

VERMONT CLEAN WATER INITIATIVE 2016 INVESTMENT REPORT



Agency of Administration
Agency of Agriculture, Food and Markets
Agency of Commerce and Community Development
Agency of Natural Resources
Agency of Transportation

VERMONT CLEAN WATER INITIATIVE 2016 INVESTMENT REPORT

Summary of the Vermont Clean Water Initiative, Describing 2016 State Investments, Actions, Outcomes and Future Recommendations

Submitted by the Vermont Clean Water Fund Board
December 30, 2016

This report satisfies the following statutory reporting requirements:

Clean Water Investment Report

2015 Act 64, Section 37, codified at 10 V.S.A. § 1389a

Execution of the Implementation Plan for the Lake Champlain Total Maximum Daily Load (TMDL)

2015 Act 64, Section 36, codified at 10 V.S.A. § 1386(d)

Activities and Progress of Water Quality Ecosystem Restoration Programs

2015 Act 64, Section 36, codified at 10 V.S.A. § 1386(e)

Report available electronically at: <http://dec.vermont.gov/watershed/cwi/cwf#report>

ACKNOWLEDGMENTS

This report was prepared by the Vermont Clean Water Initiative partner agencies on behalf of the Vermont Clean Water Fund Board. The Vermont Agency of Natural Resources, Department of Environmental Conservation (DEC), Watershed Management Division, Clean Water Initiative Program coordinated with staff of the Vermont Agency of Administration; Vermont Agency of Agriculture, Food and Markets; Vermont Agency of Commerce and Community Development; Vermont Agency of Transportation; Vermont Fish and Wildlife Department; Vermont Department of Forests, Parks and Recreation; and DEC's Facilities Engineering Division to complete this report.

VERMONT CLEAN WATER INITIATIVE AGENCIES:

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Agency of Administration - aoa.vermont.gov

Agency of Agriculture, Food and Markets - agriculture.vermont.gov

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Table of Contents

Executive Summary

1. Introduction	1
ABOUT THE CLEAN WATER INITIATIVE	1
ABOUT THIS REPORT	1
TRACKING THE STATE'S INVESTMENTS	1
ENHANCING THE STATE'S INVESTMENT REPORTING	2
2. Social Measures	3
CURRENT AND FUTURE SOCIAL MEASURES	3
SOCIAL MEASURE #1: EXTENT OF OUTREACH PROVIDED TO TARGET AUDIENCES	4
SOCIAL MEASURE #2: HOURS OF EDUCATION PROVIDED AND RECEIVED	4
SOCIAL MEASURE #3: LEVEL OF TECHNICAL ASSISTANCE PROVIDED	5
3. Investment Measures	10
CURRENT AND FUTURE INVESTMENT MEASURES	10
INVESTMENT MEASURE #1: FUNDS AWARDED BY AGENCY AND FUNDING PROGRAM	11
INVESTMENT MEASURE #2: FUNDS AWARDED BY SECTOR AND RECIPIENT CATEGORY	14
INVESTMENT MEASURE #3: GEOGRAPHIC DISTRIBUTION OF FUNDS INVESTED	16
4. Project Output Measures	17
CURRENT AND FUTURE PROJECT OUTPUT MEASURES	17
PROJECT OUTPUT MEASURES #1: RESULTS OF ASSESSMENT AND PLANNING PROJECTS	17
PROJECT OUTPUT MEASURES #2: RESULTS OF DESIGN PROJECTS	20
PROJECT OUTPUT MEASURES #3: RESULTS OF IMPLEMENTATION PROJECTS	20
5. Project Environmental Outcomes	26
CURRENT AND FUTURE ENVIRONMENTAL OUTCOME MEASURES	27
METHODS TO MEASURE ENVIRONMENTAL OUTCOMES	28
QUANTIFYING NUTRIENT POLLUTION REDUCTIONS FROM CLEAN WATER PROJECTS	29
LAKE CHAMPLAIN TMDL IMPLEMENTATION PROGRESS	29
6. Moving Forward	32
7. Appendices	33
OVERVIEW OF INVESTMENT REPORT APPENDICES	33
A. LISTING OF 2016 CLEAN WATER INITIATIVE-FUNDED PROJECTS	34
B. SUMMARY OF CLEAN WATER INITIATIVE MAJOR STATUTORY AND LAKE CHAMPLAIN PHOSPHORUS TMDL PHASE 1 PLAN DELIVERABLES	47
C. LISTING OF 2016 CLEAN WATER INITIATIVE-FUNDED PROJECTS IN THE LAKE CHAMPLAIN BASIN	53

List of Figures

Figure 1. Target audiences reached through the State's clean water outreach efforts based on number of attendees.....	4
Figure 2. Total hours of education provided by organization, and hours of education received by attendees.....	5
Figure 3. Number and type of farm visits conducted by AAFM at small, medium, and large farm operations in 2016.....	6
Figure 4. Number of projects reviewed by ANR-DEC WSMD Staff 2012 - 2016.....	7
Figure 5. Total State funds awarded in 2016 to clean water projects, by agency and fund.....	12
Figure 6. Total State funds awarded in 2016 through grants and contracts and loans, as well as operational funding.....	12
Figure 7. AAFM clean water investments by funding program.....	13
Figure 8. ANR clean water investments by funding program.....	13
Figure 9. VTrans clean water investments by funding program.....	13
Figure 10. Proportion of State investments by sector.....	14
Figure 11. Dollars of State investments by sector.....	15
Figure 12. Proportion of State investments by grant, contract, and loan recipient category.....	15
Figure 13. State clean water investments by basin.....	16
Figure 14. Map of State funds awarded through grants and contracts for clean water restoration activities by watershed.....	16
Figure 15. Map of State funds awarded through grants and contracts for clean water restoration activities by county.....	16
Figure 16. Number of priority projects identified through assessment and planning work by sector in 2016.....	18
Figure 17. Number and level of designs completed for clean water projects in 2016 by sector.....	20
Figure 18. Acres of agricultural best management practices applied/installed on cropland and pastureland in 2016.....	21
Figure 19. Number of agricultural best management practices installed in 2016, by practice type.....	22
Figure 20. Before and after installation of a stone-lined ditch along Fayston Road, Fayston.....	23
Figure 21. Before and after replacement of stream culvert at Hayes Road, Duxbury.....	23
Figure 22. Before and after installation of a pervious stormwater sidewalk in downtown Burlington.....	24
Figure 23. Before and after installation of a bioretention stormwater treatment structure at Lake Iroquois public beach.....	24
Figure 24. Full long-term scope of Investment Report environmental outcomes relative outcomes reported in the first year.....	27
Figure 25. Lake Champlain TMDLs phosphorus base load and target load by sector in metric tons per year.....	30

List of Tables

Table 1. Funding programs reported by agency.....	12
Table 2. Summary of stormwater assessments and planning project outputs achieved in 2016.....	19
Table 3. Summary of stream assessment and river planning project outputs achieved in 2016.....	20
Table 4. Summary of agriculture project planning outputs achieved in 2016.....	20
Table 5. Summary of road erosion control project outputs achieved in 2016.....	23
Table 6. Summary of stream and floodplain restoration project outputs achieved in 2016.....	25
Table 7. Summary of Vermont's ability in 2016 to account for nutrient pollution reduction.....	28
Table 8. Estimated phosphorus load reductions achieved by State-funded projects in 2016.....	30

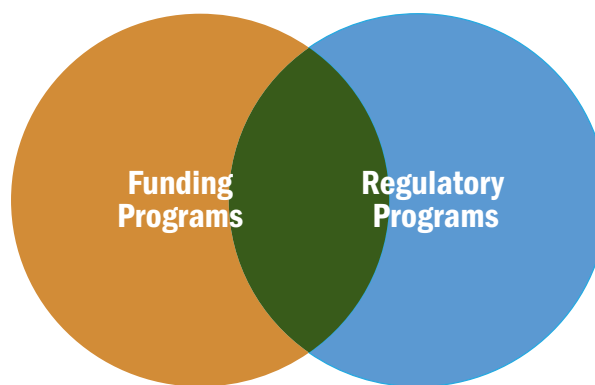
Executive Summary

DEFINING THE BASELINE: A FOUNDATION FOR MEASURING PROGRESS

The Vermont Clean Water Initiative represents a new interagency partnership aimed at safeguarding Vermonter's access to safe and clean water. Furthering this goal, the Vermont Clean Water Act (2015 Act 64), signed into law in June 2015, strengthens statutory and financial support aimed at reducing water pollution, with a focus on sediment and nutrients (phosphorus and nitrogen). The Act established the Vermont Clean Water Fund, overseen by the Vermont Clean Water Fund Board with representation from the Agencies of Administration; Agriculture, Food and Markets; Commerce and Community Development; Natural Resources; and Transportation.

Pursuant to Act 64, the Clean Water Fund Board has prepared this report. This report summarizes annual State-only investments to address priority water quality problems across Vermont.¹ This first multi-agency investment report establishes the baseline of information that will be used to gauge progress in achieving the State's clean water goals over time.

This report presents information related to State investments only. Federal agencies and programs continue to serve a critical role in helping to leverage local and State clean water investments. Federal funds, such as funds from the U.S. Department of Agriculture Natural Resources Conservation Service, are not included in this report. Work completed to comply with water quality-related regulations without State-funded grants, contracts, and loans is excluded from this report. Agency of Transportation's investments to comply with water quality regulations on State highways and non-road developed lands are also excluded from this report.



Funding and regulatory programs are important overlapping TMDL implementation mechanisms. Vermont is developing capacity to measure the results of both. This report presents information on the State-funded portion of this work.

Funding and regulatory programs are important drivers of clean water improvement projects, and the State is developing processes to capture the results of this work. As new regulations are incrementally put into place, and as funding programs grow to support the costs of compliance, the work accomplished through funding and regulatory programs is also expected to grow and become increasingly overlapped.

Given the significant costs of restoring and safeguarding water quality, it is critical for the State to spend its resources in the most cost-effective manner. State agencies use the Tactical Basin Planning process as the scientific framework to target the most important and cost effective activities to achieve the State's clean water targets. Those targets are described in clean water restoration plans, known as Total Maximum Daily Loads (TMDLs), the Vermont Clean Water Act, and the 2016 Combined Sewer Overflow (CSO) Rule.

1 Federal Transportation Alternatives Program dollars awarded by Agency of Transportation are reported. These dollars are considered State investments due to a statutory change in 2016 ensuring \$1.1 million federal transportation dollars would be dedicated to stormwater projects.

2016 Clean Water Initiative Highlights

The State of Vermont is tracking these investments and measuring project outputs and environmental outcomes to indicate the State's progress achieving its clean water goals over time. This report also summarizes the State's clean water-related outreach, and technical assistance efforts, as these actions play a critical role to support partners implementing clean water projects.



Social Measure Highlights

In 2016, State agencies and partners conducting State-funded outreach held 399 outreach events, including workshops, trainings, and public/stakeholder meetings. Outreach efforts reached 8,932 attendees who received 20,754 hours of education. Agency staff reviewed 3,887 projects to maximize water quality improvements and minimize water quality impact. Staff also visited 780 farms and provided technical assistance on 678 logging operations/forest properties, assisted 94 communities in urban and community forestry, and conducted 78 road project-related site visits.



Investment Measure Highlights

In 2016, State agencies invested \$8.5 million in clean water projects through grants and contracts. Of these investments 40 percent supported stormwater and road erosion control practices, 25 percent supported agricultural practices, 10 percent supported natural resource restoration (i.e., rivers, lake shore, wetland, and forest projects), and the remaining 4 percent supported projects that benefit across sectors. In addition, \$2.3 million in financing were provided as Clean Water State Revolving Fund low-interest loans for wastewater treatment and combined sewer overflow elimination.

Project Output Highlights



In 2016, State-funded planning and assessment work resulted in identification of 200 priority projects recommended for future design and/or implementation. 55 State-funded project designs were completed for future implementation work. Agricultural best management practices were applied/installed on over 5,009 acres. In addition to the results of Agency of Transportation-funded road projects, not available for 2016, Agency of Natural Resources-funded projects improved 5,800 feet of road drainage, repaired/replaced 177 road drainage structures, and reconnected 27 miles of stream habitat through in-stream culvert upgrades. Green stormwater infrastructure treated 0.325 acres of developed lands. 88 acres of riparian buffers along rivers, streams, and lakes were restored, and 141 acres of river corridor were conserved through easements. One wastewater treatment facility upgrade was completed, and 50 acres of developed lands were disconnected from combined sewer overflow systems, along with the disconnection of 400 feet of sewer pipe from storm sewers.



Environmental Outcome Highlights

In 2016, the State was able to quantify nutrient load reductions for 25 percent of the projects implemented, and is working to account for a higher percentage of projects in future years. Projects quantified include one wastewater treatment facility upgrade, two stormwater treatment practices, 3 riparian buffer restoration projects, and 45 agricultural practices. These projects reduced phosphorus loading into Lake Champlain by an estimated 1.76 metric tons per year, and are expected to be maintained and continued over time. The State is also building capacity to track and measure nutrient pollution reductions driven through regulatory programs, not presented in this report.

1. Introduction

ABOUT THE CLEAN WATER INITIATIVE

The Vermont Clean Water Initiative (CWI) reflects an exciting and growing collaboration among municipalities, state agencies, local and regional partners, farmers, businesses, and the public to take action that will safeguard the public's access to clean and safe water throughout the State. Furthering this goal, the Vermont Clean Water Act (2015 Act 64) was signed into law on June 16, 2015. The Act provides statutory support to strengthen efforts aimed at reducing water pollution, focusing on reducing sediment and harmful nutrient pollution (phosphorus and nitrogen) across the State. The Initiative will also help finance actions through the Clean Water Fund overseen by the Vermont Clean Water Fund Board with representation from the Agencies of Administration (AoA); Agriculture, Food and Markets (AAFM); Commerce and Community Development (ACCD); Natural Resources (ANR); and Transportation (VTrans).

ABOUT THIS REPORT

Pursuant to Act 64, the Clean Water Fund Board has prepared this report to summarize annual State-only investments made to address priority water quality problems across Vermont.² This report establishes the baseline of information for tracking purposes to gauge the State's progress in achieving water quality goals.

State agencies use the Tactical Basin Planning process as the scientific framework to target the most important and cost effective activities to achieve State and federal clean water targets.

² Federal Transportation Alternatives Program dollars awarded by Agency of Transportation are reported. These dollars are considered State investments due to a statutory change in 2016 ensuring \$1.1 million federal transportation dollars would be dedicated to stormwater projects.

Those targets are described in clean water restoration plans, known as Total Maximum Daily Loads (TMDLs), the Vermont Clean Water Act, and the 2016 Combined Sewer Overflow (CSO) Rule.

This annual report summarizes State-only investments in clean water and the results of State-funded clean water restoration activities completed within State Fiscal Year 2016, herein referred to as 2016, covering July 1, 2015 through June 30, 2016.

This report represents the first year of interagency work under the Clean Water Initiative and establishes a baseline for evaluating future actions and outcomes.



Stone-lined ditch project on Talcott Road, Fairfield, reducing road erosion

TRACKING THE STATE'S INVESTMENTS

Tracking the connection between clean water dollars invested, actions taken, and outcomes achieved enables the State to provide meaningful information to the public about the value of clean water restoration activities. Moreover, tracking actions and outcomes is consistent with State of Vermont's adoption of a results-based accountability framework to measure governmental performance.

Clean water investment reporting addresses:



Social measures on the level of clean water outreach and technical assistance provided by CWI partner agencies to support implementation of clean water restoration projects;



Investment measures on dollars invested in clean water restoration projects, addressing planning, design, and implementation of water quality improvement practices;



Measures of **project outputs**, quantifying the results of clean water restoration projects completed by project type; and



Measures of **environmental outcomes**, quantifying nutrient reductions achieved through State-funded clean water restoration projects.

The CWI partner agencies have been working since October 2015 to establish new tracking protocols to accurately account for these social, investment, project output, and environmental outcome measures. To consistently track clean water activities statewide, the CWI partner

agencies have coordinated in the development of databases to track these efforts, including the tracking system database at ANR/DEC, the agricultural partners' database at AAFM, and the Better Roads Program database at VTrans. These databases are being used to track State-funded clean water restoration activities, including projects supported by the Clean Water Fund.



Kayakers on Lake Memphremagog

ENHANCING THE STATE'S INVESTMENT REPORTING

Since these tracking systems are newly developed, clean water activities completed within 2016 were not reported and tracked systematically in prior years. Therefore, in this first year of reporting there are data and information gaps in the State's tracking of these activities, as well as limitations in accounting for the nutrient pollution reductions associated with these activities. The State is working to address these gaps and limitations by adjusting funding program reporting requirements, as well as establishing processes to quantify the environmental outcomes of projects/practices that treat runoff from stormwater and nonpoint sources. Most importantly, this report represents the first year of interagency work under the Clean Water Initiative and establishes a baseline for evaluating future actions and outcomes.

2. Social Measures

In Vermont, the majority of water pollution is transported from land to water through snow melt and precipitation, commonly referred to as runoff. What Vermonters do on the land has the greatest impact on our water resources. Reducing polluted runoff fundamentally means changing or adjusting our land uses. Changing land uses requires education. All sectors – farmers, municipal road crews and highway departments, commercial business owners with large parking lots, developers at construction sites, loggers and foresters, and residential homeowners – need opportunities to learn about the problems with polluted runoff, understand their options to address the problems, and subsequently take action to support clean water.



Fishing is one of the many recreational uses supported by clean water

The State's outreach and technical assistance programs support all sectors in planning and securing resources to implement clean water projects. These efforts raise awareness and change attitudes and behavior, thus increasing landowner acceptance of new and changing policies and willingness to adopt best management practices. In addition, the State's outreach and technical assistance efforts support all sectors in preparing to meet new regulatory requirements in the most cost-effective manner. Social measures, summarized in this report, demonstrate the extent of outreach and technical assistance provided by State agencies and partners with State financial support.

The State's outreach, education, and technical assistance activities in 2016 are summarized through the following measures:

1. Extent of outreach provided to target audiences
2. Hours of education provided by the State and received by attendees
3. Extent of technical assistance provided by agency

The State's outreach and technical assistance programs support all sectors in planning and securing resources to implement clean water projects.

CURRENT AND FUTURE SOCIAL MEASURES

Scope of Social Measures Reported

- Clean water outreach and technical assistance conducted by State agency staff and external partners with State financial support in SFY2016

Beyond the Scope of Social Measures Reported

- Clean water outreach and technical assistance conducted by external partners without State financial support

Planned Work to Enhance Social Measures Reporting

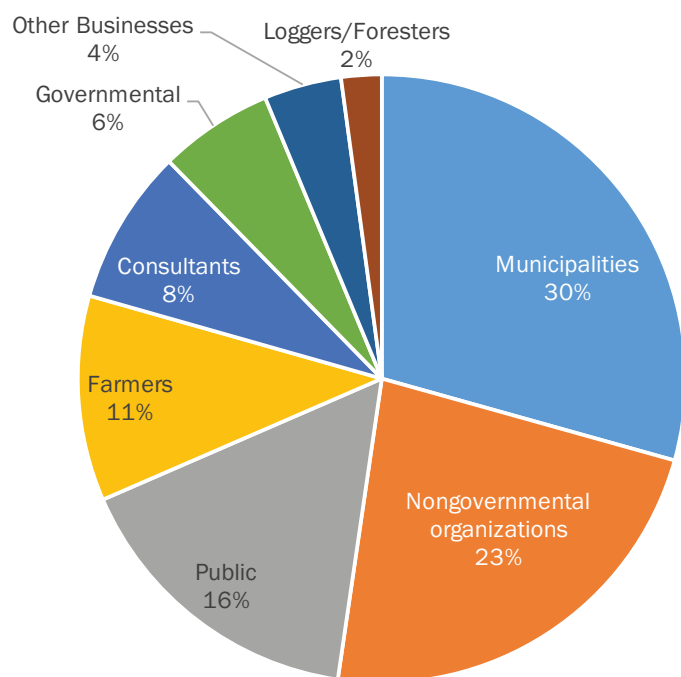
- This report establishes a baseline on the level of outreach and technical assistance effort for evaluating future actions and outcomes
- The State plans to pilot and adopt additional social measures to quantify the impact of outreach efforts in driving changes in knowledge and behavior, as well as increased implementation of clean water projects



SOCIAL MEASURE #1: EXTENT OF OUTREACH PROVIDED TO TARGET AUDIENCES

All sectors play an important role to improve clean water statewide, and the State’s goal is to educate all sectors on funding opportunities, new/changing regulations, and actions to improve water quality. Outreach efforts reported include workshops, trainings, and public/stakeholder meetings. Figure 1 demonstrates how the State’s outreach efforts target different sector-based audiences by the number of attendees. Most outreach activities targeted municipalities (30 percent), followed by non-governmental organizations (23 percent) including watershed groups, lake associations, and natural resource conservation districts, the public (16 percent), and farmers (11 percent).

