outlines a phased approach to regionalization. It concludes with actionable recommendations and next steps for implementing shared services, piloting regional roles, and formalizing governance structures to ensure equitable and effective collaboration moving forward.

The report is divided into four sections: (1) Background; (2) Research Process; (3) Research Results: and, (4) Recommendations. The report excludes an overview and history of the MS4 program.

Background

MS4 in Vermont

The Municipal Separate Storm Sewer System (MS4) program is a regulatory framework established under the federal Clean Water Act and administered by the U.S. Environmental Protection Agency (EPA). The program aims to reduce pollution in stormwater runoff that flows into local waterways. Across the United States, there are over 7,000 MS4 permittees, including municipalities, state departments of transportation, universities, and other entities that operate stormwater systems.

In Vermont, the MS4 program is implemented by the Vermont Department of Environmental Conservation (DEC) under the authority delegated by the EPA. The DEC issues MS4 permits, oversees compliance, and provides guidance on meeting the permit's six minimum control measures, which include public education, public involvement, illicit discharge detection and elimination, construction site runoff control, post-construction stormwater management, and pollution prevention/good housekeeping for municipal operations.

Each of the six communities participating in this study—Burlington, Colchester, Essex, Essex Junction, Shelburne, and South Burlington—holds its own MS4 permit. This means each municipality is independently responsible for developing and implementing its own stormwater management program, meeting permit requirements, and reporting annually to the DEC. While each community's stormwater system and operations are unique, they share similar regulatory obligations, geographic proximity, and environmental challenges related to water quality in the Lake Champlain Basin.

Because the MS4 permit requirements are largely uniform across municipalities, there is significant overlap in the tasks each community must perform. This duplication of effort presents an opportunity to explore whether certain activities could be more efficiently and cost-effectively carried out through a regionalized approach, while still maintaining compliance with state and federal requirements.

Existing MS4 Collaboration

The Chittenden County Regional Planning Commission (CCRPC) plays a key coordinating role in supporting municipalities within Chittenden County in meeting certain MS4 permit obligations, particularly those associated with Minimum Measure 1 (Public Education and Outreach) and Minimum Measure 2 (Public Involvement and Participation).

Through its Clean Water Advisory Committee (CWAC), the CCRPC brings together representatives from member municipalities, state agencies, and partner organizations to guide and implement regional water quality initiatives. One of the CCRPC's most visible contributions to MS4 compliance is the management of the Rethink Runoff campaign, a regional marketing

and outreach program designed to educate the public about stormwater impacts and promote behaviors that reduce pollution.

By centralizing outreach planning, developing shared educational materials, and coordinating regional campaigns, the CCRPC enables member municipalities to meet their public education and involvement requirements more efficiently than if each were to develop its own program independently. Municipal staff participate in the CWAC and its MS4 Subcommittee to ensure that outreach strategies and campaign content meet the specific needs of their communities while aligning with state and federal permit requirements.

For the six municipalities participating in this regionalization study the CCRPC's facilitation of these minimum measures provides a successful example of how regional collaboration can reduce duplication, share costs, and deliver a consistent message across jurisdictions.

In 2016, Shelburne initiated discussions with neighboring South Burlington to explore opportunities for contracting specific stormwater services. Those talks identified potential economies of scale, leading to the signing of an Interlocal Agreement for Stormwater Services in July 2016.

Under this agreement, the South Burlington Stormwater Utility could provide stormwater management services to Shelburne as needed to meet various MS4 permit requirements. While South Burlington staff have supported implementation—helping fulfill technical, operational, and compliance tasks—the Town of Shelburne has remained ultimately responsible for meeting each MS4 control measure. This arrangement has allowed Shelburne to leverage South Burlington's established stormwater utility expertise and capacity while maintaining legal and regulatory accountability for its own program.

Research Process

Representatives from each of the six participating municipalities met quarterly with the research fellow and Lake Champlain Sea Grant leadership. These meetings served as structured checkpoints to share progress, validate findings, and jointly decide on adjustments to the research plan. Between quarterly meetings, one-on-one discussions and targeted work sessions were held with municipal staff to gather specific operational, financial, and staffing details.

At the outset, the four project objectives from the Scope of Work were reviewed in detail. As the project progressed, each was refined.

