1. Project Summary Page

Title: Implementing Stormwater TMDLs through an Innovative Watershed Remediation Action Plan in Vermont.

Applicant: Vermont Department of Environmental Conservation (DEC)
Project Manager: Jennifer Callahan, Environmental Analyst, Stormwater Management
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Total Project Cost:
Total Budget: $396,000
Requested from EPA: $297,000
Leveraged, Non-Federally Funded Staff Time: $99,000

Project Period: October 1, 2009 through September 30, 2011

Project Abstract: Continual land development over the past few decades has put significant stress on Vermont's natural resources. In streams draining developed watersheds, biological communities are subjected to many stressors associated with stormwater runoff. Twelve of Vermont's urban streams have been identified as being principally impaired due to the effects of stormwater runoff. The majority of the development in these watersheds occurred prior to the 1980's when no meaningful stormwater regulations were in place. Subsequently, in order to restore these waters, hundreds of expensive retrofit BMPs will need to be designed and implemented. The l administrative ramifications associated with permitting such widespread retrofits will be extensive. This proposal recommends an approach to address TDML implementation and permitting complexities through a comprehensive Watershed Remediation Action Plan (WRAP). This plan will involve education and outreach, development of regulatory tools to incentive the implementation of BMPs beyond current regulatory requirements, development of non-regulatory tools (e.g. ordinances requiring buffers, downspout disconnects, minimization of impervious surface creation) to aid TMDL implementation, municipal involvement through the MS4 permit, development of watershed-specific BMP retrofit plans, and the study and creation of a regional stormwater entity to assist in the planning, funding, and management of TMDL implementation. Through this proposed approach, and creation of a central TMDL-implementation entity, DEC anticipates putting in motion cost-effective and administratively feasible plans for remediating stormwater impaired streams in Vermont. In the future, this model may be applied to other watersheds impaired by constituents contained in stormwater, such as phosphorus.

Statutory Authority and Flexibility: The project will be managed primarily by Vermont DEC's Stormwater Management program and function under existing Federal and State statutory and regulatory authorities.

State Agency Support: DEC Commissioner Pelosi fully endorses this project.

2. VT DEC Stormwater State Innovation Grant
Detailed Itemized Budget

		Budget Period	From: 10/01/09	To: 09/30/11
Position Number / Title	**Annual Salary**	**% to Grant**	**Salary Expense**	**Fringe Benefits**
Personnel		subtotal	**$ 84,008**	
[EPA Redacted as Confidential Budgetary Information]				
Fringe Benefits				
[EPA Redacted as Confidential Budgetary Information]		subtotal	**$ 23,102**	
Travel				
		0		
		subtotal	**$ -**	
Equipment				
		0		
		subtotal	**$ -**	
Supplies				
~ IT Equipment & Software Upgrade		815		
~ Miscellaneous Material & Supplies		185		
~ Office Supplies		218		
		subtotal	**$ 1,218**	
Contractual				
~ Regional Stormwater Utility Evaluation		250,000		
		subtotal	**$ 250,000**	
Other				
~ Fee-for-Space		4,595		
~ Fleet Lease Payments		1,201		
~ Telephone & Internet Services		1,924		
~ Other Services		1,801		
		subtotal	**$ 9,521**	
Indirect Costs *(% of personnel costs)*	Rate 33.51%	subtotal	**$ 28,151**	
GRAND TOTAL		Total	**$ 396,000**	
	Federal	75%	**$ 297,000**	
	Non-Federal	25%	**$ 99,000**	

3. Project Narrative

A. Problem (Issue) Statement: In streams draining developed watersheds, biological communities are subjected to many stressors associated with stormwater runoff. These stressors are related either directly or indirectly to stormwater runoff volumes and include increased watershed pollutant load, increased pollutant load from in-stream sources, habitat degradation, washout of biota, and loss of habitat due to reductions in stream base flow. The stressors associated with stormwater runoff may act individually or cumulatively to degrade the overall biological community in a stream to a point where aquatic life uses are not fully supported and the stream does not attain the Vermont Water Quality Standards.

Twelve of Vermont's urban streams have been identified as being principally impaired due to the effects of stormwater runoff. The majority of the development in these watersheds occurred prior to the enactment of stormwater regulations. Additionally, a significant portion of more recent develop was below existing jurisdictional thresholds. Consequently, the majority of existing development lacks adequate stormwater management practices. Extensive retrofit installation of stormwater management practices is now required in order for the subject streams to be restored to standards.