Figure 1. Target audiences reached through the State’s clean water outreach efforts based on number of attendees



One of the State’s water quality priorities is to support municipalities and farmers in addressing stormwater, wastewater, and agricultural sources of nutrients, which is why outreach to these audiences is so important. In addition, nongovernmental organizations, such as watershed groups, play a very important role working with landowners and securing funds to implement priority clean water projects, so it is important for the State to reach these groups in its outreach. Finally, it is important to keep the public engaged for broader support of the State’s clean water efforts. In 2016, the State held a series of meetings to collect stakeholder and public input on long term funding and financing of statewide clean water improvements.

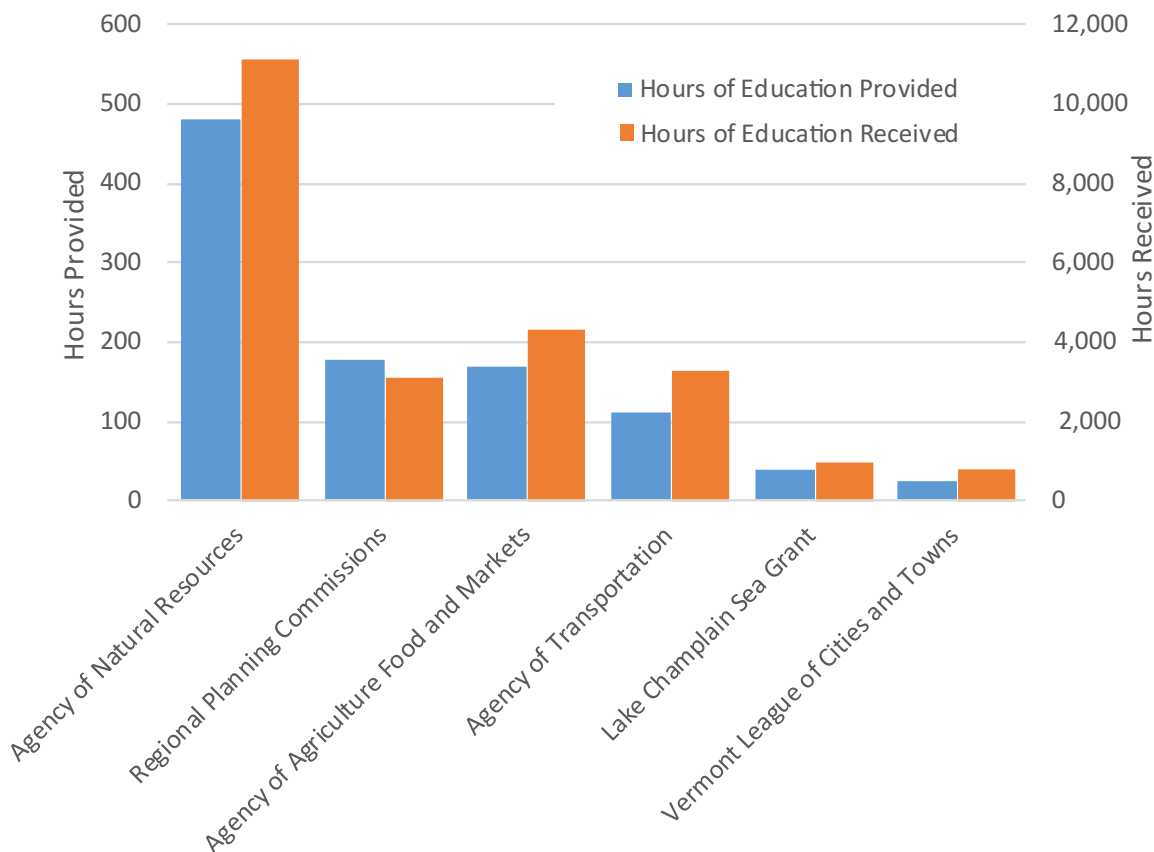
SOCIAL MEASURE #2: HOURS OF EDUCATION PROVIDED AND RECEIVED

To better quantify the extent of State clean water outreach, the State is tracking the hours of outreach provided and received through workshops, trainings, and public/stakeholder meetings. Total hours of outreach provided represent the total duration of all outreach events held. Total hours of outreach received by attendees represent the hours of outreach multiplied by the number of attendees per event.

The 399 outreach events reported in 2016 reached 8,932 attendees and provided 839 hours of education/instruction on clean water. Collectively, attendees of these outreach events received 20,754 hours of education or instruction. Figure 2 shows the total hours of education provided to attendees and received by attendees in 2016, by State agency staff or partners that conducted outreach with State funding. Please note that State agencies and partners often collaborate to provide outreach. Some overlap exists in outreach hours reported for individual agencies and partners where collaboration occurred in 2016.

Social Measures

Figure 2. Total hours of education provided by organization (blue bars, left axis), and hours of education received by attendees (orange bars, right axis); hours of education received represent the hours of outreach multiplied by the number of attendees per event



SOCIAL MEASURE #3: LEVEL OF TECHNICAL ASSISTANCE PROVIDED

In addition to outreach, State agencies and partners are providing targeted technical assistance to advise and support municipalities, farmers, loggers/foresters, and other land owners/managers in taking clean water actions. Technical assistance plays a critical role in advancing the State’s clean water goals in the most targeted and cost effective manner. Due to the range and variety of technical assistance provided by State agencies, the level of technical assistance is summarized by agency using varying measures, described in the following sections.

Agency of Agriculture, Food and Markets Technical Assistance

Agency of Agriculture, Food and Markets (AAFM) provides regulatory and non-regulatory technical assistance to agricultural operations to support the implementation of best management practices on farms. AAFM tracks their assistance by the number and nature of farm visits conducted. Farm visits were conducted on small, medium, and large farm operations, and are categorized as follows:

- **Technical assistance** farm visits to discuss programs such as the Best Management Practices (BMP) program and the Conservation Reserve Enhancement Program



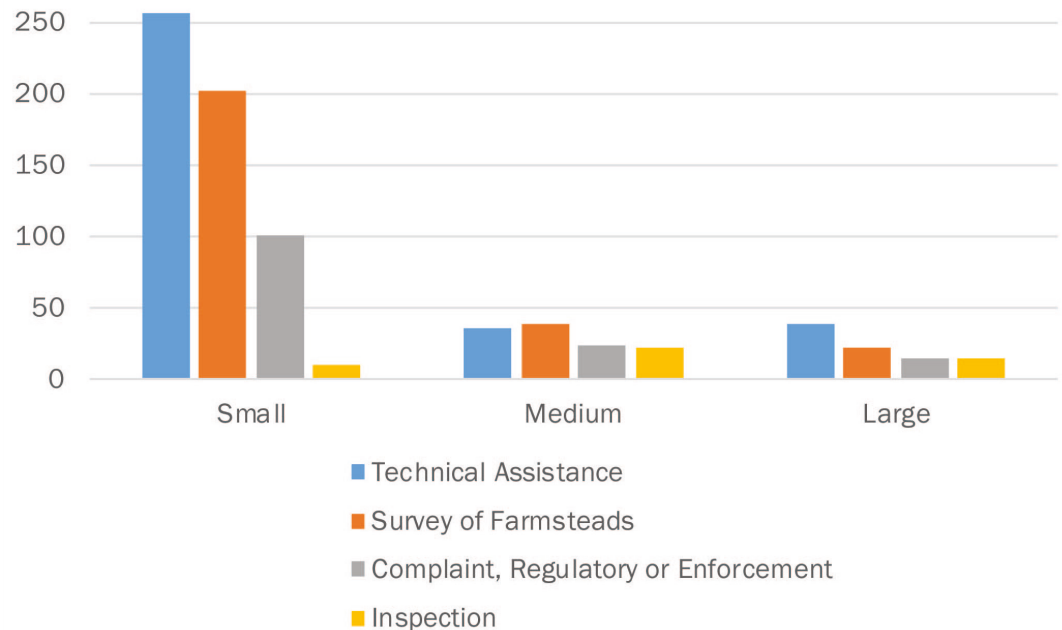
(CREP), which are programs provided by the Agency to help farms implement conservation practices that protect water quality.

- **Routine inspection** farm visits to ensure compliance with RAPs and the General Permit for the Medium Farm Operations (MFO) and Large Farm Operations (LFO) Rule and individual LFO Permits. Inspections occur at least every year for LFOs and every three years for MFOs. Certified small farm operations (SFOs) will also be inspected at least once every seven years under the revised RAPs (effective December 5, 2016).
- **Complaint, regulatory, or enforcement** driven farm visits to investigate potential water quality issues on farms. If water quality issues are found, AAFM conducts follow-up visits to ensure farms are brought into compliance with RAPs and other water quality regulations. These visits may involve delivery of enforcement actions to farms when necessary.

- **Surveys** of individual farmsteads used to house livestock were conducted in the Missisquoi and St. Albans Bay watersheds to help quantify the scope of water quality impacts from agriculture on Lake Champlain. The goal was to provide all farms with a one-on-one visit to help them understand how the water quality rules apply to their farm and to ensure that all farms are aware of management practices that help improve water quality.

In 2016, 14 AAFM Staff conducted 780 farm visits. The majority (78 percent) of farm visits occurred on SFOs, with the remaining 22 percent targeting MFOs and LFOs. Figure 3 shows the number and nature of the farm visits conducted on SFOs, MFOs, and LFOs. Of the total farm visits conducted, 45 percent were intended to provide technical assistance, followed by 35 percent to survey farmsteads, 18 percent were complaint, regulatory, or enforcement driven, and 2 percent were inspections.

Figure 3. Number and type of farm visits conducted by AAFM at small, medium, and large farm operations in 2016



Social Measures

Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division Technical Assistance

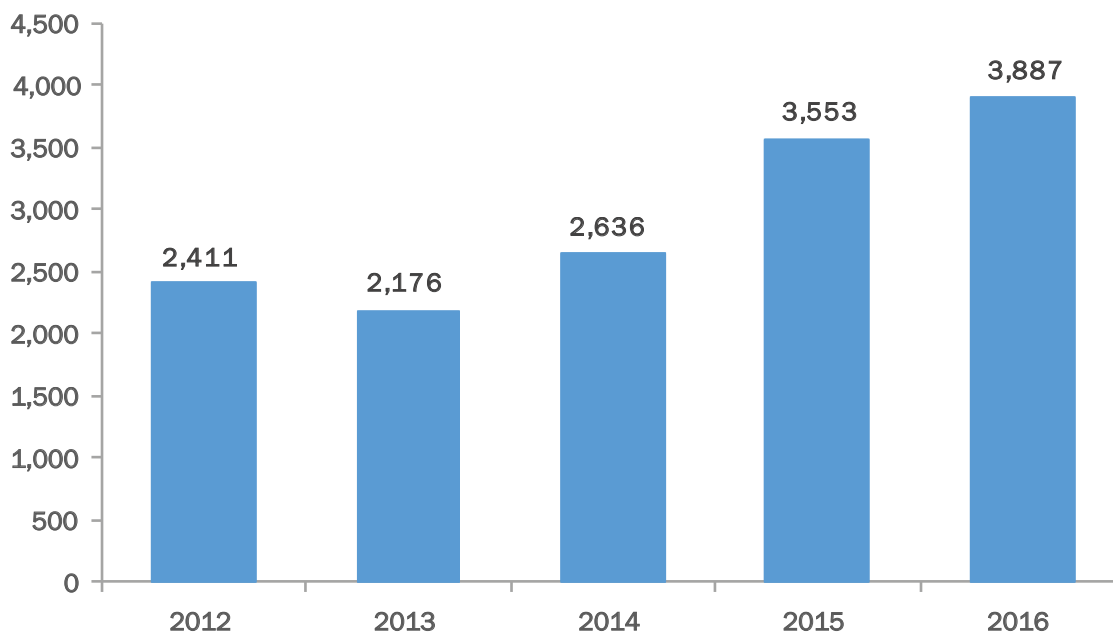
The Department of Environmental Conservation (DEC) Watershed Management Division (WSMD) provides technical assistance to municipalities, landowners, developers, and partner organizations (e.g., lake and watershed associations). Technical assistance activities are intended to ensure regulatory and non-regulatory projects support water quality improvements, and to minimize water quality impacts of land use activities. Technical assistance activities take many forms, including site visits, inspections, and project review. These activities are advisory or collaborative to support local partners in the design and implementation of projects, or regulatory to ensure permit compliance.

The WSMD has been tracking its technical assistance efforts since 2012 as part of the State's Results Based Accountability initiative.

Figure 4 shows the number of projects that WSMD Staff provided technical assistance on from 2012 to 2016. In 2016 the WSMD reviewed 3,887 projects. Project review involves determinations if permits are required, review of permit applications and renewals, municipal and partner project support, bylaw reviews, illicit discharge detection and elimination efforts, and grant application review. Technical assistance in the form of project review is critical to ensure projects are designed, implemented, and maintained in a cost effective manner.

Vermont also relies on tactical basin planning to identify the highest-priority opportunities for pollution load reductions in surface waters. The process involves coordinating watershed assessments and planning to identify and prioritize cost-effective pollution load and erosion controls. The process then involves targeting support – educational, technical and financial assistance – to implement these controls.

Figure 4. Number of projects reviewed by ANR-DEC WSMD Staff 2012 - 2016





Agency of Natural Resources, Department of Forests, Parks, and Recreation Acceptable Management Practices Technical Assistance

The Acceptable Management Practices (AMPs) for Maintaining Water Quality on Logging Jobs in Vermont are intended to prevent discharges of sediment from soil erosion and other water pollutants associated with logging from entering Vermont's waterways. The Vermont Department of Forests, Parks and Recreation (FPR) provides AMP training and technical assistance to logging contractors, landowners, and foresters to help them comply with the AMPs.

In 2015, FPR foresters provided AMP technical assistance on 48 logging operations as part of the AMP Monitoring Program.³ Of those cases, 32 logging operations had no evidence of discharge. Sixteen logging operations that were inspected revealed evidence of minor discharges of sediment into waterbodies. Remedial actions were prescribed by the FPR forester and immediately implemented by the logger to stop any on-going discharge.

FPR also provides AMP technical assistance to landowners enrolled in the Use Value Appraisal (UVA) Program during site inspections to ensure compliance with AMPs. In calendar year 2015, FPR visited 630 UVA-enrolled properties of the 1,450 properties due for inspection. UVA Program inspections covered 630 parcels spanning 107,534 acres of private forest lands. Through county foresters, FPR provided technical assistance on AMPs during an estimated 20 percent of UVA inspections, which includes, but is not limited to those areas where

³ Given the timeline of this report, calendar year 2016 data are not yet available. FPR annual statewide summary reports are available here: http://fpr.vermont.gov/forest/vermonts_forests/amps.

there is found to be risk of erosion. Within the Lake Champlain basin, during landowner visits and inspections for the Use Value Appraisal program, county foresters delivered information on financial and technical resources available to address water quality issues under the Lake Champlain Regional Conservation Partnership Program (RCPP). Landowners were provided information based on the conditions of forest roads and stream crossings and likelihood of eligibility for the RCPP program. An estimated 5-10 percent of landowners visited in the basin received this information. FPR is currently modifying how county foresters document technical assistance, which will allow for more accurate reporting for the 2017 calendar year.



Training on skidder bridges, used to prevent erosion at stream crossings on logging jobs

Agency of Natural Resources, Department of Forests, Parks, and Recreation Urban and Community Forestry Technical Assistance

FPR also provides technical assistance through its Urban and Community Forestry Program. This program is designed to help communities build capacity to plan, plant, and care for their community trees in and around developed areas, focusing on areas along streets and town-owned forests, village greens, schools and other community green spaces. Incorporating and maintaining trees in developed areas provide

Social Measures

multiple community benefits, including aesthetic and socioeconomic values, habitat function, and water quality improvement through reducing stormwater runoff. In 2016, the Urban and Community Forestry Program provided technical assistance to 94 communities and recorded 15,800 volunteer service hours.

Agency of Transportation Technical Assistance

Agency of Transportation (VTrans) staff provide technical assistance to towns in reducing road erosion and runoff. Technical assistance is often delivered in the form of site visits. During site visits, VTrans works with the towns to review proposed projects and recommend cost effective fixes to address road erosion and runoff driven issues. During site visits, VTrans staff work with municipalities to ensure road erosion control practices are constructed and function as intended, and are properly maintained over time. In 2016, VTrans Better Roads Program staff conducted 78 site visits with 54 towns to assist in grant application development, discuss project plans and recommendations, inspect newly constructed projects, and verify that prior projects have been maintained. While not quantified in 2016, District, Hydraulics, and Vermont Local Roads staff also provided technical assistance to towns. VTrans plans to capture the results of these technical assistance activities in future years.



VTrans and DEC staff visiting a rock-lined and planted ditch, during a site visit

3. Investment Measures



Restoring Vermont’s clean water will require investments at the state, federal, town, and private-level. State investments are channeled through grant, loan, and assistance programs to strategically and cost-effectively restore and safeguard the State’s rivers, streams, lakes, ponds, and wetlands. These funds are used to conduct assessments to help identify and prioritize projects, as well as to design and implement projects. This work helps municipalities, farmers, and other landowners comply with regulation, and encourages voluntary actions necessary to address runoff from unregulated sources.



Bioretention basin infiltrating stormwater runoff

To keep pace with the high demand for clean water funding, the State is working to establish additional revenue sources to close funding gaps. In June 2015, the State established its first Clean Water Fund as part of the Vermont Clean Water Act (2015 Act 64). The Fund’s current short term and sole revenue source is a property transfer surcharge in effect from June 2015 through June 2018, generating approximately \$5 million in revenue per year. As the Fund ramps up, State agencies were allocated \$2 million in 2016 and \$7.6 million in 2017 from the Fund. State agencies award these funds, along with dollars from the Capital, General, Transportation, and Watershed Grant Funds to projects.

Pursuant to Act 64, the Office of the State Treasurer, in consultation with State agencies, is evaluating strategies to further close the clean water funding gap. State agencies worked with the Office of the State Treasurer throughout 2016 to evaluate and recommend cost effective and equitable long term funding solutions for clean water. Policies that can reduce costs are also being considered and advanced. Long term funding recommendations will be presented in a legislative report, anticipated to be released in January 2017. Information about this report can be found at: <http://dec.vermont.gov/watershed/cwi/cwf/future>.

State only clean water investments made in 2016 are summarized through the following measures:

1. State investments by agency and funding program
2. State investments by sector and funding recipient category
3. Geographic distribution of investments by watershed and county

CURRENT AND FUTURE INVESTMENT MEASURES

Scope of Investment Measures Reported

- State investments in clean water projects awarded in SFY2016 through State funding programs as grants, contracts, and loans

Beyond the Scope of Investment Measures Reported

- Federal investments in water quality improvement projects through other funding programs
- Local/municipal and private investments to comply with clean water related regulations

Planned Work to Enhance Investment Reporting

- This report establishes a baseline on the level of State investment in clean water for evaluating future investments
- In future years, State investments may be evaluated relative to the estimated annual funding need based on the Clean Water Funding legislative report

Investment Measures

INVESTMENT MEASURE #1: FUNDS AWARDED BY AGENCY AND FUNDING PROGRAM

For the first time, this report summarizes total investments made in clean water by the State of Vermont across agencies. These investment measures illustrate how the State invested in clean water in 2016 by agency, funding program, and the types of investments made including grants and contracts, loans, and short term operational funding to build capacity. These investment data are based on dollars awarded to projects through the various State agency funding programs. The scope of funding programs reported are summarized in Table 1 by agency.