Objective 1 shifted from a broad identification of possible shared tasks to a focused assessment of activities with high duplication potential, limited legal/ordinance barriers, and strong feasibility for standardization. This was accomplished through reviewing each of the community's Stormwater Management Plans, Flow Restoration Plans, Phosphorus Control Plan, Vermont Department of Environmental Conservation (DEC) Annual Workbook, and additional

tasks identified at quarterly meetings. This resulted in the identification of 78 unique tasks to comply with the MS4 program. Of note, a couple communities included additional tasks that were not required by DEC's Annual Workbook which resulted in the some community reporting annually on 54 tasks while most reported on 42.

The list of 78 tasks was presented at a quarterly meeting where the group identified which of the tasks are a higher priority for further investigation. The tasks identified for exclusion from further investigation were those may impact a community's local discretion and identity (i.e. – existing ordinances or policies), had significant barriers to regionalizing (i.e. staff union contracts needing to be updated, impacts on other municipal departments, etc.), and the topic is a lower priority to the community. Based upon this exercise, the original list of 78 tasks was reduced to 42 tasks spanning all six of the MS4 minimum measures and comprise the outcome of objective 1.

Objectives 2 and 3 were similar and nature and required similar activities so they are presented together. Objective 2 was expanded to consider not only cost savings but also efficiency gains, service quality improvements, and resilience against staff turnover. Objective 3 grew to include the design of three distinct cost-sharing models—Equal Share, Population-Based, and Current-Cost-Based—so that decision-makers could weigh equity and feasibility. To complete these objectives, the communities were asked to estimate the approximate amount of staff time in hours spent on each of the 42 tasks annually. This was done through a workbook sent to each community that looks similar to the DEC Annual Workbook and included two tabs, one with the listing of tasks and various types of staff positions (Stormwater, Engineering, Public Works, etc.) where the estimated time was to be entered. An estimate was requested due to the time-limited nature of the research as time was available for a longitudinal time study and a random moment time study was inappropriate given the seasonal nature of many tasks which would have resulted in under and over reporting of time when adjusted for a full year. The other tab requested the approximate hourly salary and benefits for each type of staff.

Upon submission of the workbook by each of the communities, the data was aggregated to identify the current amount of time and corresponding cost for each of the tasks involved in the MS4 program for the six communities. This represented the status-quo scenario that other scenarios could be compared against.

Objective 4 remained unchanged. In addition to the aforementioned activities a review of Vermont Statue Statutes, the results from the mixed methods data collection, internet search for national examples of MS4 consolidation, and the existing MS4 consolidation efforts for the six communities was conducted. Based upon these efforts, the results of each objective is provided.

Research Results

Objective 1

As discussed above, 42 tasks spanning all six of the minimum measures are most appropriate for a regional compliance effort in the short-term. The listing of these 42 tasks can be found in Appendix 1. This list summarizes the full set of tasks associated with MS4 compliance and categorizes them based on priority. Forty-two tasks have been identified as higher priority and represent the core activities that municipalities should focus on to meet regulatory requirements efficiently. The remaining thirty tasks are considered lower priority and may be implemented as resources allow. In general, these 42 tasks are those currently completed by Stormwater staff and involve advance knowledge of stormwater best-management practices and policies.

Objectives 2 and 3

It should be noted that the following is based upon the estimations provided by communities which may differ from reality. Additionally, there are start-up costs typically associated with consolidating services (contracting and legal costs, one-time purchases, etc.) that have not been accounted for in this analysis.

In review of the public administration literature on municipal service consolidation, tasks that most likely to have a reduced cost are those where the amount of inputs would be reduced. For example, currently all six communities provide a staff training. In a regional entity, only one training would be needed which could results in a reduction of time by approximately 83%. Conversely, each community needs to conduct monitoring activities for illicit discharge detection and elimination. The number of sites to monitor across the six communities will not change in a regionalized system and as such, the amount of time it takes to monitor these sites is unlikely to change. There may be some negligible differences by aligning the monitoring that may reduce staff travel time but it is assumed there will be no difference in this analysis. Additionally, information from a conversation with a representative from the Truckee Meadows Stormwater Permit Coordinating Committee – the only known fully consolidated MS4 compliance program – was also utilized to inform which type of tasks resulted in estimated savings for their communities. Based on this information, the research fellow factored in an estimated percentage of staff time for each of the 42 tasks to develop the time and cost needed for a regionalized MS4 program.

The table below summarizes the current total annual staff costs for the 42 tasks across all six municipalities compared to the projected costs under a fully consolidated system and the estimated savings.