There are significant administrative burdens associated with TMDL implementation and the retrofitting of stormwater systems. The associated permitting effort will be extraordinary and involve hundreds, if not thousands of private and public entities, for example, municipalities, private businesses, individual homeowners, state and local transportation authorities. Secondly, since stormwater flow does not conform to property boundaries, remediation efforts will need to cross property boundaries and involve multiple parties. It will be difficult to implement cost-effective strategies in a watershed when hundreds, or thousands, of permitted entities are involved. Absent a central responsible party – such as a regional stormwater utility – that can develop the most cost-effective stormwater management opportunities across a watershed, and raise the necessary funds for implementation - it is anticipated that implementation efforts will devolve into sporadic, uncoordinated and high cost fixes. Any coordinated phasing of implementation efforts will be difficult. It is also expected that there will be numerous legal challenges to individual permits.

B. Background: Pursuant to Act 140, which was passed by the Vermont Legislature in 2004, the Department of Environmental Conservation's Stormwater Program is developing cleanup plans for these stormwater impaired waters. These cleanup plans are known as Total Maximum Daily Loads or "TMDLs." As of November 2008, nine of the twelve stormwater TMDLs have been approved by EPA, the remaining three were submitted to EPA in October of 2008 and are awaiting approval. To develop the necessary TMDLs the Department has worked cooperatively with representatives of other governmental agencies, national experts, private consulting companies, environmental organizations, and the University of Vermont.

The TMDLs have been developed via a comprehensive watershed-wide approach that establishes hydrologic targets for each impaired stream using flow duration curves. In addition to developing these scientifically based remediation targets, the Department's TMDL effort has involved active discussion of possible implementation strategies with a stakeholder group, Vermont's Stormwater Advisory Group (SWAG), which includes representatives of state and

local agencies, municipalities, academia, consulting firms, environmental groups, residential homeowners associations, etc..

Throughout the TMDL development process, the Department has been pressured to simply "issue the permits" to implement the TMDLs. The Department has resisted this approach, knowing that implementation is a complex, costly process and that without careful planning and secure funding implementation will fail, permits will be ignored, extensive enforcement efforts will be required and litigation will abound. Initial modeling of just one of these watersheds estimates the cost of remediation at $26 million, including constructing 236 retrofit BMPs (122 detention and 114 infiltration BMPs). In order to increase the chance of successful implementation, the Department has taken a more reasoned approach by exploring the issues and complexities of implementation, identifying the scientific uncertainties, developing a Stormwater BMP Modeling Tool to identify different BMP options and associated costs, researching the necessary components and benefits of different implementation plans, and actively engaging stakeholders to discuss implementation options.

During the summer of 2008, the Department regularly consulted with the SWAG. Based on extensive dialogue in these meetings the Department believes the most efficient and cost effective way to ensure successful implementation of these TMDLs is through the development of a comprehensive Watershed Remediation Action Plan (WRAP). A major action of the WRAP is the creation of a regional stormwater entity to plan for, manage and fund implementation. This approach finds support in research conducted by the Department on other TMDL implementation efforts around the country. This research has identified factors that aid and hinder implementation efforts. These factors are best summarized in a 2006 Report prepared for EPA by the Virginia Tech Center for TMDL and Watershed Studies, which analyzed seventeen TMDL implementation case studies. Although the TMDLs in the case studies are not specifically for stormwater, they do involve pollutants associated with stormwater runoff, including sediment, nutrients, dissolved oxygen, bacteria and temperature. The characteristics that were concluded to foster TMDL implementation are adequate funding, stakeholder engagement, government agency involvement and cooperation, sufficient data, staging, and adaptive management. The Department believes that the best approach to ensuring adequate funding, stakeholder engagement, data collection efforts and implementation through permits that reflect the concepts of staging and adaptive management is through the creation of a single entity to fund and manage BMP retrofits and to implement other permit requirements.