In 2016, the State of Vermont invested more than \$11 million to support clean water restoration activities across four agencies. Investments in clean water by agency and funding source are shown in Figure 5. The nature of how these funds were awarded (i.e., grants and contracts, loans, and operational funds) is shown in Figure 6. Most of the funds (approximately \$8.5 million) were awarded through grants and contracts to address nonpoint source, stormwater, and erosion controls. Approximately \$2.3 million were provided as low-interest loans through the Clean Water State Revolving Fund (CWSRF) to municipalities for wastewater treatment facility (WWTF) upgrades and refurbishments and combined sewer overflow (CSO) elimination.

Table 1. Funding programs reported by agency

Agency	Funding Programs Reported
Agency of Agriculture, Food and Markets (AAFM)	Best Management Practice (BMP) Program
	Conservation Reserve Enhancement Program (CREP)
	Farm Agronomic Practice (FAP) Program
	Water Quality (WQ) Grants
	Clean Water Fund (CWF) Grants and Contracts
	CWF Operational Funds
Agency of Commerce and Community Development (ACCD)	Vermont Center for Geographic Information
	Ecosystem Restoration Grants Program
Agency of Natural Resource (ANR)	Watershed Grants Program
	Clean Water State Revolving Fund Loan Program
Agency of Transportation (VTrans)	Better Roads Grant Program
	Transportation Alternatives Program (TAP)



Figure 5. Total State funds awarded in 2016 to clean water projects, by agency and fund⁴

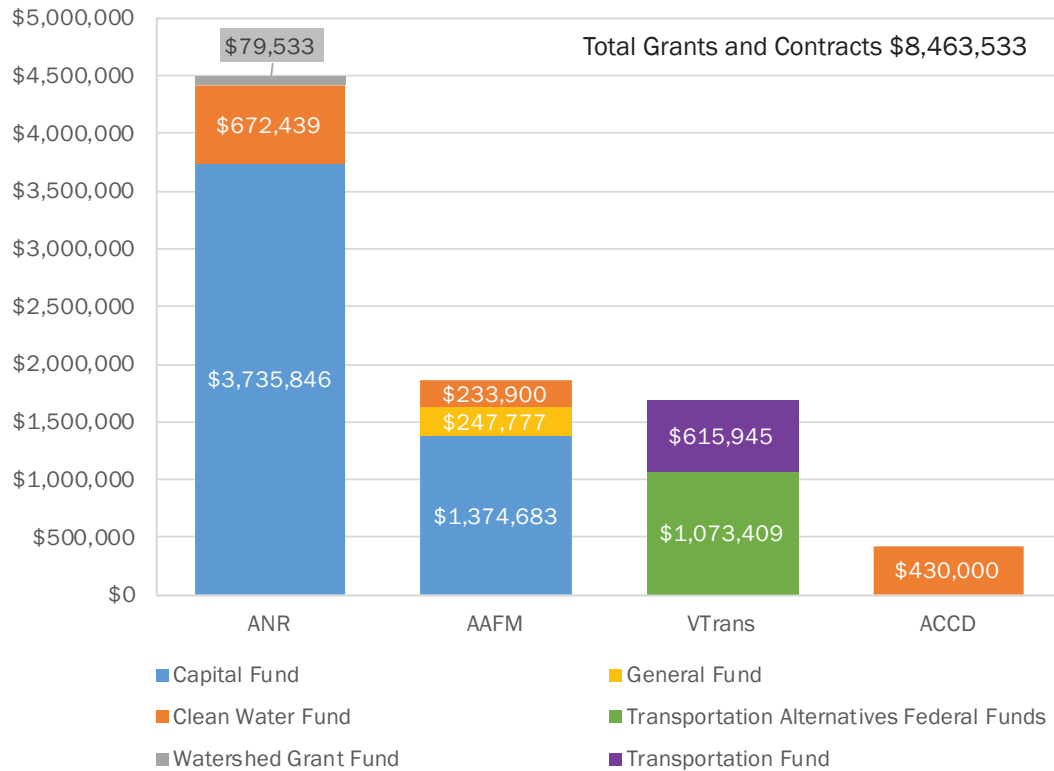
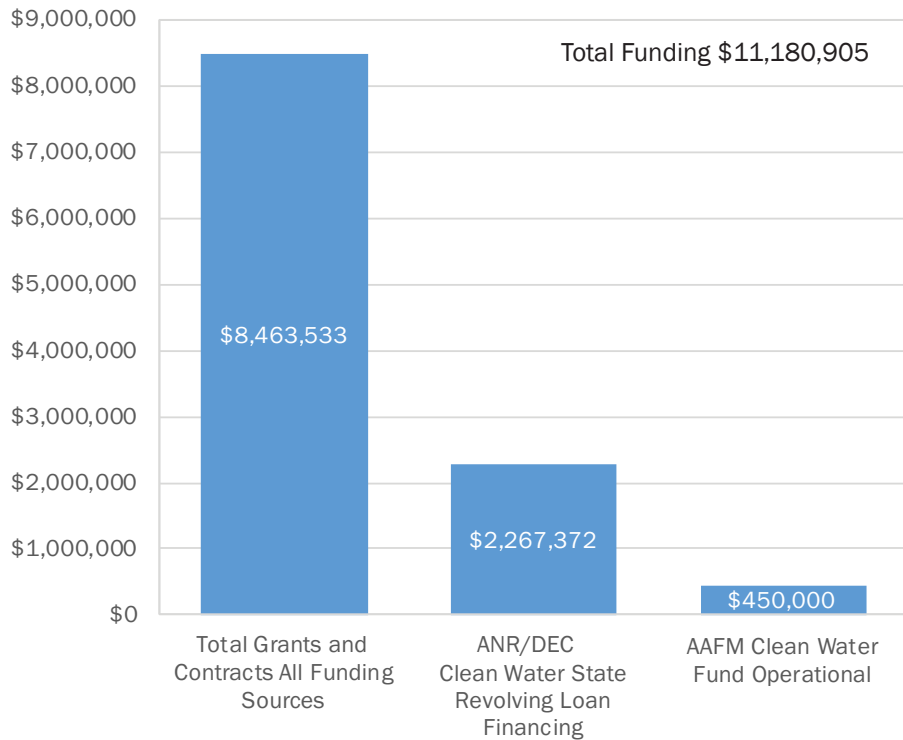


Figure 6. Total State funds awarded in 2016 through grants and contracts and loans, as well as short term operational funding for capacity building



4 VTrans Transportation Alternatives federal funds were allocated through the State legislature specifically for stormwater mitigation projects in 2016.

Investment Measures

Of the total funds invested, approximately \$1.8 million are from Vermont’s new Clean Water Fund. These dollars are allocated by the Clean Water Fund Board to State agencies at the program-level, and agencies were authorized to award these funds to projects in March 2016. Clean Water Fund dollars were awarded to projects competitively through existing funding programs as grants and contracts.

In addition to grants and contracts, the Clean Water Fund provides \$450,000 to AAFM per year over 2016-2017 in short term operational funds. The purpose of these funds is to build the agency’s capacity for increased on-farm oversight to enforce water quality regulatory requirements. This ensures greater compliance with the State’s RAPs and other water quality regulations.

Clean water investments were made through a variety of funding programs within each State agency in the form of grants, contracts, and loans. State investments are summarized by funding program for AAFM (Figure 7), ANR (Figure 8), and VTrans (Figure 9).

Figure 7. AAFM clean water investments by funding program (categories, abbreviated below, are defined in Table 1)

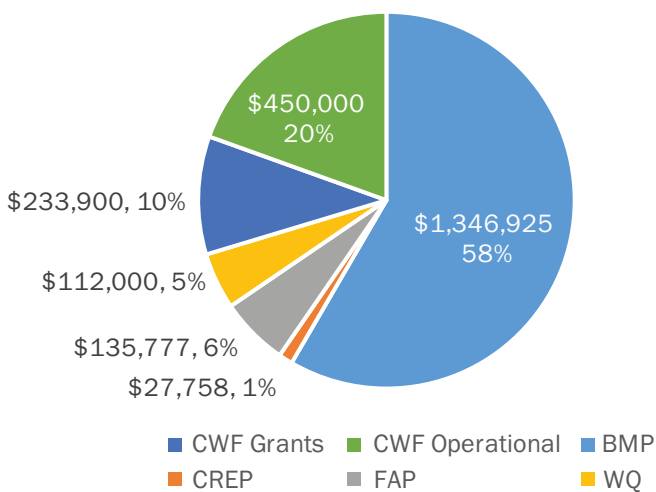


Figure 8. ANR clean water investments by funding program

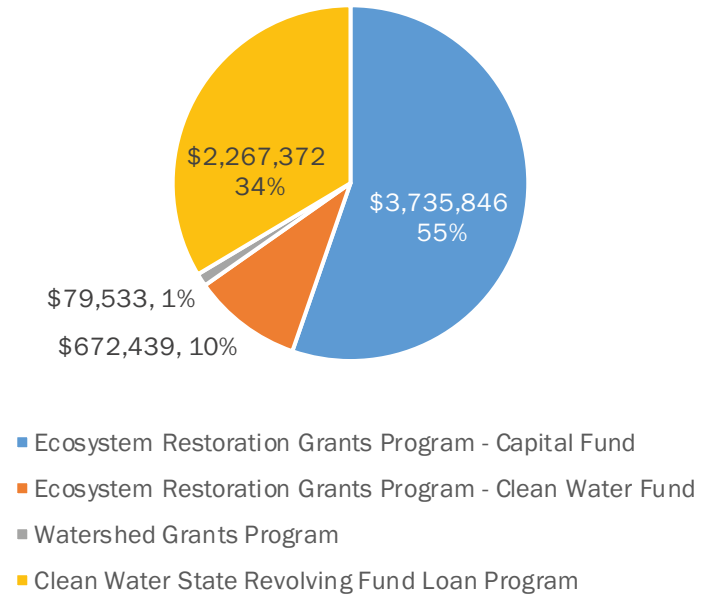
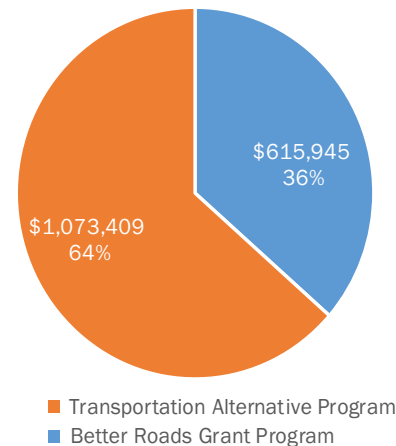


Figure 9. VTrans clean water investments by funding program



Of the VTrans funds awarded, over \$1.5 million (91 percent) will support implementation of road/transportation-related erosion control and stormwater mitigation projects, with the remaining 9 percent awarded to support the completion of road erosion control inventories.

The clean water investments reported here are limited to State funds and only represent a portion of the total clean water investments made in Vermont. In addition to State funding, federal, local, and private partners play a key role investing in Vermont’s clean water



improvements. ACCD's \$430,000 investment to enhance the State's LiDAR mapping served as match to a federal grant with U.S. Geological Survey. LiDAR mapping is used in planning and assessment activities across sectors to identify and prioritize clean water projects. In addition, VTrans Better Roads and Transportation Alternatives program-funded projects required 20 percent local match, which together leveraged almost \$423,000 in local dollars. AAFM's clean water investments in 2016 were complemented by over \$11 million in federal funds from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). ANR's Ecosystem Restoration Grant Program incentivized local match and required 50 percent match on municipal stormwater permit projects.

INVESTMENT MEASURE #2: FUNDS AWARDED BY SECTOR AND RECIPIENT CATEGORY

Providing clean water for Vermonters and visitors to use and enjoy is a shared responsibility. Reaching clean water goals to reduce nutrient pollution from precipitation driven runoff and erosion, as well as wastewater and stormwater infrastructure requires an all-in approach. Mirroring this need, the State invests in clean water projects across sectors through grants, contracts, and loans, targeting funds to the greatest water quality needs.

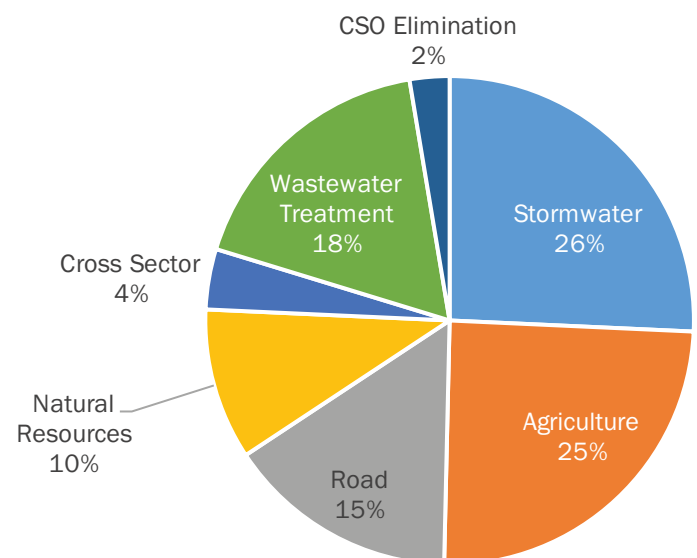
Figure 10 summarizes the proportion of State investments in clean water by sector and Figure 11 summarizes dollars invested by sector and by grants and contracts and loans. To summarize the types of entities that benefited from these investments, Figure 12 shows the proportion of State investments by grant, contract, and loan recipient category.

In 2016, most (41 percent) of the State's investments were made to address stormwater on roads (15 percent) and other hard surfaces

(26 percent), followed by 25 percent of the funds invested in agriculture. Approximately 20 percent of funds were invested through loans to address municipal wastewater infrastructure upgrades and refurbishments (18 percent) and to eliminate combined sewer overflows (CSOs) (2 percent). Approximately 10 percent of funds were invested in natural resources restoration projects, addressing river and floodplain, lake shoreland, wetland, and forest restoration. Finally, 4 percent of funds were invested across sectors through LiDAR mapping to enhance planning and assessment efforts and to identify high priority projects.

These investment data were evaluated based on the types of entities receiving grants, contracts, and loans (Figure 12). In 2016, the majority (55 percent) of funds were awarded to municipalities with 34 percent through grants and contracts and the remaining 21 percent through loans. Farmers received 15 percent of clean water funds.

Figure 10. Proportion of State investments by sector (natural resources include rivers, lakes, wetlands, and forests)



Investment Measures

Figure 11. Dollars of State investments by sector showing grants and contracts in orange and loans in blue (natural resources include rivers, lakes, wetlands, and forests)

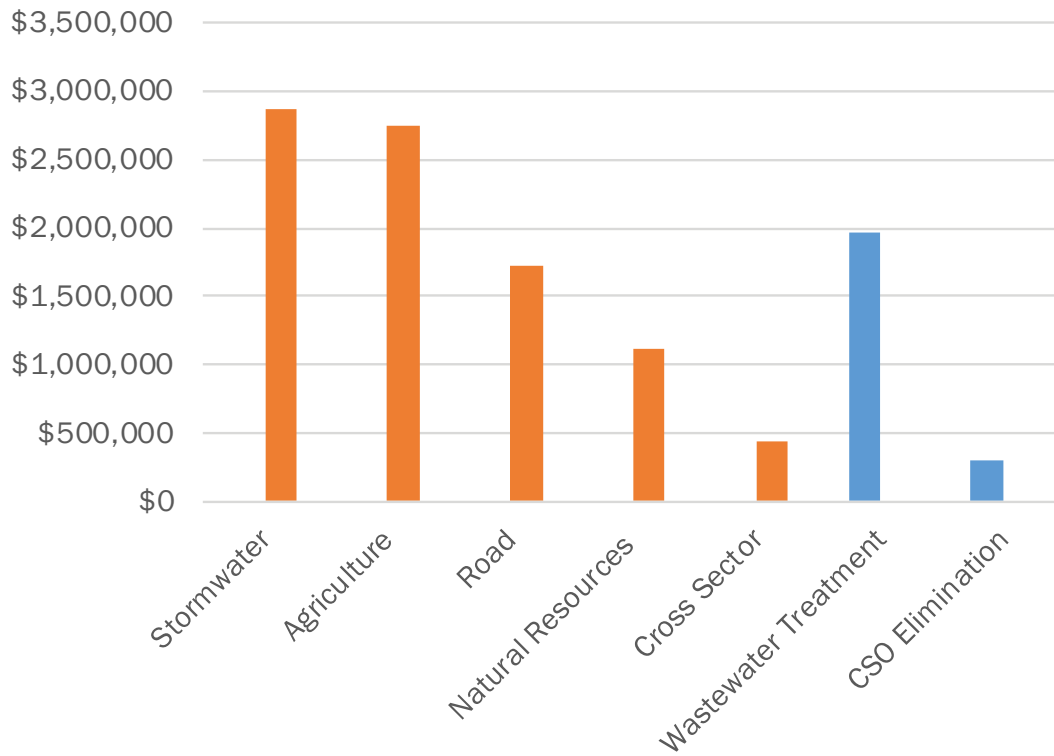
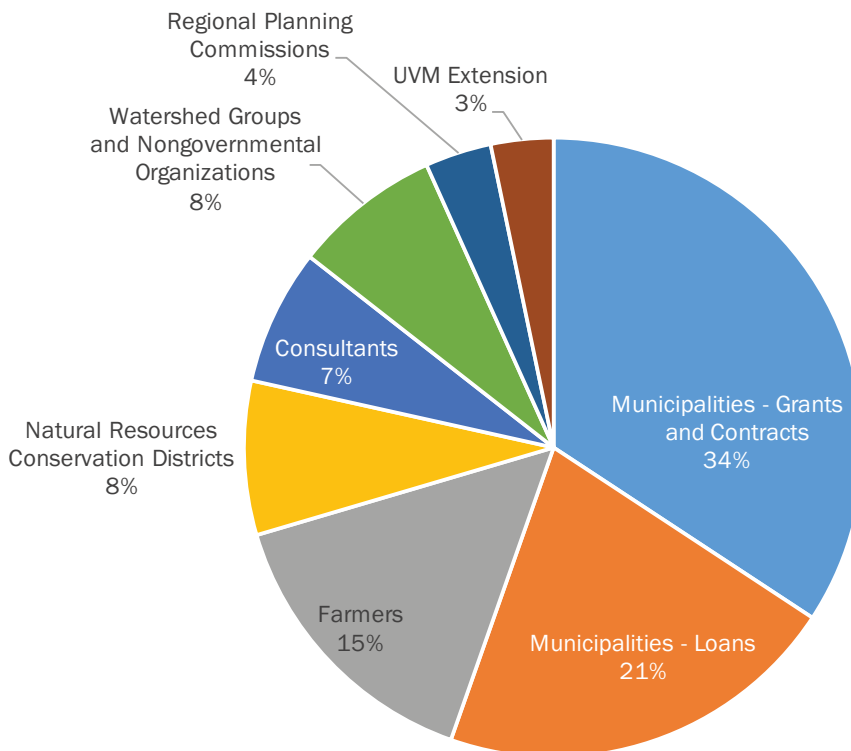


Figure 12. Proportion of State investments by grant, contract, and loan recipient category (excludes AAFM Clean Water Fund operational funding)





INVESTMENT MEASURE #3: GEOGRAPHIC DISTRIBUTION OF FUNDS INVESTED

Each section of the State has local clean water priorities to address. Vermonters want to know how the State is investing to benefit their local waters. Acknowledging this, State funding programs aim to address clean water priorities by investing in clean water statewide. Figure 14 shows the geographic distribution of state funds invested in clean water restoration activities by watershed. Figure 15 shows the geographic distribution of state funds invested in clean water restoration activities by county.

Investments in regional projects, spanning larger basins or multiple counties, were distributed evenly to the applicable watersheds and counties for presentation purposes.

In 2016, each of Vermont's 17 major river basins and 14 counties benefited from the State's investments in local, regional, and statewide clean water projects. As shown in Figure 13, approximately 54 percent (\$6,049,796) of investments occurred in the Lake Champlain basin, followed by 31 percent (\$3,460,568) in the Connecticut River basin, 6 percent (\$677,757) in the Lake Memphremagog basin, 1 percent (\$87,283) in the Batten Kill-Walloomsac-Hoosic River basin (drains to the Hudson River), and 8 percent (\$905,500) in statewide projects.