Table 1

Comparison of Existing and Consolidated System Costs for Selected MS4 Compliance Tasks

System Type	Total Cost	Estimated Savings
Existing System (Status quo)	$ 926,744	$ -
Consolidated System	$ 806,537	$ 120,207

One confounding variable is the contractual relationship between Shelburne and South Burlington and its impact on cost estimates. It is possible that Shelburne's estimates may be under-represented because of this. Another possibility, is the numbers are representative of the reality and displays the cost-effective nature of consolidating stormwater compliance. Shelburne does not have to purchase or maintain expensive equipment like a street sweeper, vacuum truck, or employ a field crew to cover multiple tasks required of its MS4 permit. This also helps add some revenue to South Burlington's Utility. This is likely a significant contributing factor for why Shelburne seems to have the lowest costs towards MS4 compliance.

Additionally, during the cost estimate phase, South Burlington's two stormwater staff involved in the project ended their employment with the city. While a different South Burlington staff member with experience and knowledge of the community's stormwater system assisted, there is the possibility that South Burlington's data may not be as accurate as other communities.

Three cost-sharing models were then developed to distribute the projected consolidated program costs:

- Equal Share – splitting costs evenly among the six communities.
- Population-Based – allocating costs in proportion to adjusted 2020 census populations.
- Current-Cost-Based – allocates the total consolidated program cost in proportion to each municipality's share of the 42 tasks' existing costs.

Equal Cost Share Model

Under the equal cost share approach, the total projected consolidated program cost is divided evenly among all participating municipalities, regardless of differences in population size, stormwater system complexity, or current spending levels. In this case, the total consolidated cost for the tasks is $806,537, resulting in each of the six municipalities being allocated $120,207 annually. This is displayed in Table 2.

Methodology

1. Identify the total projected cost for the regionalized program.
2. Divide that total by the number of participating municipalities (6).
3. Assign the resulting figure equally to each community as their annual share.
4. Compare this cost to each municipality's current cost for the same tasks to determine the change from existing spending levels.

This model produces significant shifts in contributions across municipalities. Smaller communities with lower current costs—such as Shelburne and Essex—see substantial increases in annual costs under an equal share model. Larger municipalities with high current costs—most notably Burlington—experience large decreases in their annual contribution.

Pros

- Simplicity and transparency: Easy to calculate, explain, and administer.
- Shared responsibility: Symbolically reinforces the idea that all partners have an equal stake in the program's success.
- Predictability: Provides stable, fixed annual costs for budgeting purposes.

Cons

- Equity concerns: Does not account for differences in population, system size, or existing workload, which can be perceived as unfair by smaller communities that must contribute more than they currently spend.
- Political feasibility: Large cost increases for smaller towns (e.g., Shelburne's projected increase of $66,233) may create resistance to participation.
- Potential misalignment with benefit received: Municipalities with less infrastructure or fewer regulated activities may feel they are subsidizing larger, more complex systems.

Considerations for Decision-Making

While the equal share method is administratively simple, its sustainability depends on political will and the perceived value of regionalization for all participants. This model may work best if paired with phased implementation, where tasks are added over time and cost shares are periodically reassessed to ensure perceived fairness though concerns around equity make this a difficult option for the long-term.

Table 2

Equal Cost Share Model

Municipality	Existing	Equal Share Cost	Change from Existing
Essex	$ 100,980	$ 134,423	$ 33,442
Essex Junction	$ 113,678	$ 134,423	$ 20,744
South Burlington	$ 114,535	$ 134,423	$ 19,888
Burlington	$ 406,670	$ 134,423	$ (272,247)
Colchester	$ 122,690	$ 134,423	$ 11,733
Shelburne	$ 68,190	$ 134,423	$ 66,233

Population-Based Cost Model

The population-based model distributes the total projected consolidated program cost in proportion to each municipality's share of the total population. Population figures are based on the 2020 U.S. Census, with Essex's population adjusted to exclude Essex Junction. This method ensures that communities with more residents—who may place greater demands on stormwater infrastructure—contribute proportionally more to the regional program. This is displayed in Table 3

Methodology

1. Use population figures for each municipality based upon the 2020 Census.
2. Divide each municipality's population by the total combined population (113,095).
3. Multiply that percentage by the total projected consolidated cost to determine the cost share.
4. Compare this to each municipality's current cost to determine the change.

Results

- Burlington remains the largest contributor under this model, paying $317,316, though this represents a savings of nearly $89,354 compared to its current costs.
- South Burlington is the only municipality with a substantial increase, rising by about $30,178 above its current costs, reflecting its relatively large population and comparatively low current spending.
- Colchester's allocation increases modestly ($5,256), while Essex, Essex Junction, and Shelburne all see reductions ranging from $11,195 (Shelburne) to $36,551 (Essex Junction).