This proposal recommends an approach to address TDML implementation and permitting complexities through the creation of a regional stormwater entity. Broad consensus was reached by many of the SWAG participants in 2008 that the most sound, efficient and potentially cost effective way to ensure successful implementation of TMDLs for the twelve urban impaired streams is through the creation of an overarching entity, such as a regional stormwater utility, that would be responsible to plan for, manage, and fund implementation. While the SWAG did not define the scope of such a utility, options discussed included individual municipal utilities, a regional utility encompassing geographic areas with stormwater impaired watersheds, and a state utility that could serve to both implement these TMDLs and prevent future impairments through preventative actions in other watersheds subject to development pressures. Agreement was reached that a stormwater utility evaluation should be conducted in order to define the scope of

the utility best suited to manage and fund TMDL implementation. Furthermore, the representatives from most of the affected municipalities are, for the first time, willing to participate in a regional utility feasibility study. It is crucial to the remediation of these watersheds that the Department move forward immediately with this innovative and essential approach to stormwater TMDL implementation.

Program Guidelines and Eligibility Requirements:
This project will develop and evaluate an innovative approach to preventing, reducing or eliminating water pollution associated with land development. This will be accomplished by watershed-wide TMDL implementation through the exploration of the creation of a single stormwater entity, such as a utility, that can both provide stable funding, plan for and manage BMP retrofits, and decrease the administrative burdens associated with permitting TMDL implementation across multiple watersheds.

The implementation of this project and the stormwater TMDLs will reduce impacts on water quality and quantity, wildlife, and habitat and contribute to achieving many of the EPA Strategic Goals including:

- Goal #2 - Clean and Safe Water by implementing stormwater BMPs throughout the watersheds
- Goal #3 - Land Preservation and Restoration by restoring surface and ground water quality and flow back to its natural levels and thereby restoring the quality of the land in the watersheds
- Goal #4 - Healthy Communities and Ecosystems by improving the habitat and overall biological community of the streams to support aquatic life
- Goal #5 - Compliance and Environmental Stewardship by promoting LID practices and voluntary compliance as well as voluntary remediation work above and beyond what is currently regulated.

C. Project Objectives:
The Objective of this project is to develop a Watershed Remediation Action Plan that will efficiently and cost-effectively implement Vermont's stormwater TMDLs through a regional utility, or similar entity, that will be responsible for implementing both regulatory and non-regulatory actions to remediate these streams. This entity could potentially serve as the holder of a single permit issued to implement the TMDLs that affect the watershed "region." This entity would work with local municipalities, transportation authorities, private businesses and individuals to implement the best, most coordinated, and cost-efficient suite of BMPs to reach the TMDL goals. This entity would provide a secure, reliable funding source for these efforts, including the ongoing monitoring that will be needed both before and after BMP implementation. This entity could also effectively engage in, and manage, the widespread stakeholder involvement necessary to implement TMDLs across numerous watersheds.

D. Methodology or Technical Approach: The major work elements of Watershed Remediation Action Plan include:

Task 1. Development of Overall Implementation Strategy with SWAG (6 months and on-going)

The Department convened the Stormwater Advisory Group (SWAG) in April 2008 to discuss implementation issues. SWAG had previously worked with the Department in developing the overall framework for the hydrologic stormwater TMDLs and development of the BMP Tool.

A total of nine SWAG meetings were held, including both group and sub-group meetings focused on particular issues, such as technical, phasing, funding, and municipal involvement. This process constituted the Department's first step in obtaining stakeholder involvement in development of an implementation strategy. SWAG participants included municipal, business and individual homeowners, all or some of whom may be called on to fund and/or implement necessary BMPs. The Department will reconvene SWAG to work collaboratively on the details of the WRAP.

Task 2. Identify Necessary Regulatory Tools to Foster Implementation of Plan (3 months)

Vermont's current stormwater laws have had the unintended consequence of discouraging upgrades and renewal of existing stormwater systems as well as voluntary BMP implementation of currently unregulated sites. As part of the TMDL implementation effort, the Department will work to identify the necessary regulatory and non-regulatory tools to incentivize BMP retrofits of existing stormwater systems, as well as encourage voluntary implementation of BMPS on currently grandfathered impervious surfaces.

Coordination of Permitting Across State Agencies/Programs: SWAG members expressed repeated concern about possible impediments to TMDL implementation caused by the realities of multiple permit requirements within and across state agencies. Of most concern was how Act 250 (Vermont's Landuse and Development Act) requirements might impede upgrades to existing stormwater systems. The Department acknowledges this concern, has engaged Act 250 representatives in the SWAG process and has committed to working with Act 250 on these issues. The Department anticipates a new, coordinated regulatory process is likely to be needed to enhance coordinated permitting for TMDL implementation activities.