Figure 13. State clean water investments by basin

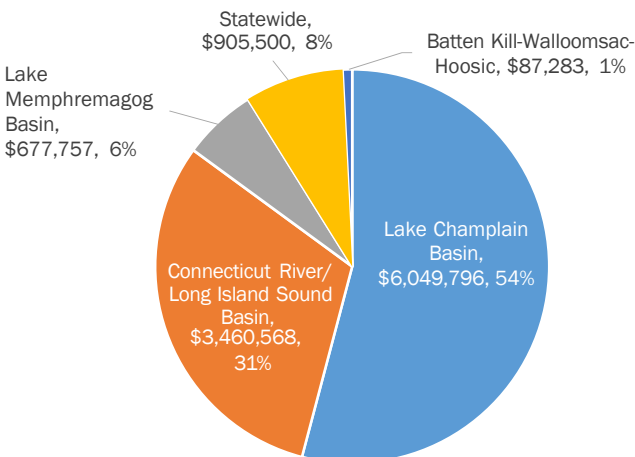


Figure 14. Map of State funds awarded through grants and contracts for clean water restoration activities by watershed

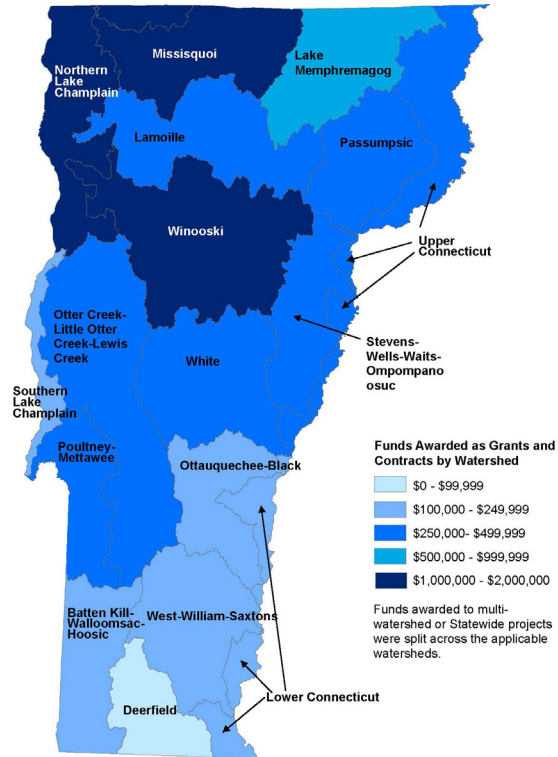
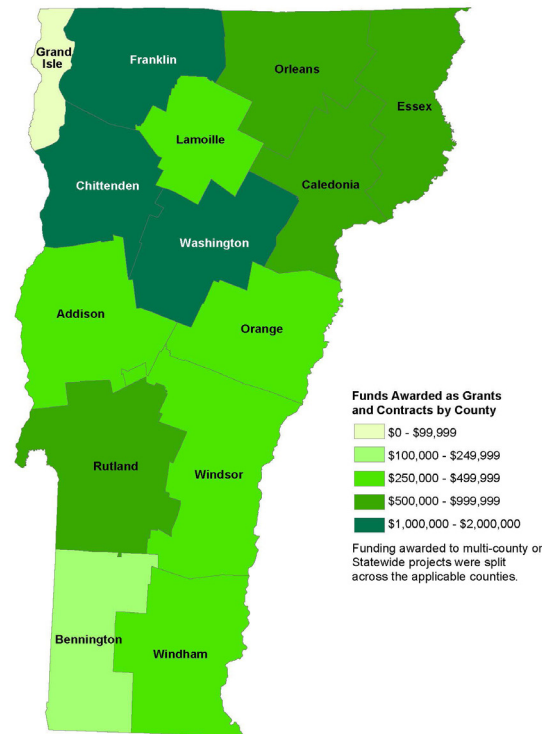


Figure 15. Map of State funds awarded through grants and contracts for clean water restoration activities by county



4. Project Output Measures

This report attempts to quantify accomplishments of clean water projects completed in 2016 by measuring and summarizing project outputs.⁵ To summarize project outputs, the State has developed standard project “performance” measures for each type of clean water project. These measures are tracked project-by-project, but are summarized by project-type for reporting purposes.

Measures of project outputs represent an important step toward evaluating the cost effectiveness of the State’s clean water investments over time.

Measures of project outputs represent an important step toward evaluating the cost effectiveness of the State’s clean water investments over time, and a major improvement in the State’s accountability for clean water investments in projects.

Project outputs completed in 2016 are summarized through the following categories of measures, organized by project stage:

1. Results of assessment and planning projects
2. Results of design projects
3. Results of implementation projects

⁵ Work completed in the reporting period of State Fiscal Year 2016 includes funding agreements with end dates falling between July 1, 2015 and June 30, 2016.

CURRENT AND FUTURE PROJECT OUTPUT MEASURES

Scope of Project Output Measures Reported

- Project outputs summarized by project type for projects with funding agreements closed out within SFY2016, addressing results of assessment, planning, design, and implementation projects

Beyond the Scope of Project Output Measures Reported

- Project outputs of federally, locally, or privately-funded projects
- Project outputs of work completed to comply with water quality regulations without State funding

Planned Work to Enhance Investment Reporting

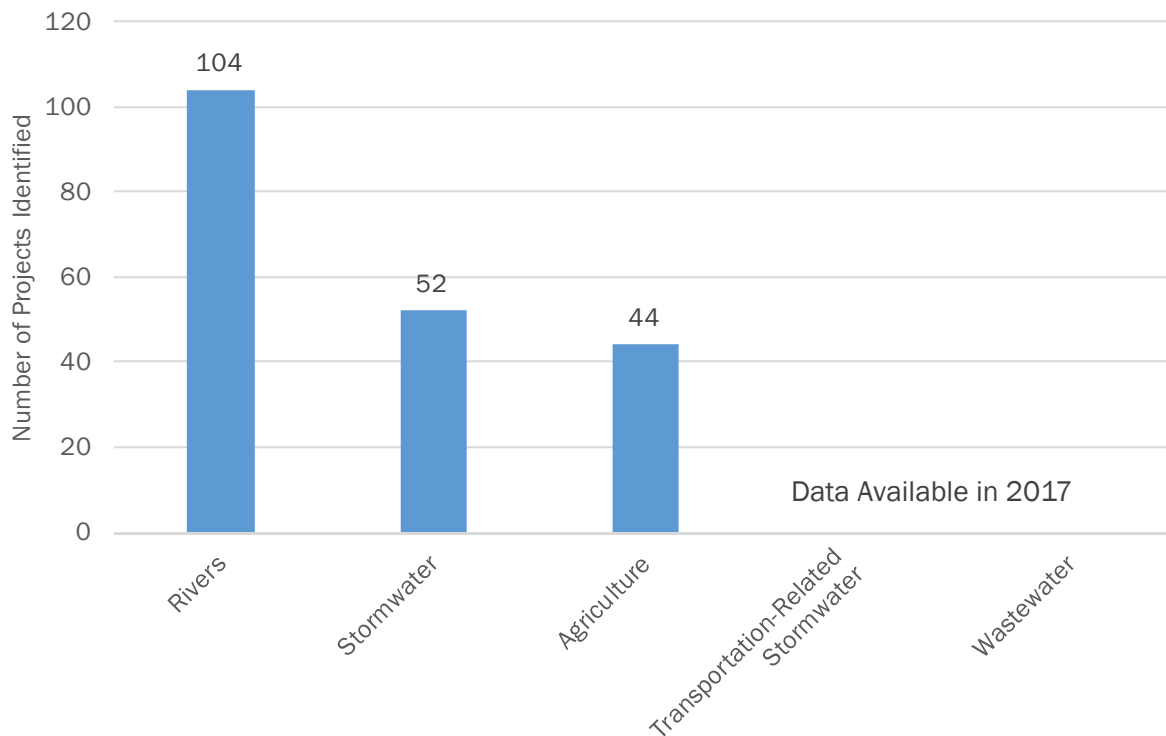
- This report establishes a baseline on the level of project outputs achieved that will be used to evaluate future actions
- In this first year of reporting, data on project outputs were not available for all projects completed as project tracking improvements are being implemented (e.g., road erosion control inventories and road erosion control projects completed with VTrans funding)
- Each State agency has enhanced its capacity to track these project output data and reporting in future years will be more comprehensive

PROJECT OUTPUT MEASURES #1: RESULTS OF ASSESSMENT AND PLANNING PROJECTS

Assessment and planning work plays an important role in identifying and prioritizing projects to improve clean water. These activities apply across multiple sectors, including stormwater, rivers/streams, roads, and wastewater treatment. Results of state-funded planning and assessment projects completed in 2016 are summarized in the following sections by sector. To summarize the results of all assessment and planning activities across sectors, Figure 16 shows the number of priority projects identified in 2016. Priority projects are projects ranked as high priority for future design and implementation through various assessment and planning methodologies.



Figure 16. Number of priority projects identified through assessment and planning work by sector in 2016



Stormwater Assessments and Planning

In 2016, stormwater mapping work funded by the State, covered 4,300 acres. Stormwater mapping is conducted to map stormwater infrastructure to inform (1) stormwater master planning efforts, which identify and prioritize projects to address stormwater runoff, and (2) illicit discharge detection and elimination (IDDE) work to identify and address unauthorized/illegal discharges of sewage or other chemicals into surface waters.

In 2016, State-funded stormwater master planning efforts covered 8,541 acres and identified 52 priority projects. In addition, State-funded IDDE studies identified and confirmed 40 unauthorized/illegal discharges of sewage or other chemicals into surface waters that are required to be addressed by the responsible municipality or landowner. Table 2 summarizes stormwater assessment and planning project results.

Table 2. Summary of stormwater assessment and planning project outputs achieved in 2016

Project Output Measure	Value
Acres of stormwater infrastructure mapped	4,300
Acres covered by stormwater master plans	8,541
Number of priority stormwater projects identified	52
Number of unauthorized/illegal discharges confirmed to be eliminated	40

Stream Assessments and Planning

In 2016, ten State-funded river/stream-related assessments and plans were completed, including Phase 1 and 2 Stream Geomorphic Assessments (SGA), river corridor plans, and scoping work to prepare river corridor easements. Phase 1 SGAs involve an initial review of stream condition at the watershed scale, and identify where stream condition may be causing erosion and contributing to

Project Output Measures

nutrient pollution. Phase 2 SGAs follow-up on Phase 1 SGAs with field-based assessments to determine potential management needs and strategies to improve stream condition. Phase 2 SGAs may identify projects to restore streams and floodplains, or to protect priority sections through river corridor easements. Finally, River Corridor Plans, created after Phase 2 SGAs, compile all data and information collected about the watershed and prioritize project strategies.

In 2016, State-funded projects resulted in the assessment of 44 stream miles through SGAs, and 69 stream miles were covered by river corridor plans. These assessment and planning activities resulted in the identification of 104 priority river and floodplain restoration projects. In addition, 181 acres were scoped to prepare river corridor easements that protect the natural nutrient attenuation and habitat function of floodplains in perpetuity. Table 3 summarizes stream/river assessment and planning project results.

Table 3. Summary of stream assessment and river planning project outputs achieved in 2016

Project Output Measure	Value
Stream miles assessed through Stream Geomorphic Assessments	44
Stream miles covered by River Corridor Plans	69
Number of priority river and floodplain projects identified	104
Acres scoped to prepare river corridor easements	181

Road Erosion Control Inventories

In 2016, road erosion control inventories were completed by 12 towns. Inventories assist towns in developing capital budgets to fix road erosion problems that contribute sediment and nutrient pollution to the State's waterways. Towns that completed road erosion inventories in 2016 include Andover, Braintree, Cavendish,

Putney, Shrewsbury, St. Johnsbury, Stockbridge, Tunbridge, West Fairlee, Westmore, Wilmington, and Woodstock. Many more inventories will be completed in the coming years, as VTrans funded 38 road erosion inventories in 2016.

Beginning in 2019, under the new Municipal Roads General Permit (MRGP), each town will be required to complete road erosion control inventories. Inventories identify priority road segments contributing to water quality issues and specific project needs to address those issues. These inventories will serve as the basis for towns to develop implementation schedules to meet the MRGP and address erosion and runoff from roads into State waterways.

Agriculture Project Planning

Information gathered from AAFM's technical assistance efforts has led to significant project planning. AAFM has contracted some of this planning work, which resulted in prioritization of 26 farms for future planning, design, and implementation work in the Northern Lake Champlain basin. In addition, AAFM's Conservation Reserve Enhancement Program completed planning for eight new riparian corridor restoration projects. Finally, contractors completed work assisting agricultural landowners in identifying 10 priority projects and beginning the process to enroll in cost-share programs. Table 4 summarizes agriculture project planning results. These planning efforts will continue, and project implementation resulting from these planning efforts will be captured in future years.

Table 4. Summary of agriculture project planning outputs achieved in 2016

Project Output Measure	Value
Number of farms prioritized for future project work	26
Number of CREP riparian buffer projects planned	8
Number of priority projects assisted to enroll in cost share	10



PROJECT OUTPUT MEASURES #2: RESULTS OF DESIGN PROJECTS

Once priority projects are identified through assessments and planning activities, the next step is to develop designs (if necessary) for those projects. In 2016, 55 State-funded designs were completed. Of these designs, 26 reached 30 percent design-level, 7 reached 60 percent design-level, and 22 reached 100 percent design-level. In future years, partners may apply for additional funding to complete designs and implement these projects. Figure 17 shows the number and level of designs completed by sector.

PROJECT OUTPUT MEASURES #3: RESULTS OF IMPLEMENTATION PROJECTS

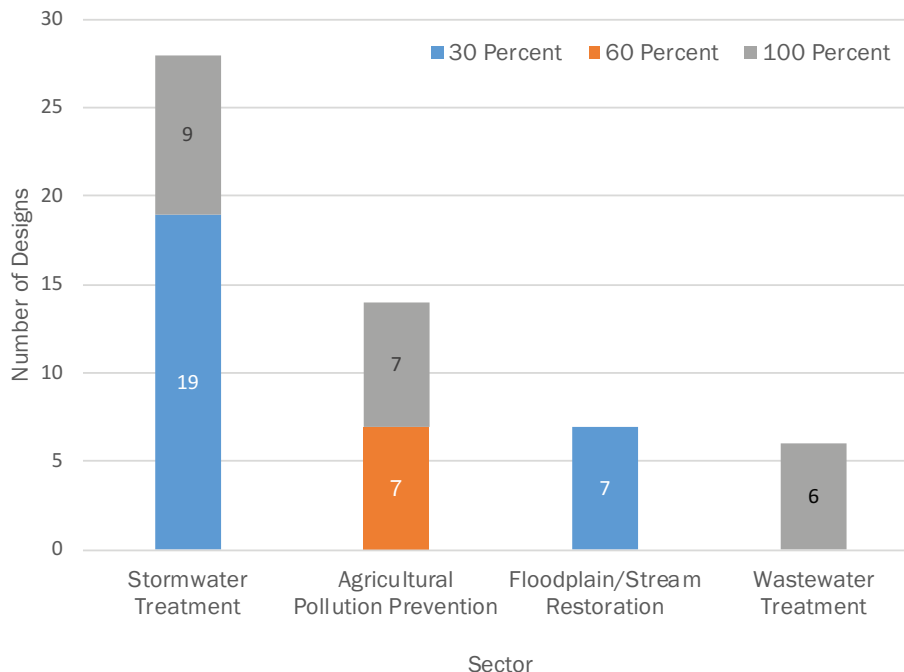
The goal of the State’s outreach, technical assistance, assessment, planning, and design efforts is to support the implementation of projects that reduce water pollution. In 2016, 210 State-funded implementation projects were completed; 107 addressed agricultural pollution

prevention, 71 addressed road erosion controls, 23 addressed natural resources restoration, three addressed stormwater treatment, and six addressed wastewater treatment and CSO elimination. Project outputs associated with each sector are summarized in the following sections.

Installation/Application of Agricultural Pollution Prevention Projects

Addressing agricultural water pollution issues is a high priority for the State of Vermont. In 2016, 107 State-funded agricultural pollution prevention projects were installed/applied. This includes practices implemented to address pollution runoff from barnyards, livestock heavy use areas, croplands, pasturelands, roads, and livestock trails/walkways. Project outputs associated with croplands and pasturelands are measured by acres of best management practices applied. Barnyard, roads, and livestock trail/walkway improvement project outputs are measured as a count of best management practices installed.

Figure 17. Number and level of designs completed for clean water projects in 2016 by sector



Project Output Measures

In 2016, field-based (i.e., cropland and pastureland) best management practices were applied/installed on 5,009 acres to reduce nutrient and sediment pollution. Figure 18 shows the number of acres of practices applied by practice type. Most of these practices were applied to croplands (i.e., corn and hay) to improve soil health and reduce soil erosion. Forested riparian buffers were installed primarily adjacent to pastureland (i.e., livestock grazing areas) to filter runoff transported from field to waterway, while also improving floodplain and habitat function.

In addition, 37 best management practices were installed to reduce polluted runoff from barnyards, agricultural roads, and livestock trails and walkways. However, these types of practices were not tracked by acres. These project outputs are summarized in Figure 19 as a count of the practices implemented by practice type.

It is important to note that the extent of implementation of agricultural best management practices, summarized here, is underreported. State funding programs have funding caps per practice type, and many farmers implemented practices on more acres, but only reported the acreage implemented with State funding. In addition, these data only reflect State-funded practices. The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) obligated over \$11 million in funding to Vermont landowners to implement agricultural best management practices in 2016.

In future years, implementation outputs will be more accurately reported thanks to the new agricultural partner's database. The database will capture work implemented through State and federal funding programs, along with some voluntary projects recorded by farm technical assistance providers.