Pros

- Aligns costs with population, which is a proxy for potential service demand.
- Perceived as equitable when population correlates to stormwater system usage.
- Allows costs to scale naturally with population changes over time.

Cons

- Population may not fully capture system complexity, infrastructure extent, or regulatory requirements.
- Some smaller towns with low infrastructure complexity but growing populations could see cost increases.
- Requires regular census or population estimate updates to remain accurate.

Considerations for Decision-Making
This model balances equity and practicality, but communities with very different system sizes relative to population may argue for adjustments to account for infrastructure realities.

Table 3

Population-Based Cost Model

Municipality	Existing	Population-Based Cost	Change from Existing
Essex	$ 100,980.44	$ 82,440	$ (18,540)
Essex Junction	$ 113,678.36	$ 77,127	$ (36,551)
South Burlington	$ 114,534.80	$ 144,712	$ 30,178
Burlington	$ 406,670.00	$ 317,316	$ (89,354)
Colchester	$ 122,690.00	$ 127,946	$ 5,256
Shelburne	$ 38,300.00	$ 56,995	$ (11,195)

Current-Cost-Based Model

The current-cost-based model allocates the total projected consolidated cost proportionally to each municipality's current spending on the tasks. This approach assumes that current costs reflect the scale and complexity of each community's MS4 compliance obligations and allocates future costs in proportion to that baseline. This is displayed in Table 4.

Methodology

1. Calculate the total of all current costs.
2. Determine each municipality's share of this total.
3. Apply the same percentage to the projected consolidated cost.
4. Compare the resulting allocation to current costs to determine change.

Results

- Burlington remains the largest contributor under this model, paying $353,921 compared to its current $406,670, a reduction of about $52,749.
- Essex Junction, South Burlington, Colchester, and Essex also see meaningful savings, reducing costs by about $14,745; $14,856; $15,914; and $13,098, respectively.
- Shelburne, the smallest spender, also benefits with a reduction of about $8,845.
- Because the allocation is directly tied to existing spending patterns, all municipalities see savings while maintaining their relative shares of the overall cost.

Pros

- Minimizes disruption by keeping cost shares consistent with current allocations while ensuring every municipality sees savings.
- Simple and transparent to calculate and explain, supporting clarity in decision-making.
- Politically feasible, as no municipality experiences a cost increase or disproportionately large shift.

Cons

- Preserves existing inequities if current spending is not aligned with actual service needs or efficiencies.
- Does not reward or incentivize cost efficiency—high-spending municipalities continue to pay more.
- Relies on the accuracy of current cost estimates, which may vary in methodology across municipalities.

Considerations for Decision-Making

This model may be the most politically feasible starting point for regionalization, particularly for pilot programs, as it minimizes cost shocks. However, over time, it may need to be revisited to align with actual workload, system complexity, and measurable benefits of regionalization.

Table 4

Current-Cost-Based Model

Municipality	Existing	Current-Cost-Based Cost	Change from Existing
Essex	$ 100,980.44	$87,882.39	($13,098.05)
Essex Junction	$ 113,678.36	$98,933.28	($14,745.08)
South Burlington	$ 114,534.80	$99,678.63	($14,856.17)
Burlington	$ 406,670.00	$353,921.34	($52,748.66)
Colchester	$ 122,690.00	$106,776.03	($15,913.97)
Shelburne	$ 68,190.00	$59,345.16	($8,844.84)

In addition to the three cost-sharing models analyzed in detail, there are other approaches that could be explored in the future. One option is to base cost shares on impervious surface area, which serves as a direct proxy for stormwater runoff generation. Data on impervious cover are available through national mapping products, and several municipalities may maintain parcel-level impervious data as part of their stormwater structures. Using impervious area as a basis for allocation would more directly link costs to the physical drivers of stormwater management needs.

Another factor to consider is growth and development activity, which directly affects the volume of work required for construction site inspections, plan reviews, and post-construction compliance. Communities experiencing higher rates of development may require more intensive support under a regionalized model, suggesting that cost shares could also incorporate a growth-related metric in addition to population, impervious cover, or current spending.

While this study did not attempt to model these alternatives, acknowledging them provides a broader menu of options. As municipalities move from exploratory analysis to pilot implementation, testing different allocation bases—alone or in hybrid form—could help align costs more closely with actual service demand and long-term equity considerations.