Task 3. Conducting an evaluation of the options for creation of a stormwater TMDL implementation entity, such as a regional stormwater utility, in order to fund and manage implementation (18 months)

Working collaboratively with the affected municipalities and an experienced consultant, the Department will conduct a stormwater utility evaluation and begin the process of forming a utility. This study will be designed to investigate the following:

- The potential benefits of a regional utility for TMDL implementation
- Defining the functions of a utility
- The government and management structure of a utility
- Utility financing
- Defining the process for utility start-up
- Process for ongoing stakeholder interaction

Task 4. Defining the role and responsibilities of municipalities, including the scope of the MS4 permit. (4 months and on-going)

In consultation with USEPA, the Department will work to reissue Vermont's MS4 General Permit in light of the EPA-approved stormwater TMDLs. The Department will work to define the role of municipalities, both if a regional utility is formed, and if it is not.

The Department will:

- Encourage or require the affected municipalities to participate, along with the Department, in a stormwater utility evaluation. SWAG members agreed that implementation is likely best facilitated through a utility that provides technical, financial, and administrative support to affected watersheds.

- Work with municipalities and a regional utility, if formed, to develop watershed-specific BMP plans that identify and prioritize projects necessary to implement TMDLs and include stakeholder involvement. The BMP plans will include schedules for design, permitting and implementation. The BMP plans will also include watershed-specific public participation and outreach plans.

- Work with municipalities and a regional utility, if formed, to identify and implement low-cost upgrades to existing municipal discharges. This effort is expected to result in up-front and cost-effective benefits to the impaired streams. The Department will assist the municipalities in identifying these low-cost upgrades and provide other technical assistance as requested. The Department will work toward expediting and coordinating the issuance of permits for these projects.

- Require Prioritization and Implementation of Projects Identified in Watershed-specific BMP Plans Upon Formation of Stormwater Utility. Once a stormwater utility is formed, it will generate funds necessary to prioritize and implement BMP projects necessary to implement the TMDLs.

Task 5. Incentivizing voluntary upgrades of existing permitted and unpermitted impervious surfaces by municipalities and private parties. (4 months and on-going)

The Department is seeking to promote the voluntary implementation of BMPs at private permitted and unpermitted sites. There are currently a significant number of permitted and unpermitted impervious surfaces in these impaired watersheds that predate current stormwater permitting requirements. The Department will pursue regulatory tools and incentives to encourage voluntary BMP implementation and upgrades of these systems. The Department will work with land owners to provide technical and funding assistance where available, to identify, design, and construct new or retrofitted stormwater systems for existing discharges. This effort will necessarily involve pubic education and outreach, and close interaction with municipalities.

Task 6. Evaluate Project WRAP

VTDEC will fully document the results, including charts and descriptions of processes and policies established. Additionally, key measures will be used to evaluate the major tasks of this project at different stages and will be reported in quarterly progress reports and in the final project document.

Task 7. Report Progress

The VTDEC project manager will provide quarterly progress reports as well as a detailed final project summary to EPA, keep records, and ensure that tasks are moving forward as expected.

Selection Criteria

- Consistency with Solicitation Theme: see page 5 of this proposal Program Guidelines and Eligibility Requirements
- Consistency with Priority Focus Areas: Project WRAP is a sector based (land development sector) environmental plan that integrates permitted and unpermitted remediation actions such as building stormwater-permitted facilities, river corridor protection, and wetland remediation. Additionally, the project will coordinate actions between programs (e.g. Stormwater, Rivers Management, and Wetlands) as well as between the state and local municipalities.
- Producing Measurable Environmental Outcomes: see section E of this proposal Outcomes and Measures
- Transferring Innovation: The permitting effort associated with implementing stormwater TMDLs can be extraordinary and involve hundreds, if not thousands of private and public entities. Many states are just embarking on this effort and are faced with this issue. Through this proposed approach, and creation of a central TMDL-implementation entity, DEC anticipates putting in motion cost-effective and administratively feasible model that can not only be used in other states but can be applied to watersheds impaired by specific constituents contained in stormwater, such as phosphorus.
- Project Technical Feasibility: VT DEC has substantial experience facilitating the formation of regional partnerships, including the Regional Stormwater Education Program via the MS4 General Permit, and in the review and management of post-construction stormwater management systems, including the ongoing administration of nearly 3,000 regulated systems. VTDEC feels that the proposed budget and time frame are appropriate for this project
- Addressing EPA Regional-State Priorities: TMDL implementation is a priority for the region
- Programmatic Capability and Reporting on Past Performance of Environmental Results: please refer to Past Performance – Programmatic Capability and Reporting Environmental Results, page 9
- Regulatory and Statutory Environment for Project Implementation: The project will be managed primarily by Vermont DEC's Stormwater Management program and function under existing Federal and State statutory and regulatory authorities.
- Budget Reasonableness: please refer to page 2, detailed itemized budget
- Collaboration/Partnerships: VTDEC proposes to continue meeting with the Storm Water Advisory Group (SWAG) which includes representatives of state and local agencies,