Figure 18. Acres of agricultural best management practices applied/installed on cropland and pastureland in 2016 to reduce nutrient and sediment pollution, by practice type

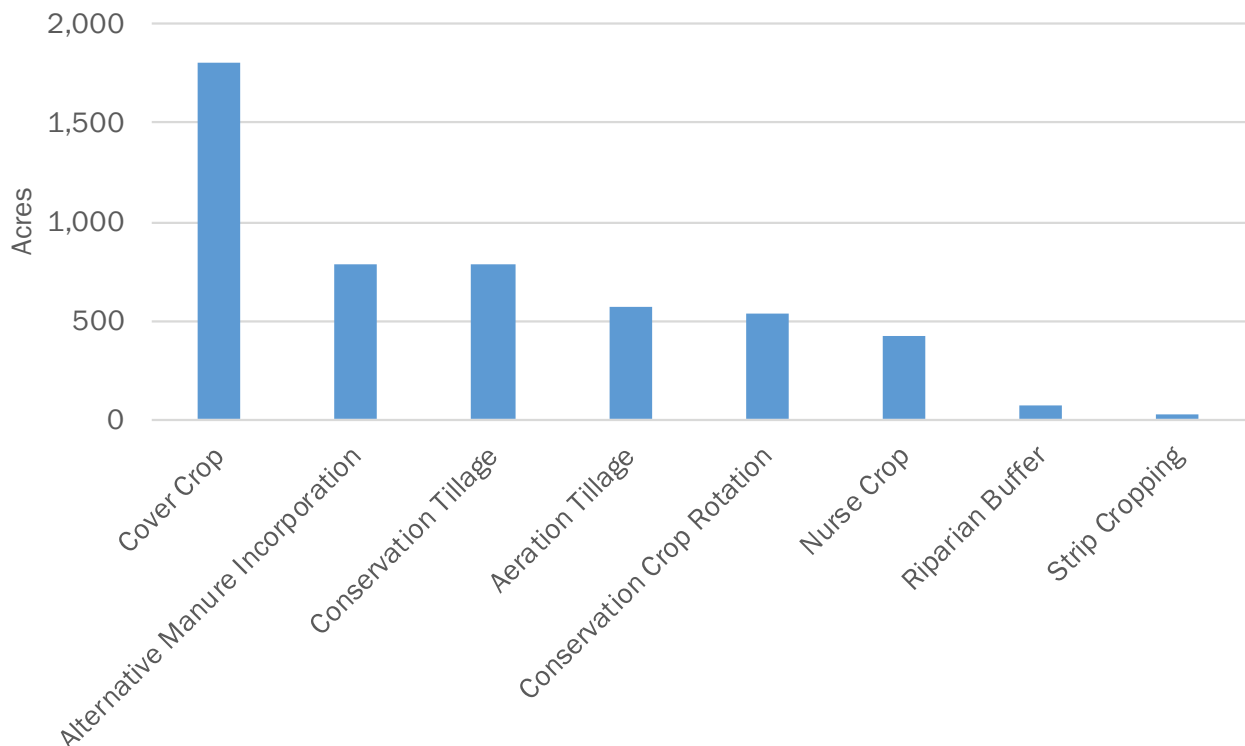
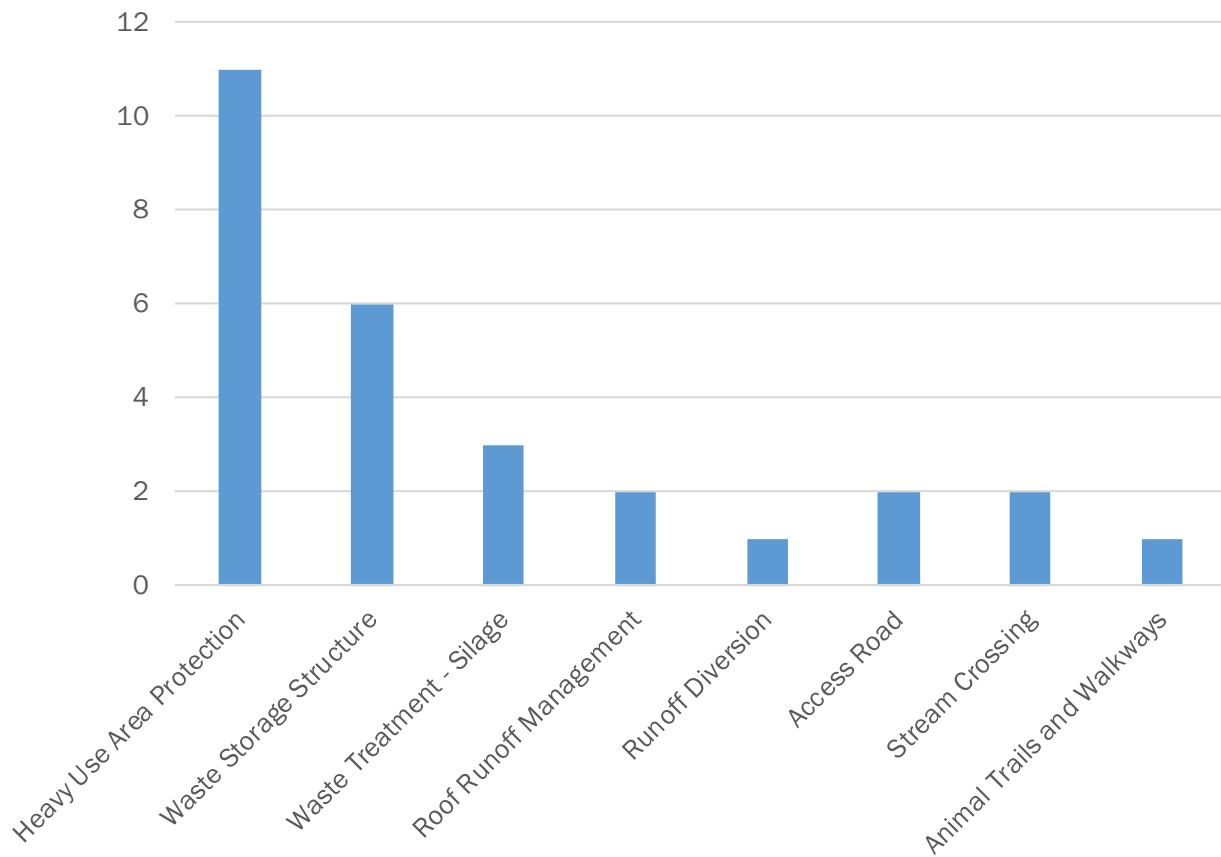




Figure 19. Number of agricultural best management practices installed in barnyards or on agricultural roads and livestock trails/walkways in 2016, by practice type



Installation of Road Erosion Control Practices

Roads represent an estimated 42 percent of all impervious surfaces (e.g., roads, pavement, and rooftops) contributing to stormwater runoff in Vermont.⁶ Reducing runoff and erosion associated with roads is critical to meeting the State’s clean water goals. In 2016, 71 State-funded road erosion and runoff control projects were installed, seven were funded by ANR and 64 were funded by VTrans (the primary funder of road erosion control work in Vermont). Data on project outputs are only available for the seven ANR-funded projects, summarized in Table 5.

The seven ANR-funded projects installed resulted in 5,800 feet of road drainage improvements, 177 road drainage structure installations and repairs, and the replacement of three stream crossing culverts. Feet of road drainage improved represent the total length of stoned-lined ditches, grass-lined ditches, and road shoulder berm removal implemented. Figure 20 pictures before and after the installation of a stone-lined ditch to control erosion caused by runoff from the roadway. The number of road drainage structures improved represents the number of drainage culverts, water bars, and check-dams installed or repaired.

⁶ Estimate uses the Lake Champlain basin where these data are available as a proxy for the State. Estimate is based on Lake Champlain Basin Program impervious surfaces data layer (2011)

Project Output Measures

Three in-stream culverts were upgraded to better accommodate flood waters and reduce streambank erosion. These culvert upgrades provide the habitat benefit of reconnecting 27 miles of upstream waters to allow aquatic organism (e.g., fish) passage. Figure 21 pictures a stream culvert replacement before and after completion.

Since project output data are only available for seven of the 71 road projects installed, these project results are significantly underreported. In future years, these data will be systematically tracked by VTrans and will more accurately represent the extent of work completed. For information on VTrans funded projects visit: <http://vtrans.vermont.gov/highway/better-roads>.

Table 5. Summary of road erosion control project outputs achieved in 2016 (represents 7 or the 71 projects completed)

Project Output Measure	Value
Feet of road drainage improvements	5,800
Number of road drainage structures repaired or replaced	177
Number of stream culverts upgraded or replaced	3
Miles of stream reconnected for aquatic organism passage	27

Figure 20. Before (left) and after (right) installation of a stone-lined ditch along Fayston Road, Fayston, completed by Friends of the Mad River



Figure 21. Before (left) and after (right) replacement of stream culvert at Hayes Road, Duxbury, completed by Friends of the Winooski River



Installation of Stormwater Treatment Practices

In 2016, three State-funded stormwater treatment practices were completed to absorb and treat stormwater from hard (i.e., impervious) surfaces. These projects resulted in the treatment of 0.325 acres through the installation of green stormwater infrastructure. Green stormwater infrastructure employs natural hydrologic processes to absorb and treat stormwater runoff. These practices reduce the impact of the built environment, while providing additional societal benefits, such as green space in urban areas.

Figure 22 and Figure 23 show before and after installation of two stormwater treatment practices, completed in 2016.

The number of State-funded stormwater treatment practices installed is expected to grow significantly in the coming years, as the many stormwater planning and design projects move toward the stage of implementation.

Figure 22. Before (left) and after (right) installation of a pervious sidewalk in downtown Burlington, completed by the City of Burlington

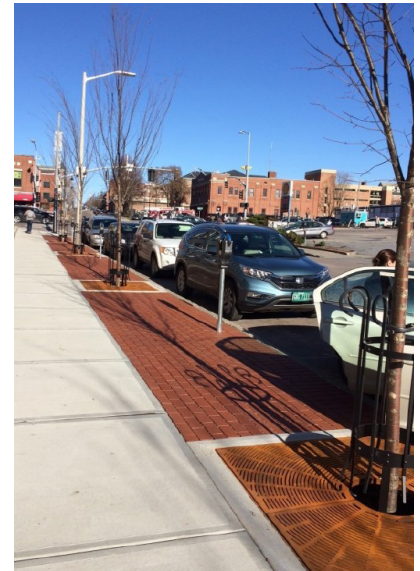


Figure 23. Before (left) and after (right) installation of a bioretention stormwater treatment structure installed at Lake Iroquois public beach parking lot, completed by the Lake Iroquois Recreation District



Natural Resources Restoration

In 2016, 22 State-funded river/stream, floodplain, and lake shore restoration projects were implemented. This work resulted in the restoration of 88 acres of stream and lake shore buffer (i.e., riparian corridor) by planting native trees and shrubs. Buffer plantings improve soil stability, reduce erosion, filter runoff from adjacent lands, and restore or enhance habitat structure and function. An additional 141 acres and 3.7 miles of river corridor were conserved through corridor easements to protect water quality benefits, floodplain function, and habitat function of corridors. Easements allow the stream and floodplain to restore itself over time to its least erosive condition. Table 6 summarizes project output measures of natural resources restoration projects.

Table 6. Summary of stream and floodplain restoration project outputs achieved in 2016

Project Output Measure	Value
Acres of riparian buffer restored through buffer planting	88
Acres of river corridor conserved through easements	141
Miles of river corridor conserved through easements	3.7

Wastewater Treatment Upgrades and Combined Sewer Overflow Elimination

In 2016, six wastewater treatment upgrade and combined sewer overflow (CSO) elimination projects were completed that received Clean Water State Revolving Fund (SRF) loans. This work included the Waterbury municipal wastewater treatment facility (WWTF) phosphorus upgrade, which reduced the total phosphorus discharge from the plant by 58 percent from 1.339 to a maximum of 0.563 metric tons per year. Waitsfield installed three decentralized wastewater treatment systems to address water quality issues associated with inadequate or failed septic systems. Rutland and Springfield completed CSO elimination work. Rutland’s CSO work resulted in the disconnection of approximately 50 acres of lawn and impervious surfaces from the area draining into the CSO. Springfield’s CSO work separated 400 linear feet of sewer pipe from storm sewers.



Volunteers planting trees for a riparian buffer restoration project

5. Project Environmental Outcomes



Project outputs, previously outlined in this report, attempt to quantify the extent of work completed with State funding. Environmental outcomes represent the water quality benefit achieved through State-funded work. The State has developed a tracking system and is developing processes to measure these water quality benefits by estimating nutrient pollution reductions at the project-level.

Within the scope of the State’s investment reporting, the long-term goal is to quantify nutrient pollution reductions for all types of State-funded clean water projects. This would include agriculture, stormwater, road erosion control, natural resources restoration, and forestry/logging erosion control projects. For the Lake Champlain and Lake Memphremagog basins, phosphorus load reductions will be estimated, as phosphorus is the nutrient pollutant of concern for fresh water. In the Connecticut River basin, nitrogen load reductions will be estimated, as the Connecticut River drains to Long Island Sound and nitrogen is the pollutant of concern for salt water.

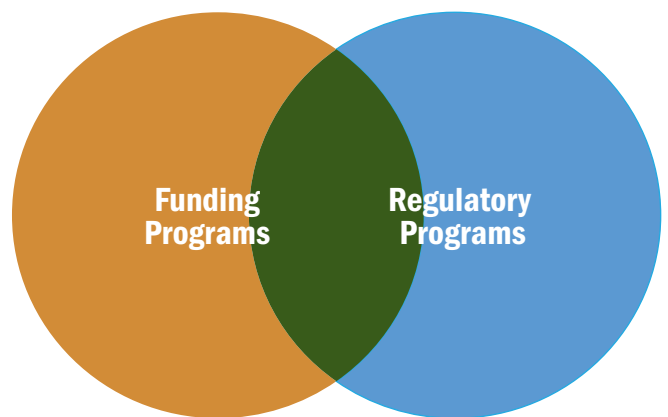
Each of these basins have, or will have in the future, reduction targets for the nutrient of concern. These reduction targets are designed to restore water quality and are outlined in restoration plans known as a Total Maximum Daily Loads, or TMDLs. TMDLs represent the total amount of a pollutant a waterbody can receive and still meet water quality standards. Vermont will use these TMDLs as the basis for tracking progress to reduce nutrient pollution.

To provide additional assurances that TMDL targets will be achieved, the Vermont Clean Water Act established additional statutory and financial support for restoring Vermont’s clean water. The Act enhanced Vermont’s clean water funding by establishing the first Vermont Clean Water Fund. It also established new or enhanced

regulatory programs that will support clean water, addressing:

- Stormwater controls from municipal and private developed lands and roads
- Required agricultural practices to minimize runoff and erosion on farms
- Adjusted wastewater treatment facility permit limits for phosphorus

Funding and regulatory programs are important mechanisms for implementing TMDLs, and the State is developing mechanisms and processes to capture the results of both in monitoring TMDL progress. As new regulations are incrementally put into place, and as funding programs grow to support the costs of complying with regulations, the work accomplished through funding and regulatory programs is expected to grow and become increasingly overlapped. The collective results of funding and regulatory programs in reducing nutrient pollution and meeting TMDL targets will be captured through other reporting mechanisms. The scope of this Investment Report focuses on the environmental outcomes of State-funded projects only.



Funding and regulatory programs are important overlapping TMDL implementation mechanisms. Vermont is developing capacity to measure the results of both. This report presents information on the State-funded portion of this work.

Project Environmental Outcomes

CURRENT AND FUTURE ENVIRONMENTAL OUTCOME MEASURES

Scope of Environmental Outcome Measures Reported

- Environmental outcomes of State-funded projects with funding agreements closed out within SFY2016

Beyond the Scope of Environmental Outcomes Reported

- Environmental outcomes of federally, locally, or privately-funded projects
- Environmental outcomes of work completed under regulatory programs without State funding

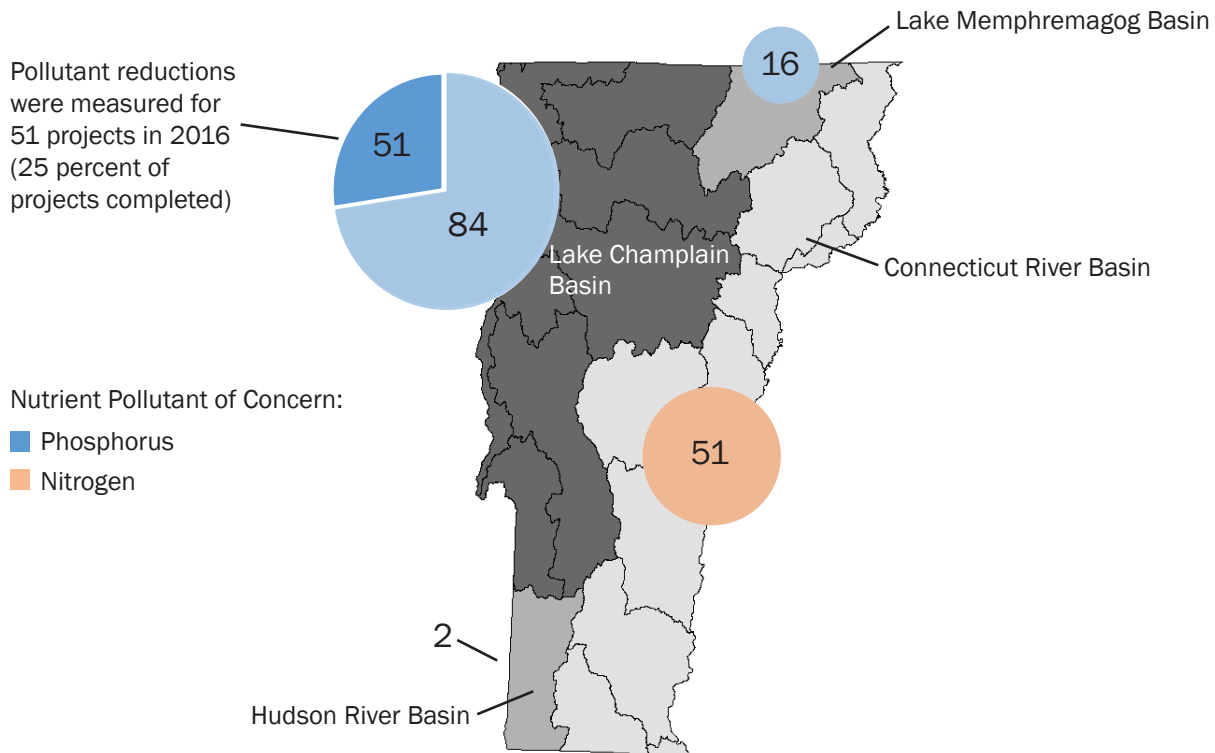
Planned Work to Enhance Investment Reporting

- This report establishes a baseline on the level of environmental outcomes achieved by State-funded projects for evaluating future work
- In this first year, the State is able to measure environmental outcomes as phosphorus pollution reductions for agricultural, stormwater, and riparian buffer restoration projects completed in the Lake Champlain basin
- The State is developing processes to account for environmental outcomes for all project-types completed statewide in future years

Vermont’s new tracking and reporting systems represent a significant improvement in accountability for State investments in clean water. In the past, the State’s reporting addressed dollars invested by individual agencies and, separately, water quality monitoring data. These new tracking systems allow the State to measure and report on environmental outcomes at the project-level and evaluate the cost effectiveness of investments in clean water. These tracking systems provide improved transparency to the public on the results of State investments in clean water.

The full, long-term scope of this report, as shown in Figure 24, is intended to cover environmental outcomes of all State-funded projects, focusing on nutrient pollution. In this first year, the State currently has the capacity to account for the environmental outcomes of work completed in the form of estimated phosphorus load reductions in the Lake Champlain basin.

Figure 24. Full long-term scope of Investment Report environmental outcomes relative to outcomes measured in the first year of reporting





METHODS TO MEASURE ENVIRONMENTAL OUTCOMES

To estimate nutrient load reductions achieved by projects, first the State needs data on the rate of nutrient loading from different land uses. With these data, the State can estimate the total nutrient load treated by a project based on the area of land treated. Then, the average annual performance of the project is applied to the total load delivered from the land treated. This average annual performance is expressed as a percent reduction of nutrient loading. Table 7 summarizes the State of Vermont’s current ability to quantify nutrient load reductions by basin and project category.

For this first year of reporting, the State only has specific nutrient land loading rates for the Lake Champlain basin. This is thanks to the recent watershed modeling completed to develop new phosphorus reduction goals for Lake Champlain, identified in the U.S. Environmental Protection Agency’s *Phosphorus Total Maximum Daily Loads for Vermont Segments of Lake*

Champlain. This means that the State, currently, can only account for phosphorus pollution reductions from projects in the Lake Champlain basin. In future years, as land loading rates are established in other basins, the State will expand this work to the Lake Memphremagog and Connecticut River basins.

The State is also limited in the types of projects for which nutrient load reductions can be quantified. The State currently has the ability to account for nutrient pollution reductions from most stormwater and agricultural practices, as well as riparian buffer restoration projects based on studies completed on the performance of these practices. The State can also report on phosphorus reductions from wastewater treatment facility upgrades, as phosphorus loading from facilities are monitored and reported. In future years, as additional work is completed to evaluate the performance of other types of projects, the State will be able to expand nutrient pollution reduction estimates to more project types.

Table 7. Summary of Vermont’s ability in 2016 to account for nutrient pollution reductions by project type, region, and nutrient of concern

Key
Currently have ability to account for nutrient pollution reduction
Do not currently have ability to account for nutrient pollution reduction

Project Type	Lake Champlain	Lake Memphremagog	Connecticut River
Wastewater Treatment	Phosphorus	Phosphorus	Nitrogen
Stormwater Treatment	Phosphorus	Phosphorus	Nitrogen
Agricultural Practices	Phosphorus (cropland/pasture practices)	Phosphorus	Nitrogen
River/Floodplain Restoration	Phosphorus (riparian buffer restoration)	Phosphorus	Nitrogen
Road Erosion Control	Phosphorus	Phosphorus	Nitrogen
Wetland Restoration	Phosphorus	Phosphorus	Nitrogen
Forestry/Logging Erosion Control	Phosphorus	Phosphorus	Nitrogen
Summary of Status to Build Tracking and Accounting Capacity	Developing methodologies to account for phosphorus reductions from all project types (where feasible) in 2017-2018	Will have capacity to account for phosphorus reductions once Lake Memphremagog TMDL is finalized in 2017	Need Vermont nitrogen land loading rates to quantify the nitrogen load for land treated by practices (may depend on timing/results of EPA’s regional nitrogen strategy).