This analysis addresses Objectives 2 and 3 by evaluating how the financial and non-financial impacts of regionalization would vary across municipalities and by developing three cost-sharing models to allocate the projected consolidated program cost. Comparing current costs to allocations under the Equal Share, Population-Based, and Current-Cost-Based models shows that some communities—particularly Burlington—would see substantial savings, while others, such as Shelburne, could face increases under certain models. These results highlight both the distribution of benefits and trade-offs among participants (Objective 2) and provide decision-makers with concrete allocation frameworks, each with different implications for equity, feasibility, and political acceptability (Objective 3).

Objective 4

Objective 4 examined the appropriate level of regionalization—full, partial, or phased—given the operational, political, and legal context of the six municipalities. The research incorporated findings from:

- A review of Vermont statutes and relevant municipal charters to identify legal mechanisms for shared service delivery.
- Analysis of existing shared-service arrangements among the six municipalities, including collaborative purchasing and shared equipment programs.
- National examples of MS4-related consolidation, with emphasis on governance structures, startup timelines, and operational scope.
- Input from municipal managers and stormwater program staff regarding barriers (e.g., collective bargaining agreements, local ordinance differences) and opportunities (e.g., specialized staff retention, service continuity).

Municipalities in Vermont have several legal and practical mechanisms available for working together to provide shared services. Each option varies in formality, governance, and flexibility, and the right choice depends on the scope of the service, the number of participating communities, and the level of integration desired.

1. Interlocal Agreements

An interlocal agreement is a contractual arrangement between two or more municipalities to share or provide services without forming a new legal entity. Under this model, one municipality can provide services directly to another, as South Burlington currently does for Shelburne's stormwater program. These agreements are typically established under Vermont's interlocal contract statutes and can be tailored to specific services and terms.

Pros:

- Flexible and relatively quick to implement.
- Allows for targeted service sharing without overhauling existing governance structures.
- Can be customized to the needs and capacities of the parties involved.

Cons:

- Limited to the scope of the contract; expansion or changes require renegotiation.
- Typically does not create shared ownership—service provider typically retains operational control though this is an item for negotiations in the contract.
- May rely heavily on the capacity and stability of the provider municipality.

2. Intermunicipal Service Agreements via Regional Planning Commissions (RPCs)
In this arrangement, multiple municipalities contract with their regional planning commission to deliver a specific service on their behalf. The CCRPC's role in managing the Rethink Runoff program is an example, where municipalities pool funding for public education and involvement activities required under MS4 Minimum Measures 1 and 2. The RPC acts as the coordinating entity, managing contracts, staff, and program implementation.

Pros:

- Leverages RPC's regional coordination expertise and administrative capacity.
- Reduces duplication by creating a single point of service delivery for multiple communities.
- Can cover multiple jurisdictions with consistent service quality.

Cons:

- Municipalities have less direct operational control.
- Dependent on RPC's capacity and priorities, which may change over time.
- Governance decisions are made through the RPC's established structure, which may not always align with individual municipal preferences.

3. Union Municipal Districts
A union municipal district is a formal, separate governmental entity created by two or more municipalities under Vermont law to provide one or more shared services. Districts have their own governing board, can hire staff, own property and equipment, and manage budgets independent of the member municipalities. Examples include Green Mountain Transit and Chittenden Solid Waste District.

Pros:

- Creates a dedicated entity with its own authority, resources, and accountability.
- Allows for comprehensive, long-term planning and investment.
- Provides equal representation in governance and formalized decision-making processes.

Cons:

- Requires significant upfront legal and administrative work to establish.
- Less flexibility to dissolve or exit once formed.
- May be perceived as adding a new layer of government and bureaucracy.

This review suggested that a phased regionalization approach is the most practical pathway. Early phases could focus on high-duplication, low-barrier tasks such as outreach, education, and training, followed by expansion into more complex operational functions once governance structures and trust are established. Full consolidation remains a longer-term option but would require significant alignment of policies, budgets, and staff roles.

This analysis addresses Objective 4 by outlining a phased regionalization strategy supported by three legally recognized governance pathways: Interlocal Agreements, Intermunicipal Service Agreements through the CCRPC, and Union Municipal Districts. Interlocal Agreements, such as the existing Shelburne–South Burlington arrangement, offer a flexible and low-barrier way to begin with a limited set of tasks. Intermunicipal Service Agreements through CCRPC, modeled after the Rethink Runoff collaboration, can expand coordination to multi-community outreach and education programs in Phase 2. Finally, if early phases demonstrate success and there is interest in full integration, forming a Union Municipal District provides a permanent, dedicated structure for managing all MS4 tasks regionally. By aligning each phase with a governance model of appropriate complexity, this approach enables communities to build trust, evaluate results, and scale up regionalization at a manageable pace.