Public Involvement

VTDEC will develop and implement a detailed pubic involvement plan to ensure that a large range of affected stakeholders are involved in the development and implementation of the WRAP. In addition to continued meetings with the previously mentioned SWAG group DEC will hold public education and outreach meetings to encourage participation and increase the likelihood of successful implementation.

E. Outcomes and Measures

Vermont DEC proposes key measures of resources, activities, outputs and outcomes for this project. Specifically, the Department will monitor staff time, the number of public meetings, voluntary upgrades and implementation of stormwater BMPs, and the number of watershed-specific BMP plans developed.

A key outcome expected from this project is a process to address the administrative and technical demands of implementing a large number of expensive, time-consuming and difficult projects. The proposed project will establish a more collaborative permitting process between the state, affected municipalities, and private land owners that also supports innovative problem-solving and encourages increased implementation of stormwater BMPs. Long-term measures of success of this project include a consistent funding source for monitoring data and BMP implementation; implementation of watershed-specific BMP plans; improvement of the permit process for these watersheds; and improvement of water quality and habitat in the stormwater impaired streams.

4.Past Performance – Programmatic Capability and Reporting Environmental Results

The Vermont Department of Environmental Conservation is the lead entity for this grant program. The Water Quality Division (WQD) is the program that is proposing and carrying out the work. WQD has long history of successful cooperative and other grant agreements with USEPA. WQD staff has managed a variety of projects, of various sizes. Recent examples include: REMAP assessment of mercury in VT/NH lakes ($450K total in three awards through EPA/ORD); Biocriteria/Nutrient Criteria Development Project ($80K+$40K – EPA Region 1); TMDL development for nutrient impaired lakes ($80K – EPA Region 1). The department has also managed grant-funded projects from USFS, NOAA, USDA-NSRC, and is charged with oversight of CWA §106 Supplemental Monitoring funds (~$170K/yr) and implementation of the National Lake Survey ($80K). The WQD's history for successful technical and programmatic completion of these projects is very good.

The list of projects provided directly above is relevant to the programmatic capability and reporting of environmental results. During the implementation of those projects, project managers commonly reported quarterly or annually to EPA project officers. In addition, in many cases, mid-stream progress reports were provided in public forums, including conferences and other meetings, to highlight technical findings of regional or national import. WQD staff is forthcoming with EPA project officers about difficulties encountered managing grant programs.