Project Environmental Outcomes

QUANTIFYING NUTRIENT POLLUTION REDUCTIONS FROM CLEAN WATER PROJECTS

As previously described and summarized in Table 7, gaps in statewide nutrient loading rates and gaps in understanding the performance of select project types currently limit the State's ability to quantify nutrient reductions for all project types statewide.

As summarized in Figure 24, of the 204 clean water implementation projects completed in 2016, 135 were located in the Lake Champlain basin, 51 in the Connecticut River/Long Island Sound basin, 16 in the Lake Memphremagog basin, and 2 in the Batten Kill-Walloomsac-Hoosic basin. Due to gaps in statewide nutrient loading rates, currently the State can only account for nutrient pollution reductions in the Lake Champlain basin. Of the 135 projects implemented in the Lake Champlain basin, environmental outcomes could not be measured for 84 projects due to gaps in the understanding of performance of project types and/or insufficient project data.

Environmental outcomes were measured for the remaining 51 projects completed in the Lake Champlain basin in the form of phosphorus load reductions. This represents 38 percent of projects completed in the Lake Champlain basin and 25 percent of projects completed statewide. Projects with quantifiable nutrient load reductions involve the following work completed in the Lake Champlain basin, and the results of this work are described in the following section:

- Completion of wastewater treatment facility phosphorus upgrade (1 project)
- Installation of stormwater treatment practices (2 practices)
- Application/installation of agricultural best management practices (45 practices)
- Restoration of forested riparian buffers (3 projects, representing 18 buffer installations)

LAKE CHAMPLAIN TMDL IMPLEMENTATION PROGRESS

The *Phosphorus TMDLs for Vermont Segments of Lake Champlain*, finalized in June 2016, evaluates current phosphorus pollution loading into Lake Champlain and establishes reduction targets to restore water quality. Current phosphorus loading (i.e., *baseload*), is the baseline that will be used to measure progress implementing the Lake Champlain TMDLs. Phosphorus load reductions achieved through a variety of funding and regulatory programs will be measured relative to the TMDLs' baseline and target loads.

Based on the Lake Champlain TMDLs, current phosphorus loading from Vermont into Lake Champlain is 631 metric tons per year. The total phosphorus loading target for Vermont portions of the basin is 418 metric tons per year, and the total phosphorus load reduction required from Vermont is 213 metric tons per year. Figure 25 summarizes the Lake Champlain TMDLs basin-wide base loads and phosphorus reduction targets.

Phosphorus load reductions achieved by the 51 quantifiable projects completed within the Lake Champlain basin in 2016 are summarized in Table 8. Completion of these projects reduced phosphorus loading into Lake Champlain by an estimated 1.76 metric tons per year.

These load reductions do not represent the full extent of work completed in 2016 to implement the Lake Champlain TMDL. These results exclude work completed through other funding programs and regulatory programs. Even within the scope of this Investment Report, the phosphorus load reductions only represent 25 percent of the total projects implemented in 2016.



Figure 25. Lake Champlain TMDLs phosphorus base load (top) and target load (bottom) for Vermont portions of the basin by sector in metric tons per year

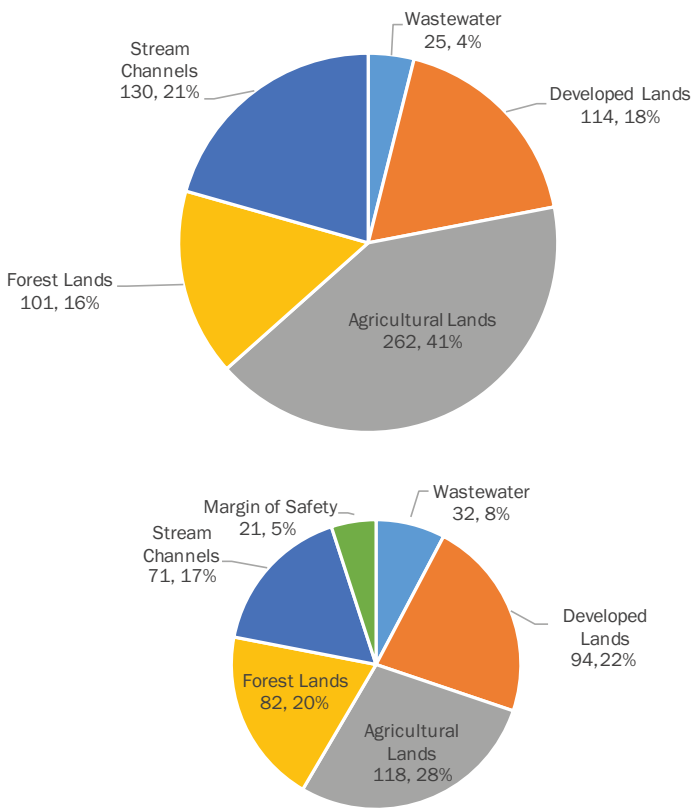


Table 8. Estimated phosphorus load reductions, in kilograms per year, achieved by State-funded projects in 2016 (represents 25 percent of projects implemented)

Sector	Work Completed	Estimated Phosphorus Reduction
Wastewater	1 WWTF Upgrade	776.0
Developed Lands	2 Stormwater Practices	0.3
Agricultural Lands	45 Agricultural Practices	910.3
Stream Channels	18 Buffers Restored	73.6
Basin-Wide Total		1,760.2

Wastewater Treatment Phosphorus Upgrade

In 2016, a phosphorus upgrade completed with financing from a Clean Water SRF loan at the Waterbury Municipal Wastewater Treatment Facility (WWTF) reduced total phosphorus discharge by 58 percent from 1.339 to a maximum of 0.563 metric tons per year. This represents a total phosphorus load reduction of 0.776 metric tons per year, or 776 kilograms per year.

Installation of Stormwater Treatment Practices

In 2016, the installation of two stormwater treatment practices resulted in an estimated phosphorus load reduction of 0.3 kilograms per year. It is important to note that this stormwater work only reflects a fraction of the work being implemented to meet TMDL targets for developed lands. Currently the State is developing processes to quantify phosphorus load reductions achieved by road erosion control practices. Once quantified, road erosion control work will count toward meeting the TMDL targets for developed lands. Stormwater regulatory programs are also key in driving TMDL implementation. The State is currently developing procedures for tracking TMDL implementation under these regulatory programs.

Finally, these projects represent the completion of projects funded years ago. Since then, the State has begun funding more municipal stormwater treatment practices and has increased stormwater planning and design efforts to lead to the installation of priority projects. In 2016, 40 percent of State funds were awarded to support stormwater and road erosion control projects. Phosphorus load reductions achieved through State-funded stormwater treatment practices are expected to increase in the coming years as these projects are installed.

Project Environmental Outcomes

Installation/Application of Agricultural Best Management Practices

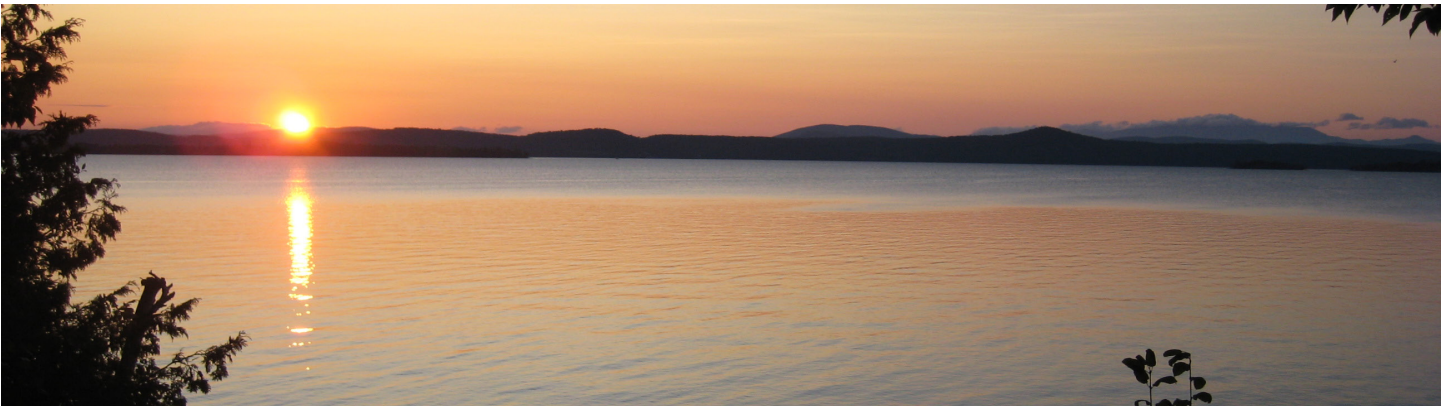
In 2016, the installation/application of 45 State-funded agricultural best management practices resulted in an estimated annual average phosphorus load reduction of 910.3 kilograms per year. It is important to note that these data only capture a fraction of agricultural best management practices implemented, excluding U.S. Department of Agriculture NRCS funded practices. NRCS is the primary funder of agricultural best management practices in Vermont, however, results of federally funded projects are beyond the scope of this report.

Most the agricultural practices reported with phosphorus reductions quantified are annual agronomic practices including cover crop, crop rotation, and conservation tillage. These are important practices for water quality. However, this level of annual effort needs to continue in future years to maintain the phosphorus reductions achieved in 2016. Riparian buffers, on the other hand, are considered more structural practices that, if maintained, will continue to reduce phosphorus loading over time.

Restoration of Riparian Buffers on Non-Agricultural Lands

The restoration of riparian buffers is important for treating nonpoint source runoff from the land draining into them. Buffers also provide a range of flood resiliency and habitat benefits. In 2016, 48 riparian buffer areas were restored statewide, with 18 buffers located in the Lake Champlain basin. These buffers begin providing benefits when they are planted. However, once these buffers are fully established (approximately five years) they will reduce an estimated 73.6 kilograms of phosphorus per year. The success in riparian buffers treating phosphorus pollution depends on the ability of the buffers to become established and maintained over time.

6. Moving Forward



Vermonters care deeply about the health of the State's rivers, streams, wetlands, ponds and lakes, including Lake Champlain. Clean water supports fishing, swimming, boating, and other recreational uses, bolsters tourism, helps to maintain property values and provides access to safe drinking water. Clean water is also good for business and supports commercial uses ranging from local farms to international companies. Maintaining clean water creates business opportunities, provides jobs, and supports economic development by investing in clean water infrastructure and natural resources restoration. In many cases, business smart solutions are also clean water solutions. For example, collaboration between farmers and electric companies to generate energy from cow manure. The benefits and innovations surrounding clean water highlight the importance of State investments in clean water projects.

Current water quality conditions statewide are a reflection of the investments made over the past few decades to reduce phosphorus and sediment pollution from discharges, runoff and erosion. Despite the years of effort and investment, Vermont still faces significant water quality challenges that are threatening the health and well-being of our communities and economy. These challenges indicate that we still have much more important work to do.

Given the prevalence of the State's water quality challenges and the price of restoring and safeguarding water quality, it is imperative that the State spends its resources in a manner that targets the most strategic and cost-effective projects. Recent research in the Missisquoi Bay watershed shows that targeting of phosphorus reduction practices, based on site-specific characteristics, can result in two to three times more phosphorus pollution reduction than an untargeted approach. Vermont's Tactical Basin Planning process and its scientific framework to target the most important pollution sources will help the State achieve State and federal clean water targets in the most cost-effective way possible.

This Clean Water Initiative Investment Report is the first in a new annual report series, transparently summarizing the results of public investments in clean water improvement projects across all sectors. State agencies will continue to work together over the long-term to track this progress in a way that is transparent and accountable to the public. This first report establishes a baseline for evaluating future actions and outcomes, and helps Vermonters make connections between clean water investments made, projects implemented, and outcomes achieved.

7. Appendices

OVERVIEW OF INVESTMENT REPORT APPENDICES

Appendix A is a listing of State-funded projects awarded within State Fiscal Year 2016 by Clean Water Initiative agencies. Appendix A was prepared to fulfill the reporting requirement of 2015 Act 64, Section 36, 10 V.S.A. § 1386, including a summary of projects funded by the Ecosystem Restoration Grant Program. This Investment Report summarizes the clean water and ecosystem restoration activities, and measures of progress for State-funded work completed in State Fiscal Year 2016.

Appendix B and C were prepared to fulfill the reporting requirement of 2015 Act 64, Section 36, 10 V.S.A. § 1386, addressing the execution of the updated *Vermont Lake Champlain Phosphorus TMDL Phase 1 Implementation Plan*. Appendix B, provides a summary of the efforts undertaken to implement the Phase 1 Implementation Plan, including the status of major statutory and Phase 1 Implementation Plan deliverables. This Investment Report, and the social, investment, project output, and environmental outcome measures summarized, will serve as the framework for assessing and evaluating the efficacy of the Phase 1 Implementation Plan. Additionally, the State is developing processes to track and measure the environmental outcomes of funding and regulatory programs to monitor progress reducing phosphorus pollution in the Lake Champlain basin.

A. LISTING OF 2016 CLEAN WATER INITIATIVE-FUNDED PROJECTS

B. SUMMARY OF CLEAN WATER INITIATIVE MAJOR STATUTORY AND LAKE CHAMPLAIN PHOSPHORUS TMDL PHASE 1 PLAN DELIVERABLES

C. LISTING OF 2016 CLEAN WATER INITIATIVE-FUNDED PROJECTS IN THE LAKE CHAMPLAIN BASIN

Appendix A

Listing of Clean Water Initiative State-Funded Projects State Fiscal Year (SFY) 2016 By Agency and Funding Program

Vermont Agency of Agriculture, Food and Markets	
Grants and Contracts Awarded in SFY2016 _____	35
Vermont Agency of Commerce and Community Development	
Contract Awarded in SFY2016 _____	36
Vermont Agency of Natural Resources, Department of Environmental Conservation	
Ecosystem Restoration Grants and Contracts Awarded in SFY2016 _____	37
Clean Water State Revolving Fund Loans Awarded in SFY2016 _____	41
Vermont Agency of Natural Resources, Fish and Wildlife Department	
Watershed Grants Awarded in SFY2016 _____	42
Vermont Agency of Transportation	
Better Roads Grants Awarded in SFY2016 _____	43
Transportation Alternatives Program Grants Awarded in SFY2016 _____	46

Vermont Agency of Agriculture, Food and Markets
Grants and Contracts Awarded in SFY2016

Funding Program	Partner	Summary Title	Funding
Best Management Practice	Agricultural Producers	Erosion Control on Access Roads, Animal Trails, and Walkways	\$37,219
Best Management Practice	Agricultural Producers	Compost Facility Runoff Reductions	\$65,000
Best Management Practice	Agricultural Producers	Clean Water Diversion from Barnyards ¹	\$92,898
Best Management Practice	Agricultural Producers	Livestock Exclusion Fencing	\$3,000
Best Management Practice	Agricultural Producers	Heavy Use Area Runoff Controls	\$432,440
Best Management Practice	Agricultural Producers	Stream Crossing	\$3,960
Best Management Practice	Agricultural Producers	Use Exclusion	\$1,553
Best Management Practice	Agricultural Producers	Waste Storage, Transfer, and Treatment Structures	\$698,085
Best Management Practice	Agricultural Producers	Watering Facility	\$12,770
Farm Agronomic Practice	Agricultural Producers	Farm Agronomic Practices ²	\$135,777
Conservation Reserve Enhancement Program	Agricultural Producers	Riparian Buffer Restoration	\$27,758
Water Quality	Natural Resources Conservation Districts	Technical Assistance	\$112,000
Clean Water Fund Grants and Contracts	New England Interstate Water Pollution Control Commission/Lake Champlain Basin Program	Tile Drainage Study in Jewett Brook Watershed	\$12,900
Clean Water Fund Grants and Contracts	University of Vermont (UVM) Extension	Technical Assistance and Outreach to Farm Owners on Clean Water Business Management (i.e., Farm Viability)	\$105,000
Clean Water Fund Grants and Contracts	UVM Extension	Custom Manure Applicator Certification Program	\$60,000
Clean Water Fund Grants and Contracts	UVM Extension	Technology for Crop and Nutrient Record Keeping	\$56,000
Clean Water Fund Operational	Vermont Agency of Agriculture, Food and Markets	Increased On-Farm Oversight to Enforce Regulatory Requirements	\$450,000

¹ Clean Water Diversion from barnyards includes installation of pipelines and roof runoff management structures.

² Farm Agronomic Practices include cover crop, crop rotation, nurse crop, alternative manure application, strip cropping, and conservation tillage.

Vermont Agency of Commerce and Community Development
Contract Awarded in SFY2016

County	Partner	Summary Title	Funding
Caledonia, Essex, Orange, Windham, Windsor	United States Geological Survey	LiDAR Mapping of the State of Vermont to Support Agriculture, Stormwater, River, and Forest Road Mapping	\$430,000

Vermont Agency of Natural Resources, Department of Environmental Conservation
Ecosystem Restoration Grants and Contracts Awarded in SFY2016

Project Topic and Category Key

Topics:

- A: Agricultural Runoff
- F: Forestry
- R: River Corridor/Floodplain Restoration/Protection
- Rd: Road Construction/Maintenance
- S: Stormwater Runoff
- W: Wetland

Categories:

- 1: Assessments, Planning, and Project Development
- 2: Project Design
- 3: Project Implementation
- 3E: Implementation through Capital Equipment Assistance

County	Partner	Summary Title	Funding	Topic	Category
Addison, Bennington, Rutland	Vermont Association of Conservation Districts	Agricultural Best Management Practice Implementation in South Lake Champlain and Beyond	\$150,000	A	3
Addison, Orange, Rutland, Windsor	Watershed Consulting	White River Illicit Discharge Detection and Elimination	\$77,010	S	1
Bennington	Bennington County Regional Commission	Hoosic River Corridor Planning	\$30,000	R	1
Bennington	Bennington County Conservation District	Woodford-Packers Floodplain Restoration Design	\$33,770	R	2
Caledonia	Vermont Land Trust	Clough Farm Corridor Easement	\$174,898	R	3
Caledonia	NorthWoods Stewardship Center	NorthWoods Conservation Corps Watershed Crew, 2016	\$18,615	Rd	3
Caledonia	Caledonia County Natural Resources Conservation District (NRCD)	St. Johnsbury Stormwater Master Planning	\$38,100	S	1
Caledonia	St. Johnsbury	Western Ave Outfall Stormwater Treatment System Installation	\$160,000	S	3
Caledonia	Caledonia County NRCD	Lyndon Stormwater Master Plan	\$42,800	S	1
Caledonia	Caledonia County NRCD	Hardwick Stormwater Master Plan	\$24,700	S	1
Caledonia, Essex, Lamoille, Orleans	NorthWoods Stewardship Center	Lake Shoreland and River Buffer Restoration in the Memphremagog Basin	\$82,057	R	3