Research Limitations

While this study provides valuable insights into the potential benefits, trade-offs, and feasibility of regionalizing certain MS4 compliance activities, several limitations should be acknowledged when interpreting the results.

First, the cost analysis relies heavily on self-reported data from each municipality regarding the number of hours staff spend on specific tasks and the corresponding hourly wage and benefits rates. Differences in how municipalities track time, classify tasks, or interpret the activity list may affect the comparability of data across communities. In some cases, operational cost information was incomplete or inconsistently reported, requiring caution in its use or exclusion from the analysis.

Second, the modeling of potential savings under a fully consolidated system is based on assumed efficiency gains for certain categories of tasks. These assumptions were informed by stakeholder input and examples from other jurisdictions but were not validated through pilot testing. As such, actual time and cost savings could be higher or lower depending on implementation details, governance structures, and the level of coordination achieved.

Third, the study focuses on a subset of all MS4 compliance tasks—those that municipalities collectively identified as feasible for regionalization—while excluding activities constrained by local ordinances, site-specific requirements, or community preferences. This means that the results do not represent the full scope of MS4 compliance costs, but rather a subset of activities deemed most suitable for shared delivery.

Fourth, the governance and cost-sharing models were evaluated in conceptual form only. While they provide a useful starting point for decision-making, they do not account for potential legal, political, or operational barriers that might emerge during formal negotiations.

Fifth, the study does not attempt to quantify non-financial benefits such as improved service consistency, enhanced staff expertise, or greater resilience to staff turnover—though these factors were frequently cited as important by stakeholders. Incorporating these qualitative benefits into future evaluations could provide a more comprehensive understanding of regionalization's value.

Finally, the results are subject to external factors that could influence both the feasibility and desirability of regionalization. During the course of this project, one municipality lost both of its dedicated stormwater staff, and several others experienced turnover in stormwater positions. Such changes can strain a municipality's ability to meet MS4 requirements independently, potentially making regional solutions more attractive. Conversely, turnover can also slow decision-making and limit the capacity to engage in collaborative planning. Future regulatory changes at the state or federal level, fluctuations in funding availability, and broader economic conditions could also alter cost structures or compliance obligations, thereby impacting the applicability of the scenarios modeled in this study.

Recommendations

Based on the findings, the following recommendations are offered for consideration by the participating municipalities and Lake Champlain Sea Grant:

1. **Adopt a Phased Implementation Strategy**
   Begin with tasks that have the clearest potential for cost savings and operational consistency, such as shared training programs, GIS system, and consolidated reporting. These "early wins" can demonstrate value, build trust, and establish working relationships that pave the way for more complex integration.

2. **Select a Cost-Sharing Model Early**
   Agreeing on how costs will be distributed is critical to building confidence in the process. The Current-Cost-Based model offers the least disruption, while Equal Share and Population-Based models may be viable if equity concerns are addressed. Factoring in impervious surface area, as well as growth and development activity with one of these models should also be considered. Consider piloting with one model and reassessing after the first year.

3. **Formalize Governance and Accountability**
   Establish an interlocal or intermunicipal agreement that outlines roles, decision-making authority, dispute resolution processes, and performance metrics. Clearly define how annual work plans will be developed and approved.

4. **Invest in Regional Staff Capacity**
   Create shared positions (e.g., a regional stormwater coordinator, shared inspector) to handle specialized tasks and ensure continuity of knowledge across municipalities. Provide cross-training to reduce vulnerability to turnover.

5. **Evaluate and Expand**
   Build in regular evaluation checkpoints—both quantitative (cost, time saved) and qualitative (service quality, stakeholder satisfaction)—to inform decisions about expanding the scope of regionalization. Document lessons learned and adapt the model as needed.

Appendix 1: MS4 Compliance Tasks by Minimum Measure

This list summarizes the full set of tasks associated with MS4 compliance and categorizes them based on priority. Forty-two tasks have been identified as higher priority and represent the core activities that municipalities should focus on to meet regulatory requirements efficiently. The remaining thirty tasks are considered lower priority and may be implemented as resources allow.