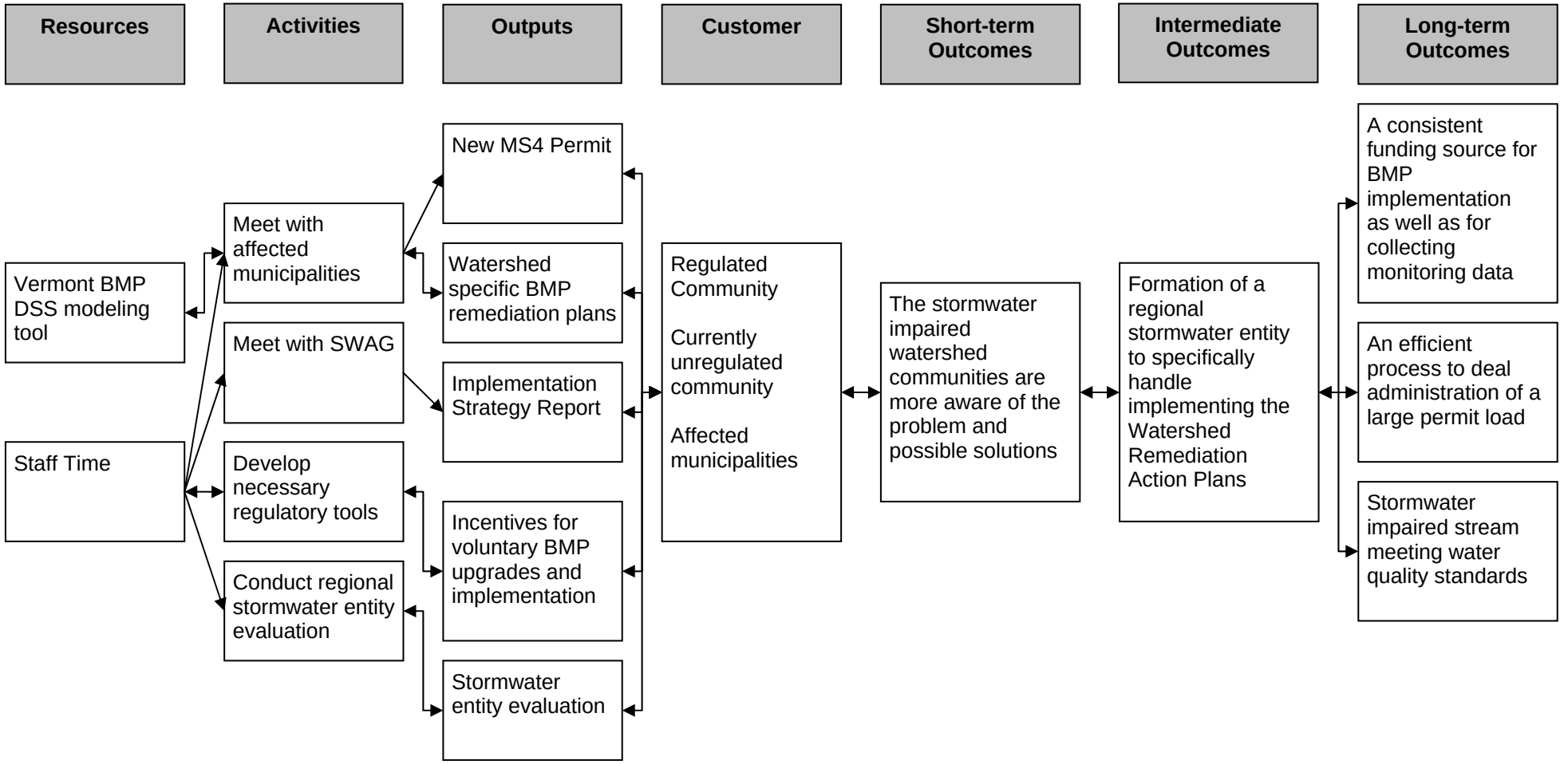
The grant projects discussed above have resulted in a wide variety of additions to Vermont's, and the region's, assessment and remediation "toolbox," and improvements in water quality.

5. Logic Model

Please see attached Logic Model

ATTACHMENTS

Logic Model for Implementing Vermont's Stormwater TMDLs through an Innovative Watershed Remediation Action Plan



JENNIFER CALLAHAN

EDUCATION

University of Rhode Island at Kingston, Rhode Island
Master of Science in Geology 2000

University of Massachusetts at Amherst, Massachusetts,
Bachelor of Science in Geology 1995

PROFESSIONAL EXPERIENCE

Environmental Analyst III, Vermont Department of Environmental Conservation, Water Quality Division, Stormwater Management Section, Waterbury Vermont, September 2004 - present, responsibilities include**:**

- **Stormwater Impaired TMDL and Permit Development –** Responsible for the development of a Total Maximum Daily Load (TMDL) or Water Quality Remediation Plan (WQRP) in each of the stormwater impaired watersheds and their subsequent watershed permits.
- **Oversight of Contracts and Grants** – Responsible for the management of various contracts and grants including stream geomorphic assessments, subwatershed mapping, flow gaging and precipitation monitoring, impervious surface mapping, and the development of the Vermont Best Management Practice Decision Support System.
- **Section Contact for the Clean and Clear Program** – Responsible for attending meetings; yearly reporting to the legislature on stormwater related clean and clear activities as well as stormwater indicators for the Lake Champlain TMDL. Also involved in the technical review and oversight of Clean and Clear related projects.