County	Partner	Summary Title	Funding	Topic	Category
Chittenden	Chittenden County Regional Planning Commission	Jericho Stormwater Master Plan	\$19,000	S	1
Chittenden	South Burlington	Bartlett Brook Central Stormwater Infiltration Project	\$400,000	S	3
Chittenden	Fitzgerald Environmental Associates	Crooked Creek Gully Restoration	\$40,000	A	3
Chittenden	Winooski NRCD	Winooski Trees for Streams/Riparian Buffer Restoration, 2016	\$14,300	R	3
Chittenden	Burlington	Burlington Stormwater Master Planning	\$100,000	S	1
Chittenden	Lewis Creek Association	Preparing Local Watersheds for Flood Resilience and Reducing Runoff in Lewis Creek	\$67,254	S	2
Chittenden	Williston	Williston Town Fields Stormwater Treatment System	\$49,877	S	3
Chittenden	South Burlington	Village at Dorset Park Stormwater Pond Improvements	\$250,000	S	3
Essex	Vermont River Conservancy	Nulhegan River Confluence Easements	\$9,500	R	3
Essex	Brighton	Town of Brighton Storm Water Retrofits	\$348,545	S	3
Franklin	UVM Extension	Enhancing Nutrient Management Plan Implementation with GoCrop Software	\$57,577	A	1
Franklin	UVM Extension	Reduction of Fall Tillage in Jewett and Stevens Brook Watersheds	\$102,154	A	3E
Franklin	Franklin Watershed Committee	Towle Neighborhood Road Erosion Control - Planning and Design	\$8,800	Rd	2
Franklin	Friends of Northern Lake Champlain	Feasibility Study into the Relocation of Enosburg Town Garage to Prevent Erosion and Runoff to Surface Waters	\$12,000	S	1
Grand Isle	Lamoille County NRCD	Alburgh Stormwater Mitigation and Road Erosion Control Designs	\$1,350	S	2
Lamoille	Vermont Land Trust	Rankin Farm River Corridor Easement	\$40,349	R	3
Lamoille	Vermont Land Trust	Kaiser Farm River Corridor Easement	\$42,098	R	3
Lamoille, Washington	Stone Environmental	Upper Winooski River Illicit Discharge Detection and Elimination - Follow-up Investigation	\$37,175	S	1
Orleans	Orleans County NRCD	Whitney Brook and Black River Riparian Buffer Restoration	\$12,723	R	3
Orleans	Vermont Land Trust	Moulton River Corridor Easement	\$70,699	R	3
Rutland	Poultney-Mettowee NRCD	Castleton Headwaters Stormwater Master Plan	\$28,000	S	1

County	Partner	Summary Title	Funding	Topic	Category
Rutland	Rutland NRC	Green Stormwater Infrastructure Design in the East Creek Watershed	\$17,050	S	2
Rutland	Poultney-Mettowee NRC	Lake Bomoseen Stormwater Master Planning	\$24,430	S	1
Rutland	Rutland NRC	Adams Street Outfall Stormwater Treatment System Installation	\$82,500	S	3
Rutland	Poultney Village	York Street Infiltration Basin Installation	\$180,000	S	3
Washington	Central Vermont Regional Planning Commission	Barre City, Barre Town, and Plainfield Stormwater Master Plan	\$95,641	S	1
Washington	Central Vermont Regional Planning Commission	Berlin Stormwater Master Plan	\$45,248	S	1
Washington	UVM Extension	Precision Manure Application Equipment in the Jewett Brook Watershed	\$75,000	A	3E
Washington	Friends of the Winooski River	Dog River Floodplain Restoration Design	\$30,340	R	2
Washington	Friends of the Winooski River	Hayes Road Erosion Control Project	\$25,000	R	3
Washington	Vermont Land Trust	Rogers Farm River Corridor Easement	\$85,309	R	3
Washington	Friends of the Winooski River	Quarry Hill and Sterling Hill Stormwater Master Planning	\$19,490	S	1
Washington	Stone Environmental	Montpelier Illicit Discharge Detection and Elimination	\$43,080	S	1
Washington	Friends of the Winooski River	Cabot School Stormwater Mitigation - Construction	\$9,522	S	3
Washington	Waitsfield	Constructing Green Stormwater Infrastructure at the Waitsfield Town Office	\$15,000	S	3
Washington	Winooski NRC	Absorbing the Storm at Rumney Memorial School - Construction	\$97,750	S	3
Washington	Central Vermont Regional Planning Commission	Northfield Village Bioretention Installation	\$110,695	S	3
Washington	Montpelier	Taylor Street Redevelopment – Green Stormwater Infrastructure and Green Space	\$230,000	S	3
Washington	Montpelier	Taylor Street Redevelopment – Green Stormwater Infrastructure including Bioretention, Stormwater Sidewalks, and Tree Filters	\$250,000	S	3
Windham	Windham County NRC	Whetstone Brook Corridor Easement Planning	\$6,000	R	1
Windham	Windham Regional Commission	North River Stream Geomorphic Assessment and Corridor Planning for Project Identification	\$41,600	R	1

County	Partner	Summary Title	Funding	Topic	Category
Windham	Windham Regional Commission	Adams Brook Restoration Design	\$6,050	R	2
Windham	Vermont River Conservancy	Stickney River Corridor Easement	\$35,796	R	3
Windsor	Two Rivers-Ottawaquechee Regional Commission	Kedron Brook Agricultural Nutrient Management Planning and Flood Resiliency	\$23,418	A	2
Windsor	Springfield	Stream Geomorphic Assessment along Valley Street, Springfield	\$3,250	R	1
Windsor	White River Partnership	Lower White River Bank Restoration Design	\$9,075	R	2
Regional – Lake Champlain Basin	Cold Hollow to Canada	Mapping Forest Roads, Trails, and Log Landings on Private Forests to Identify Erosion Hotspots	\$10,441	F	1
Regional – Lake Champlain Basin	Arrowwood	Lake Champlain Basin Wetlands Project Outreach and Development under the Regional Conservation Partnership Program	\$119,999	W	1
Statewide	Vermont Association of Conservation Districts	Statewide Trees for Streams/Riparian Forest Restoration, 2016	\$173,250	R	3

Vermont Agency of Natural Resources, Department of Environmental Conservation
Clean Water State Revolving Fund Loans Awarded in SFY2016

County	Partner	Summary Title	Funding	Category
Caledonia	Ryegate	WWTF Refurbishment	\$8,240	1
Chittenden	Shelburne	WWTF and Collection Systems Refurbishment	\$37,800	1
Chittenden	Williston	Collection System Refurbishment	\$135,100	3
Orange	Williamstown	WWTF Refurbishment	\$135,900	2
Rutland	Castleton	WWTF and Collection Systems Refurbishment	\$21,500	1
Windham	Bellows Falls Village	WWTF Refurbishment	\$350,000	2
Windsor	Springfield	CSO Elimination	\$294,504	2
Windsor	West Windsor	Installation of New Collection System	\$1,284,328	3

WWTF: Wastewater treatment facility
 CSO: Combined sewer overflow
 Upgrades: Change to wastewater treatment technology
 Refurbishment: Refurbish existing technology with newer equipment

Category Key:
 1: Assessments, Planning, and Project Development
 2: Project Design
 3: Project Implementation

Vermont Agency of Natural Resources, Fish and Wildlife Department
Watershed Grants Awarded in SFY2016

Project Topic and Category Key

Topic Key:

- C: Cross Sector
- F: Forestry
- R: River Corridor/Floodplain Restoration/Protection

Category Key:

- 1: Assessments, Planning, and Project Development
- 2: Project Design
- 3: Project Implementation
- E: Educational

County	Partner	Summary Title	Funding	Topic	Category
Addison	Lake Champlain Maritime Museum	Lewis Creek Watershed from Headwaters to Lake Champlain: A Pilot Education Program for Tributaries	\$4,950	C	E
Addison	Lewis Creek Association	Workshops and Analysis to Enhance Flood Resiliency of Headwater Forests	\$4,998	F	E
Caledonia	Dartmouth College	Wells River Basin Assessment of Water Temperature and Areas for Riparian Buffer Restoration/Protection	\$3,030	R	1
Franklin	Ottawaquechee NRCD	Water Quality Sampling	\$3,500	C	E
Franklin	Missisquoi River Basin Association	Missisquoi Water Quality Sampling	\$3,500	C	1
Franklin	Northern Forest Canoe Trail	East Highgate Dam Remains Removal	\$10,000	R	3
Rutland	Trout Unlimited	Mettowee River Connectivity Project and Culvert Restoration	\$5,000	R	3
Washington	Winooski River NRCD	Improving Fish Passage on Chase and Slide Brooks	\$6,305	R	3
Windham	Connecticut River Watershed Council	Bagatelle Dam Removal, West River Watershed	\$9,500	R	3
Windsor	White River Partnership	White River Stream and Riparian Buffer Restoration Project	\$10,000	R	3
Regional – Lake Champlain Basin	Lake Champlain Committee	Lake Champlain Basin Flood Resiliency Education: Lessons from the Floods	\$5,000	R	E
Statewide	Valley Quest	Valley Quest Watershed Institute Curriculum Development	\$5,000	C	E
Statewide	Vermont River Conservancy	Community Based Riparian Restoration and Recreation Enhancement Project	\$8,750	R	3

Vermont Agency of Transportation
Better Roads Grants Awarded in SFY2016

Project Category Key

Category A: Road Inventory and Capital Budget Planning

Category B: Correction of a Road Related Erosion Problem and/or Stormwater Mitigation for gravel and paved roads

County	Partner	Summary Title	Funding	Category
Addison	Lincoln	South Lincoln Road Improvements	\$10,000	B
Addison	Waltham	Buck Mountain Sports Culvert	\$2,600	B
Addison	Hancock	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Bennington	Dorset	Squirrel Hollow Retaining Wall	\$10,000	B
Bennington	Rupert	Mill Brook Stabilization	\$8,050	B
Bennington	Winhall	Drainage Pearl Buck Drive	\$9,324	B
Bennington	Arlington	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Bennington	Pownal	Mann Hill Road South Erosion Control	\$1,463	A
Bennington	Shaftsbury	South Hollow/Little White Creek Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Caledonia	Burke	Pumpkin Road/Washburn Road	\$10,000	B
Caledonia	Danville	Stanton Road	\$10,000	B
Caledonia	Groton	Ricker Mill Road	\$7,434	B
Caledonia	Newark	Schoolhouse Road Erosion Control	\$10,000	B
Caledonia	Waterford	Hale Road Culvert and Ditching	\$10,000	B
Caledonia	Wheelock	Stannard Mountain Road	\$10,000	B
Caledonia	Danville	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Caledonia	Ryegate	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Caledonia	Waterford	Road Erosion Inventory/Capital Budget Plan	\$3,840	A
Chittenden	Essex	Brigham Hill Ditching	\$9,996	B
Chittenden	Huntington	Taft Road Water Quality Protection	\$10,000	B
Chittenden	Jericho	Category A Planning Grant	\$4,000	B
Chittenden	Milton	Quarry Lane Culvert Replacement	\$10,000	B
Chittenden	Williston	Stone Line East Hill Road Phase Two	\$10,000	B
Essex	Averill	Cottage Road and Canaan Road Upgrades	\$10,000	B
Essex	Brighton	Taylor Road Culvert Replacement	\$10,000	B
Essex	Canaan	Canaan Hill Road	\$10,000	B

County	Partner	Summary Title	Funding	Category
Essex	Concord	Long Hill Road	\$9,495	B
Essex	Lemington	Sims Hill Ditching	\$10,000	B
Essex	Lemington	Road Erosion Inventory	\$3,200	A
Essex	Lunenburg	Road Erosion Inventory	\$4,000	A
Franklin	Berkshire	Richmond Road Ditching	\$8,286	B
Franklin	Enosburg	Perley Road Project	\$6,802	B
Franklin	Fletcher	School Road	\$10,000	B
Franklin	Franklin	Gallup Road Ditching	\$10,000	B
Franklin	Swanton	Sweet Hollow Ditching/Slope Stabilization	\$10,000	B
Franklin	Enosburg	Duffy Hill Drainage Project	\$10,000	B
Franklin	Fairfield	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Franklin	Highgate	Road Erosion Inventory	\$4,000	A
Franklin	Swanton	Road Erosion Inventory/Capital Budget Plan	\$3,842	A
Franklin	Enosburg	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Grand Isle	Grand Isle	Road Erosion Inventory/Capital Budget Plan	\$3,200	A
Grand Isle	North Hero	Road Erosion Inventory/Capital Budget Plan	\$3,200	A
Lamoille	Hyde Park	Cooper Hill and McKinistry Hill Erosion	\$10,000	B
Lamoille	Belvidere	Florence Road Swale Improvements	\$10,000	B
Lamoille	Cambridge	Cady Hill Road	\$10,000	B
Lamoille	Eden	Cooper Hill Phase 1	\$10,000	B
Lamoille	Johnson	Foot Brook Road Erosion	\$10,000	B
Lamoille	Stowe	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Orange	Braintree	Connecticut Corners Ditching	\$10,000	B
Orange	Corinth	Cross Road Drainage	\$10,000	B
Orange	Fairlee	Quinibeck Road Ditching	\$10,000	B
Orange	Chelsea	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Orange	Thetford	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Orleans	Craftsbury	Collinsville Road	\$9,325	B
Orleans	Glover	Philips Road/Beach Hill Intersection	\$10,000	B
Orleans	Morgan	Culvert Reset Ditching add sediment ponds	\$10,000	B
Rutland	Benson	Parkhill Road Erosion	\$10,000	B
Rutland	Middletown Springs	Coy Hill Ditching	\$9,013	B
Rutland	Pittsford	Depot Hill Road	\$5,208	B

County	Partner	Summary Title	Funding	Category
Rutland	Castleton	Culvert Inventory/Capital Plan	\$4,000	A
Rutland	Danby	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	Middletown Springs	Road Inventory/Culvert Update	\$4,000	A
Rutland	Pittsford	Culvert/Structure Inventory	\$3,200	A
Rutland	Poultney	Village Road, Culvert Inventory/Capital Plan	\$4,000	A
Rutland	Tinmouth	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	West Haven	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	Chittenden	Road Inventory/Culvert Update	\$4,000	A
Washington	Cabot	TH#30 Bank Stabilization	\$10,000	B
Washington	Calais	Mirror Lake Road	\$6,648	B
Washington	Duxbury	Hayes Road Culvert	\$10,000	B
Washington	Warren	West Hill, Lincoln Slide	\$10,000	B
Washington	Duxbury	Road Erosion Assessment	\$4,000	A
Washington	Middlesex	Gravel Roads Erosion Assessment	\$4,000	A
Washington	Moretown	Road Erosion Assessment	\$4,000	A
Washington	Waitsfield	Gravel Roads Assessment	\$4,000	A
Windham	Brookline	Parker Hill Stream Erosion	\$5,650	B
Windham	Londonderry	West River Street/Culverts and Aprons	\$10,000	B
Windham	Brattleboro	Drainage Planning Project	\$4,000	A
Windsor	Bethel	Sanders Road Culvert Replacement	\$9,500	B
Windsor	Stockbridge	River Road Culvert Replacement	\$9,500	B
Windsor	Weathersfield	Thrasher Road Culvert/Erosion Prevention	\$10,000	B
Windsor	West Windsor	Rush Meadow Road Ditch/Bank Stabilization	\$4,827	B
Windsor	West Windsor	Knob Hill Road Ditch/Bank Stabilization	\$4,343	B
Windsor	Rochester	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Windsor	Bethel	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Windsor	Chester	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Windsor	Reading	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Windsor	Springfield	Culvert Update and Capital Budget Plan	\$4,000	A
Windsor	Weston	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Windsor	Woodstock	Town Wide Road Planning/Capital Budget Plan	\$4,000	A

Vermont Agency of Transportation

Transportation Alternatives Program Grants Awarded in SFY2016³

County	Partner	Summary Title	Funding
Chittenden	Essex	Sydney Drive Detention Pond Stormwater Treatment Retrofit	\$243,953
Chittenden	Essex	Village-Owned Road Gravel Wetland Stormwater Treatment System	\$142,456
Chittenden	South Burlington and Shelburne	Shelburne Bay Gravel Wetland Stormwater Treatment System	\$87,000
Chittenden	South Burlington	Butler Farms and Oak Creek Village Undersized Culvert Replacements	\$300,000
Franklin	Fairfield	Salt Shed Construction near the Black River	\$300,000

³ VTrans Transportation Alternatives federal funds were allocated through the State legislature specifically for stormwater mitigation projects in 2016.

Appendix B

Summary of Clean Water Initiative Major Statutory and Lake Champlain Phosphorus TMDL Phase I Plan Deliverables

*** The light blue-shaded tasks are milestones specified in the Lake Champlain TMDLs
Accountability Framework – the guide containing required tasks for monitoring progress in the restoration of
Lake Champlain*

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
ANR/DEC, AAFM, VTrans, ACCD, Administration	Establish a Clean Water Fund Support Office of the State Treasurer Legislative Report on Clean Water Funding	Act 64: 06/16/2015 established fund; Legislative report due 1/15/2017; Legislative action anticipated by 6/2017	Established Fund; Requires legislative action to sustain fund beyond 6/30/2018; Legislative Report by State Treasurer on clean water funding options under development (due 1/2017); New legislative target date to select revenue sources to sustain Fund: 6/30/2017	No
ANR/DEC	Develop Clean Water Fund budget	June, 2017	FY16 & FY17 appropriated; FY18 budget proposed as part of state budget process; Next step: legislative budget approval and appropriations process	Annually
ANR/DEC	Develop Stormwater Management Practices Handbook for sub-jurisdictional activities	Act 64: 1/1/2016	Completed web-based materials and hard copy; New target date to publish handbook: 3/1/2017	No
ANR/DEC, AAFM	ANR and AAFM shall each develop 3 performance measures relating to MOU	Act 64: 7/1/2016	Part of MOU update process and based on Results Based Accountability measures that are under development; New Target Date: 1/31/2017	No
ANR/DEC, AAFM	Develop ANR/AAFM MOU regarding the concentrated animal feeding operation (CAFO) program and relationship with state large, medium and small farm operations (LFO, MFO and SFO, respectively), enforcement and implementation	Act 64: 7/1/2016	Integrating three MOUs (CAFO, enforcement, nonpoint source pollution) into one MOU; Schedule for revision and MOU under development; Anticipate public comment period in December, 2016; New Target Date: 1/31/2017	No

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
ANR/DEC, AAFM	Develop ANR/DEC and AAFM MOU relating to AAFMS's request to ANR to take enforcement action to enforce 6 V.S.A. Ch. 215.	Act 64: 7/1/2016	Integrating three MOUs (CAFO, enforcement, nonpoint source pollution) into one MOU; Schedule for revision and MOU under development; New Target Date: 1/31/2017	No
ANR/DEC, AAFM	Update Water Quality Standards Anti-Degradation Implementation Rule	Act 64: 7/1/2016	VT Water Quality Standards rule completed and approved on 11/17/2016; anti-degradation rule to be completed in 2017; Champlain TMDL deadline: 12/30/2017	No
ANR/DEC, AAFM, VTrans, ANR/FPR	Update Phase 1 Plan to reflect final Lake Champlain Phosphorus TMDL and how basin plans will be used for TMDL implementation and hold 30-day public comment period	Act 64: Three months following release of final TMDL; Deadline: 9/15/2016	Completed; Responsiveness Summary under development; New Target Date: 1/15/2017	No
ANR/DEC, AAFM	Develop accounting and tracking system including ability to estimate phosphorus load reductions achieved by TMDL implementation activities at the BMP level and documentation protocol to describe methods used to estimate pollutant load reductions	Champlain TMDL deadline: 12/30/2016	Completed; incorporated EPA's phosphorus tracking tool into project data base; in partnership with Keurig and the Nature Conservancy, online mapping system under development; Target Date: 12/30/2017	No
ANR/DEC	Prepare and maintain management plan to assure that the State is meeting water quality standards and include a schedule for updating basin plans	Schedule: 2015: 2 Plans 2016: 2 Plans 2017: 3 Plans 2018: 3 Plans 2019: 3 Plans 2020: 2 Plans	Tactical basin plans scheduled for 2015 and 2016 on-schedule. Statewide Strategy undergoing revision; Lake TMDL Phase 1 plan includes release schedule of tactical basin plans	Schedule for issuance of tactical basin plans in Lake TMDL Phase 1 Plan
ANR/FPR	Revise by rule the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs (Act 64, Sec. 49)	Champlain TMDL deadline: 12/30/2016	Completed and in effect on 10/22/2016. Next step is to complete the AMP guide. Anticipated deadline: 12/30/2017	No