MM#1: Public Education and Outreach

Prioritized Tasks

- Website maintained with locally relevant stormwater information
- Maintain a program to identify opportunities and provide technical assistance on Low Impact BMPs
- Participate in a regional stormwater education strategy or develop an MS4-specific program
- Create educational brochure about pet waste and water quality
- Install signs with the message 'pick up after your pet'
- Provide regular updates on social media accounts; track engagement statistics

Lower Priority Tasks

- Provide biodegradable pet waste bags to the community
- Install pet waste dispensers
- Provide educational talks about the importance of water quality
- Review of land use codes to ensure consistency with LID practices
- Review of site plans to ensure incorporation of LID and BMPs
- Send one community newsletter to the public annually
- Incorporate LID into municipal projects

MM#2: Public Involvement and Participation

Prioritized Tasks

- Participate in a regional stormwater public involvement and participation strategy or develop an MS4-specific program
- Storm Drain Stenciling program

Lower Priority Tasks

- Participate in Vermont Green-up Day or organize stream clean-up day

MM#3: Illicit Discharge Detection and Elimination

Prioritized Tasks

- Develop and maintain a GIS or AutoCAD map of the storm sewers in the regulated MS4 showing all outfalls
- Inform public on the dangers of illegal discharges
- Monitoring activities:
    - Outfall inspections
    - Dry-weather samples
    - Stormwater drainage pipe inspection
    - Discharge detection
    - Discharge correction
    - Other monitoring

Lower Priority Tasks

- Develop ordinance or policy prohibiting non-stormwater discharges and implement enforcement procedures
- Develop and implement a plan to detect and address non-stormwater discharges
- Review of Stormwater Ordinance and Land Development Code to effectively prohibit illicit discharge
- Coordination with drinking water suppliers

MM#4: Construction Site Stormwater Runoff Control

Prioritized Tasks

- Review existing policies to determine effectiveness, consistency with state standards; Amend for consistency with state standards
- Inspect construction sites for compliance with stormwater construction permits
- Final site inspections post-construction
- Site plan / land development code review
- EPSC plan review and associated in-field site visits

Lower Priority Tasks

- Develop and implement procedures to ensure that construction activities undertaken by the MS4 are properly permitted
- Develop and implement ordinance that regulates earth disturbance <1ac
- Provide erosion control brochures to zoning permit applicants

MM#5: Post Construction Stormwater Management

Prioritized Tasks

- Review existing policies for effectiveness, consistency with state standards, opportunities for LID, and opportunities for changes to street and parking requirements; Amend for consistency with state standards
- Develop and implement procedures for inspecting projects subject to the MS4's ordinance
- Maintain an updated list of STPs covered by the MS4's permit authorization
- Inspect and ensure maintenance of all STPs covered by the MS4's permit authorization
- Assist ANR with stormwater permitting program
- Maintain BMPs:
    - Stormwater infiltration
    - Bioretention area
    - Stormwater treatment swale
    - Pipe replacement
    - Other

Lower Priority Tasks

- Develop and implement procedures to identify projects that disturb >1ac but do not require a state post-construction permit
- Adopt an ordinance or policy requiring projects that disturb >1ac to use BMPs and ensure long-term maintenance
- Develop and implement procedures to ensure that development activities undertaken by the MS4 are properly permitted
- Track number of people applying for incentives annually

MM#6: Pollution Prevention and Good Housekeeping

Prioritized Tasks

- Conduct stormwater training for staff
- Inspect MS4 permitted infrastructure:
    - STPs
    - Catch basins
    - Outfalls
    - Other
- Inventory and install 'No Dumping, Drains to Waterways' markers or stencils on catch basins
- Document audit once per permit cycle

Lower Priority Tasks

- Implement controls for reducing or eliminating the discharge of pollutants from the MS4
- Develop and implement procedures for proper disposal of wastes
- Prohibit use of phosphorus-containing fertilizers unless warranted by a soil test
- Participate in the Agency's Municipal Compliance Assistance Program (or other audit program) for municipal garages
- Installation of STPs
- Installation of retrofitted STPs
- Develop budget for stormwater permit compliance including BMP implementation
- Calibrate every winter the salt delivery systems
- Calibrate salt delivery systems annually on plow trucks
- Provide technical assistance to residents (e.g., 'how do I', 'do I need a permit')
- Field calls from community members (concerns/complaints)