Hydrogeologist, Tighe and Bond Engineering, Inc., Worcester, MA, October 2002–January 2004, responsibilities included**:**

- **Groundwater Exploration –** Worked with municipalities to find new groundwater sources for potential public water supply wells.
- **Drilling Supervision –** Supervised soil test borings and installation of overburden, and bedrock monitoring wells.
- **Underground Storage Tank Closures and Removals –** Managed underground storage tank evaluations, removals, closures and abandonment's.
- **Supervision of Sub-contractors –** Scheduled field staff, sub-contractors, and field equipment for daily and weekly fieldwork activities.
- **Evaluation of Analytical Data and Report Preparation –** Performed analytical reviews to establish the regulatory status of projects and seasonal variations in contamination concentrations.

GIS Analyst, Marin Environmental, Inc., Southbridge, MA, June 2000 – October 2002, responsibilities include:

- **Project Management –** Management of various aspects of GIS projects including client contact and personnel management.
- **Digital Conversion of Parcel, Zoning, Water, and Sewer Data –** Completed conversions of data from paper, linen, and mylar maps to GIS coverages using ArcGIS 8.x, ArcInfo 7.2, ArcView 3.2a, and AutoCad Map 2000i.

Padraic Monks

Education

1992 - 1994 University of Michigan Ann Arbor, MI

M.S. Natural Resources

- Concentration in Resource Policy and Planning

1985 - 1989 Northeastern University Boston, MA

B.A. Anthropology

- Magna Cum Laude

Professional experience

1997-present Vermont Agency of Natural Resources Waterbury, VT

Manager, Stormwater Program

- Manage all components of the Vermont Stormwater Program
- Provide technical and regulatory guidance to regulated community
- Review major projects for compliance with tech and regulatory standards
- Coordinate with State and Federal agencies
- Supervise program staff

Wetlands Ecologist, Wetlands Section (1997-2001)

- Reviewed projects under Vermont Wetland Rules and Act 250
- Educated public on functions and values of wetlands and water resources
- Performed wetland delineations, including hydric soil determinations

1995 - 1997 Heindel and Noyes Burlington, VT

Staff Scientist

- Managed projects including contaminated sites, Act 250, and water resources
- Performed soil characterizations, hydrologic investigations, habitat assessment, sampling, and remote mapping
- Responsible for all phases of report preparation

1993 - 1994 Sumpter Township Sumpter, MI

Assistant Environmental Planner (Internship)

- Provided public outreach on range of environmental planning issues
- Assisted in development of town recycling and composting ordinances

Emily Schelley

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EDUCATION

Bachelor of Science May 2005
The University of Vermont Burlington, VT
Major: Environmental Science Minor: Chemistry

PROFESSIONAL EXPERIENCE

Environmental Analyst
VTDEC: Stormwater Section, Waterbury, VT

- Operate the Vermont BMP Decision Support System, a GIS based hydrologic model to aid in the development of Watershed Remediation Action Plans for Vermont's stormwater impaired waters. Duties include:
  - Interaction with the contractor to create a software product specific to the state's needs
  - Creation, management, and bringing up to date various data inputs required by the model
  - Set-up and operation of the model
  - Field checking of preliminary results
- Interaction with affected municipalities and stakeholders in the development of the implementation plans
- Provide technical and administrative support to senior analyst as necessary.

October 2006 - Present

Environmental Technician
VTDEC: Stormwater Section, Waterbury, VT

- Collected and analyzed data on existing stormwater infrastructure in impaired watersheds.
- Created and utilized GIS layers for hydrologic modeling.
- Developed support materials for state permits.
- Researched property ownership for expired permits.

July 2005 – October 2006

Supplemental Instructor
University of Vermont, Burlington, VT

- Prepared and conducted problem solving sessions for a junior level environmental science class.

Fall 2004

Field Researcher
University of Vermont, Burlington, VT

- Collected stormwater samples from Shelburne Farms in Shelburne, VT for water quality assessment.
- Collected and performed chemical analysis on water and soil samples from a wetland on site.

May 2004-September 2004

COMPUTER SKILLS

Microsoft Word, Excel, PowerPoint, Publisher, Adobe Photoshop, Adobe Illustrator, Quark, ArcGIS, TR-55, HydroCAD, Crystal Reports, Vermont Best Management Practice Decision Support System (VT BMPDSS), P8