Appendix 2: Prioritized Task List Cost Comparison

MM#1: Public Education and Outreach on Stormwater Impacts			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Website maintained with locally relevant stormwater information	$ 15,132.78	$ 7,566.39	$ (7,566.39)
Maintain a program to identify opportunities and provide technical assistance on Low Impact BMPs	$ 134,768.68	$ 67,384.34	$ (67,384.34)
Participate in a regional stormwater education strategy or develop an MS4-specific program	$ 21,564.27	$ 21,564.27	$ -
Create educational brochure about pet waste and water quality	$ 383.58	$ 191.79	$ (191.79)
Provide educational talks about the importance of water quality	$ 12,172.20	$ 8,520.54	$ (3,651.66)
Provide regular updates on social media accounts; track engagement statistics	$ 3,390.90	$ 1,695.45	$ (1,695.45)
MM#2: Public Involvement and Participation			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Participate in a regional stormwater public involvement and participation strategy or develop an MS4-specific program	$ 13,001.90	$ 13,001.90	$ -
Storm Drain Stenciling program	$ 6,690.58	$ 5,352.46	$ (1,338.12)
MM#3: Illicit Discharge Detection and Elimination			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Develop and maintain a GIS or AutoCAD map of the storm sewers in the regulated MS4 showing all outfalls	$ 54,928.78	$ 49,435.90	$ (5,492.88)
Inform public on the dangers of illegal discharges	$ 3,257.58	$ 2,606.06	$ (651.52)
Monitoring activities:	$ 3,700.00	$ 3,700.00	$ -
Outfall inspections	$ 16,862.90	$ 16,862.90	$ -
Dry-weather samples	$ 3,383.90	$ 3,383.90	$ -
Stormwater drainage pipe inspection	$ 11,002.00	$ 11,002.00	$ -
Discharge detection	$ 1,528.72	$ 1,528.72	$ -
Discharge correction	$ 2,003.72	$ 2,003.72	$ -
Other	$ 1,606.00	$ 1,606.00	$ -
Unspecified monitoring	$ 12,656.63	$ 12,656.63	$ -

MM#4: Construction Site Stormwater Runoff Control			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Review existing policies to determine effectiveness, consistency with state standards; Amend for consistency with state standards	$ 16,902.70	$ 13,522.16	$ (3,380.54)
Inspect construction sites for compliance with stormwater construction permits	$ 53,047.40	$ 53,047.40	$ -
Time associated with final site inspections post-construction	$ 15,115.83	$ 15,115.83	$ -
Time associated with site plan / land development code review	$ 61,509.00	$ 61,509.00	$ -
Time associated with EPSC plan review and associated in-field site visits	$ 26,771.97	$ 26,771.97	$ -
MM#5: Post Construction Stormwater Management for New Development and Redevelopment			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Review existing policies to determine effectiveness, consistency with state standards, opportunities for LID, and opportunities for changes to street and parking requirements; Amend for consistency with state standards	$ 8,577.43	$ 6,861.94	$ (1,715.49)
Develop and implement procedures for inspecting projects subject to the MS4's ordinance	$ 10,871.18	$ 5,435.59	$ (5,435.59)
Maintain an updated list of STPs covered by the MS4's permit authorization	$ 9,467.67	$ 8,520.90	$ (946.77)
Inspect and ensure maintenance of all STPs covered by the MS4's permit authorization	$ 41,211.82	$ 41,211.82	$ -
Assist ANR with stormwater permitting program	$ 5,094.90	$ 2,547.45	$ (2,547.45)
Time associated with maintaining BMPs:	$ -	$ -	$ -
Stormwater infiltration	$ 17,325.10	$ 17,325.10	$ -
Bioretention area	$ 5,770.10	$ 5,770.10	$ -
Stormwater treatment swale	$ 41,060.10	$ 41,060.10	$ -
Pipe replacement	$ 51,382.65	$ 51,382.65	$ -
Other	$ 62,480.00	$ 62,480.00	$ -
Unspecified BMP maintenance	$ 25,188.30	$ 25,188.30	$ -

MM#6: Pollution Prevention and Good Housekeeping for Municipal Operations			
Activity	**Current Cost**	**Regional Cost**	**Difference**
Conduct stormwater training for staff	$ 24,183.90	$ 12,091.95	$ (12,091.95)
Inspect MS4 permitted infrastructure (split out by various types (STPs, catch basins, outfalls, other)?	$ -	$ -	$ -
STPs	$ 15,061.27	$ 15,061.27	$ -
Catch basins	$ 51,149.27	$ 51,149.27	$ -
Outfalls	$ 11,119.27	$ 11,119.27	$ -
Other	$ 15,675.00	$ 15,675.00	$ -
Unspecified inspection	$ 26,944.70	$ 26,944.70	$ -
Inventory and installation of "No Dumping, Drains to Waterways" markers or painted stencils on catch basins	$ 5,076.10	$ 5,076.10	$ -
Document audit once per permit cycle	$ 3,212.00	$ 1,606.00	$ (1,606.00)