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
ANR/DEC, AAFM	Revise ANR/DEC/AAFM MOU for the agricultural nonpoint source program	Champlain TMDL deadline: 12/30/2016	Integrating three MOUs (CAFO, enforcement, nonpoint source pollution) into one MOU; Schedule for revision and MOU under development; New Target Date: 1/31/2017	No
ANR/DEC	Update Vermont Stormwater Management Manual	Champlain TMDL deadline: 12/30/2016	In Rule-making; on track for meeting deadline	No
ANR/DEC	Complete Update of Tactical Basin Plans (Phase 2 Implementation Plans) for Lamoille and Missisquoi basins	Champlain TMDL deadline: 12/30/2016	On Track	To be updated using Tactical Basin Planning five year cycles
ANR/DEC	Issue TS4 Permit for VTrans State roads and VTrans non-road developed lands	Champlain TMDL deadline: 12/30/2016	On Public Notice; on track for meeting deadline	No
ANR/DEC, Office of the State Treasurer	Report to the Legislature on Financing of Statewide Clean Water Improvement (in partnership with Office of State Treasurer, Dept. of Taxes, AAFM, VTrans, ACCD)	Act 64: 1/15/2017	Held 23 stakeholder and public meetings; on track for meeting deadline	No
AAFM, ANR/DEC	Report to Legislature on meeting agricultural nonpoint source pollution MOU performance measures	Act 64: 1/15/2017	Under development	1/15/2017 and annually thereafter
AAFM, ANR/DEC	Submit report to legislature on current scientific research and recommendations to amend RAPs to reduce nutrient contributions from tile drainage	Act 64: 1/15/2017	Under development; Champlain TMDL deadline: 12/30/2017	No
ANR/DEC, AAFM	Report to Legislature on the execution of the Phase I Implementation Plan for the Lake Champlain TMDL	Act 64: 1/15/2017	To be integrated into the Clean Water Initiative Annual Investment Report	1/15/2017, and every four years thereafter
AAFM	As part of the Small Farm Certification Program, Farms are to certify for compliance with RAPs	Act 64: 7/1/2017	--	7/1/2017 and annually thereafter
ANR/DEC	Issue Municipal Roads General Permit	Champlain TMDL deadline: 12/30/2017	On track; draft standards developed; outreach to municipalities underway	No
ANR/DEC	Adopt rules to manage stormwater runoff, including technical standards and BMPs	12/31/2017	Draft under development; stakeholder process will be held in 2017	No

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
ANR/DEC	Issue Stormwater general permit for impervious surfaces equal to or greater than 3 acres	Champlain TMDL deadline: 12/30/2017	Under development; stakeholder process to be held in 2017	No
ANR/DEC	Complete Update of Tactical Basin Plans (Phase 2 Implementation Plans) for Poultney, Mettowee and Lower Lake Champlain basins	Champlain TMDL deadline: 12/30/2017	--	To be updated using Tactical Basin Planning five year cycles
ANR/DEC	Update existing regulated municipal MS4 permits to include Phosphorus Control Plan requirements that are consistent with the TMDLs' targets	Champlain TMDL deadline: 12/30/2017	Under development; stakeholder process to be held in 2017	No
AAFM	Target funding for agricultural BMP and Nutrient Management Plan implementation for Missisquoi Bay, St. Albans Bay & South Lake	Champlain TMDL deadline: 12/30/2017	Underway	Likely; Need remains
AAFM	Complete education, outreach & compliance activities with farms in the Missisquoi Bay watershed per Section II,6 of Secretary of AAFM 2/3/2016 decision	Champlain TMDL deadline: 12/30/2017	Underway	No
AAFM	Commence notification of affected farms about the Assessment and Plan process, per Section II,6 of Secretary of AAFM 2/3/2016 decision	Champlain TMDL deadline: 12/30/2017	--	No
ANR/DEC, AAFM, VTrans, ACCD, Administration	Establish long-term revenue source to support water quality improvement via the Clean Water Fund	Champlain TMDL deadline: 12/30/2017	Requires legislative decision-making in Leg. Session 2017 to establish revenue source for FY19 budget	No
AAFM	Revise RAPs to include requirements to reduce nutrient pollution from tile drains and other priority actions (Act 64, Sec. 4)	Act 64: 1/15/2018	--	No

COMPLETED Clean Water Initiative Deliverables

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
AAFM, ANR/DEC	Submit interim progress report to legislature on impacts from tile drainage	Act 64: 1/15/2016	Report completed	No
ANR/DEC	Report on lowering the impervious surface regulatory permitting threshold from one acre to 1/2 acre	Act 64: 1/15/2016	Report completed	No
ANR/DEC	Report to Legislature on Basin Planning Progress	Act 64: 1/15/2016	Report completed	1/15/2016 and annually thereafter
ANR/DEC	Report to Legislature on land application of septage and sludge	Act 64: 1/15/2016	Report completed	No
ANR/FPR	Report to legislature on recommendation on how to implement forestry AMPs as mandatory practices, how to enforce AMPs, whether maple syrup production should be enrolled in UVA as managed forestland	Act 64: 1/15/2016	Report completed	No
ANR/DEC	Report on activities and progress of water quality ecosystem restoration programs	Act 64: 2/1/2016	Report completed	2/1/2016 and annually thereafter
ANR/DEC	Develop TMDL implementation tracking system at ANR/DEC with ability to estimate phosphorus load reductions achieved by TMDL implementation activities	Act 64: 6/1/2016	Tracking System completed	No
ANR/DEC, AAFM, VTrans	Develop databases to consistently track TMDL implementation activities achieved through regulatory and funding programs across agencies, and link databases with ANR/DEC TMDL implementation tracking system	Champlain TMDL deadline: 12/30/2016	Databases completed	No
ANR/DEC	Update Combined Sewer Overflow (CSO) Rule	Champlain TMDL deadline: 12/30/2016	Rule completed	No

Agency	KEY TASK	DEADLINE	UPDATE	RECURRING?
AAFM	As part of revisions to Required Agricultural Practices (RAP; formerly "Accepted agricultural practices or AAP), adopt by rule requirements for training classes or programs for farmers	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	As part of RAP revisions, adopt by rule a custom applicator certification program for operating in VT (Act 64, Sec. 16)	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	Adopt small farm certification program	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	Revise AAPs to improve water quality in the state and implement the small farm certification program	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	Develop a matrix and small farm template for nutrient management planning	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	Establish livestock exclusion standards to prevent erosion and water quality impacts (Act 64, Sec. 4)	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No
AAFM	Establish a training program and schedule for all farmers to complete training	Champlain TMDL deadline: 12/30/2016	RAPs completed; effective date: 12/05/2016	No

Key

AAFM: Agency of Agriculture, Food and Markets

ACCD: Agency of Commerce and Community Development

ANR: Agency of Natural Resources

DEC: Department of Environmental Conservation at ANR

CAFO: Concentrated animal feeding operation

FPR: Forests, Parks and Recreation Department at ANR

LFO: Large Farm Operations Program at AAFM

MFO: Medium Farm Operations Program at AAFM

MOU: Memorandum of Understanding

RAPs: Formerly Accepted Agricultural Practices; now referred to as Required Agricultural Practices

SMO: Small Farm Operations Program at AAFM

TMDL: Total Maximum Daily Loads

TS4: Transportation Separate Storm Sewer System General Permit, Issued by ANR/DEC

VTrans: Vermont Agency of Transportation

Appendix C

Listing of Clean Water Initiative State-Funded Projects State Fiscal Year (SFY) 2016 By Agency and Funding Program In the Lake Champlain Basin and Statewide

Vermont Agency of Agriculture, Food and Markets

Grants and Contracts Awarded in SFY2016 in the Lake Champlain Basin and Statewide _____ 54

Vermont Agency of Natural Resources, Department of Environmental Conservation

Ecosystem Restoration Grants and Contracts Awarded in SFY2016 in the Lake Champlain Basin and Statewide _____ 55

Clean Water State Revolving Fund Loans Awarded in SFY2016 in the Lake Champlain Basin _____ 57

Vermont Agency of Natural Resources, Fish and Wildlife Department

Watershed Grants Awarded in SFY2016 in the Lake Champlain Basin and Statewide _____ 58

Vermont Agency of Transportation

Better Roads Grants Awarded in SFY2016 in the Lake Champlain Basin _____ 59

Transportation Alternatives Program Grants Awarded in SFY2016 in the Lake Champlain Basin _____ 60

Vermont Agency of Agriculture, Food and Markets

Grants and Contracts Awarded in SFY2016 in the Lake Champlain Basin and Statewide

Funding Program	Partner	Summary Title	Funding
Best Management Practice	Agricultural Producers	Erosion Control on Access Roads, Animal Trails, and Walkways	\$19,219
Best Management Practice	Agricultural Producers	Compost Facility Runoff Reductions	\$65,000
Best Management Practice	Agricultural Producers	Clean Water Diversion from Barnyards ¹	\$42,898
Best Management Practice	Agricultural Producers	Heavy Use Area Runoff Controls	\$298,527
Best Management Practice	Agricultural Producers	Stream Crossing	\$3,960
Best Management Practice	Agricultural Producers	Use Exclusion	\$1,553
Best Management Practice	Agricultural Producers	Waste Storage, Transfer, and Treatment Structures	\$615,485
Best Management Practice	Agricultural Producers	Watering Facility	\$10,270
Farm Agronomic Practice	Agricultural Producers	Farm Agronomic Practices ²	\$102,661
Conservation Reserve Enhancement Program	Agricultural Producers	Riparian Buffer Restoration	\$20,038
Water Quality	Natural Resources Conservation Districts	Technical Assistance	\$70,000
Clean Water Fund Grants and Contracts	New England Interstate Water Pollution Control Commission/Lake Champlain Basin Program	Tile Drainage Study in Jewett Brook Watershed	\$12,900
Clean Water Fund Grants and Contracts	University of Vermont (UVM) Extension	Technical Assistance and Outreach to Farm Owners on Clean Water Business Management (i.e., Farm Viability)	\$105,000
Clean Water Fund Grants and Contracts	UVM Extension	Custom Manure Applicator Certification Program	\$60,000
Clean Water Fund Grants and Contracts	UVM Extension	Technology for Crop and Nutrient Record Keeping	\$56,000
Clean Water Fund Operational	Vermont Agency of Agriculture, Food and Markets	Increased On-Farm Oversight to Enforce Regulatory Requirements	\$450,000

¹ Clean Water Diversion from barnyards includes installation of pipelines and roof runoff management structures.

² Farm Agronomic Practices include cover crop, crop rotation, nurse crop, alternative manure application, strip cropping, and conservation tillage.

Vermont Agency of Natural Resources, Department of Environmental Conservation
Ecosystem Restoration Grants and Contracts Awarded in SFY2016 in the Lake Champlain Basin and Statewide

Project Topic and Category Key

Topics:

- A: Agricultural Runoff
- F: Forestry
- R: River Corridor/Floodplain Restoration/Protection
- Rd: Road Construction/Maintenance
- S: Stormwater Runoff
- W: Wetland

Categories:

- 1: Assessments, Planning, and Project Development
- 2: Project Design
- 3: Project Implementation
- 3E: Implementation through Capital Equipment Assistance

County	Partner	Summary Title	Funding	Topic	Category
Addison, Bennington, Rutland	Vermont Association of Conservation Districts	Agricultural Best Management Practice Implementation in South Lake Champlain and Beyond	\$150,000	A	3
Caledonia	Caledonia County NRC	Hardwick Stormwater Master Plan	\$24,700	S	1
Chittenden	Chittenden County Regional Planning Commission	Jericho Stormwater Master Plan	\$19,000	S	1
Chittenden	South Burlington	Bartlett Brook Central Stormwater Infiltration Project	\$400,000	S	3
Chittenden	Fitzgerald Environmental Associates	Crooked Creek Gully Restoration	\$40,000	A	3
Chittenden	Winooski NRC	Winooski Trees for Streams/Riparian Buffer Restoration, 2016	\$14,300	R	3
Chittenden	Burlington	Burlington Stormwater Master Planning	\$100,000	S	1
Chittenden	Lewis Creek Association	Preparing Local Watersheds for Flood Resilience and Reducing Runoff in Lewis Creek	\$67,254	S	2
Chittenden	Williston	Williston Town Fields Stormwater Treatment System	\$49,877	S	3
Chittenden	South Burlington	Village at Dorset Park Stormwater Pond Improvements	\$250,000	S	3
Franklin	UVM Extension	Enhancing Nutrient Management Plan Implementation with GoCrop Software	\$57,577	A	1
Franklin	UVM Extension	Reduction of Fall Tillage in Jewett and Stevens Brook Watersheds	\$102,154	A	3E
Franklin	Franklin Watershed Committee	Towle Neighborhood Road Erosion Control - Planning and Design	\$8,800	Rd	2

County	Partner	Summary Title	Funding	Topic	Category
Franklin	Friends of Northern Lake Champlain	Feasibility Study into the Relocation of Enosburg Town Garage to Prevent Erosion and Runoff to Surface Waters	\$12,000	S	1
Grand Isle	Lamoille County NRCDC	Alburgh Stormwater Mitigation and Road Erosion Control Designs	\$1,350	S	2
Lamoille	Vermont Land Trust	Rankin Farm River Corridor Easement	\$40,349	R	3
Lamoille	Vermont Land Trust	Kaiser Farm River Corridor Easement	\$42,098	R	3
Lamoille, Washington	Stone Environmental	Upper Winooski River Illicit Discharge Detection and Elimination - Follow-up Investigation	\$37,175	S	1
Orleans	Vermont Land Trust	Moulton River Corridor Easement	\$70,699	R	3
Rutland	Poultney-Mettowee NRCDC	Castleton Headwaters Stormwater Master Plan	\$28,000	S	1
Rutland	Rutland NRCDC	Green Stormwater Infrastructure Design in the East Creek Watershed	\$17,050	S	2
Rutland	Poultney-Mettowee NRCDC	Lake Bomoseen Stormwater Master Planning	\$24,430	S	1
Rutland	Rutland NRCDC	Adams Street Outfall Stormwater Treatment System Installation	\$82,500	S	3
Rutland	Poultney Village	York Street Infiltration Basin Installation	\$180,000	S	3
Washington	Central Vermont Regional Planning Commission	Barre City, Barre Town, and Plainfield Stormwater Master Plan	\$95,641	S	1
Washington	Central Vermont Regional Planning Commission	Berlin Stormwater Master Plan	\$45,248	S	1
Washington	UVM Extension	Precision Manure Application Equipment in the Jewett Brook Watershed	\$75,000	A	3E
Washington	Friends of the Winooski River	Dog River Floodplain Restoration Design	\$30,340	R	2
Washington	Friends of the Winooski River	Hayes Road Erosion Control Project	\$25,000	R	3
Washington	Vermont Land Trust	Rogers Farm River Corridor Easement	\$85,309	R	3
Washington	Friends of the Winooski River	Quarry Hill and Sterling Hill Stormwater Master Planning	\$19,490	S	1
Washington	Stone Environmental	Montpelier Illicit Discharge Detection and Elimination	\$43,080	S	1
Washington	Friends of the Winooski River	Cabot School Stormwater Mitigation - Construction	\$9,522	S	3
Washington	Waitsfield	Constructing Green Stormwater Infrastructure at the Waitsfield Town Office	\$15,000	S	3
Washington	Winooski NRCDC	Absorbing the Storm at Rumney Memorial School - Construction	\$97,750	S	3

County	Partner	Summary Title	Funding	Topic	Category
Washington	Central Vermont Regional Planning Commission	Northfield Village Bioretention Installation	\$110,695	S	3
Washington	Montpelier	Taylor Street Redevelopment – Green Stormwater Infrastructure and Green Space	\$230,000	S	3
Washington	Montpelier	Taylor Street Redevelopment – Green Stormwater Infrastructure including Bioretention, Stormwater Sidewalks, and Tree Filters	\$250,000	S	3
Regional – Lake Champlain Basin	Cold Hollow to Canada	Mapping Forest Roads, Trails, and Log Landings on Private Forests to Identify Erosion Hotspots	\$10,441	F	1
Regional – Lake Champlain Basin	Arrowwood	Lake Champlain Basin Wetlands Project Outreach and Development under the Regional Conservation Partnership Program	\$119,999	W	1
Statewide	Vermont Association of Conservation Districts	Statewide Trees for Streams/Riparian Forest Restoration, 2016	\$173,250	R	3

Vermont Agency of Natural Resources, Department of Environmental Conservation
Clean Water State Revolving Fund Loans Awarded in SFY2016 in the Lake Champlain Basin

County	Partner	Summary Title	Funding	Category
Chittenden	Shelburne	WWTF and Collection Systems Refurbishment	\$37,800	1
Chittenden	Williston	Collection System Refurbishment	\$135,100	3
Orange	Williamstown	WWTF Refurbishment	\$135,900	2
Rutland	Castleton	WWTF and Collection Systems Refurbishment	\$21,500	1

WWTF: Wastewater treatment facility
 Refurbishment: Refurbish existing technology with newer equipment

Category Key:
 1: Assessments, Planning, and Project Development
 2: Project Design
 3: Project Implementation

Vermont Agency of Natural Resources, Fish and Wildlife Department
Watershed Grants Awarded in SFY2016 in the Lake Champlain Basin and Statewide

Project Topic and Category Key

Topic Key:

- C: Cross Sector
- F: Forestry
- R: River Corridor/Floodplain Restoration/Protection

Category Key:

- 1: Assessments, Planning, and Project Development
- 2: Project Design
- 3: Project Implementation
- E: Educational

County	Partner	Summary Title	Funding	Topic	Category
Addison	Lake Champlain Maritime Museum	Lewis Creek Watershed from Headwaters to Lake Champlain: A Pilot Education Program for Tributaries	\$4,950	C	E
Addison	Lewis Creek Association	Workshops and Analysis to Enhance Flood Resiliency of Headwater Forests	\$4,998	F	E
Franklin	Missisquoi River Basin Association	Missisquoi Water Quality Sampling	\$3,500	C	1
Franklin	Northern Forest Canoe Trail	East Highgate Dam Remains Removal	\$10,000	R	3
Rutland	Trout Unlimited	Mettowee River Connectivity Project and Culvert Restoration	\$5,000	R	3
Washington	Winooski River NRCD	Improving Fish Passage on Chase and Slide Brooks	\$6,305	R	3
Regional – Lake Champlain Basin	Lake Champlain Committee	Lake Champlain Basin Flood Resiliency Education: Lessons from the Floods	\$5,000	R	E
Statewide	Valley Quest	Valley Quest Watershed Institute Curriculum Development	\$5,000	C	E
Statewide	Vermont River Conservancy	Community Based Riparian Restoration and Recreation Enhancement Project	\$8,750	R	3

Vermont Agency of Transportation

Better Roads Grants Awarded in SFY2016 in the Lake Champlain Basin

Project Category Key

Category A: Road Inventory and Capital Budget Planning

Category B: Correction of a Road Related Erosion Problem and/or Stormwater Mitigation for gravel and paved roads

County	Partner	Summary Title	Funding	Category
Addison	Lincoln	South Lincoln Road Improvements	\$10,000	B
Addison	Waltham	Buck Mountain Sports Culvert	\$2,600	B
Bennington	Dorset	Squirrel Hollow Retaining Wall	\$10,000	B
Chittenden	Essex	Brigham Hill Ditching	\$9,996	B
Chittenden	Huntington	Taft Road water quality Protection	\$10,000	B
Chittenden	Jericho	Category A Planning Grant	\$4,000	B
Chittenden	Milton	Quarry Lane Culvert Replacement	\$10,000	B
Chittenden	Williston	Stone Line East Hill Road Phase Two	\$10,000	B
Franklin	Berkshire	Richmond Road Ditching	\$8,286	B
Franklin	Enosburg	Perley Road Project	\$6,802	B
Franklin	Fletcher	School Road	\$10,000	B
Franklin	Franklin	Gallup Road Ditching	\$10,000	B
Franklin	Swanton	Sweet Hollow Ditching/Slope Stabilization	\$10,000	B
Franklin	Enosburg	Duffy Hill Drainage Project	\$10,000	B
Franklin	Fairfield	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Franklin	Highgate	Highgate Road Inventory	\$4,000	A
Franklin	Swanton	Road Erosion Inventory/Capital Budget Plan	\$3,842	A
Franklin	Enosburg	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Grand Isle	Grand Isle	Road Erosion Inventory/Capital Budget Plan	\$3,200	A
Grand Isle	North Hero	Road Erosion Inventory/Capital Budget Plan	\$3,200	A
Lamoille	Hyde Park	Cooper Hill & McKinistry Hill Erosion	\$10,000	B
Lamoille	Belvidere	Florence Road Swale Improvements	\$10,000	B
Lamoille	Cambridge	Cady Hill Road	\$10,000	B
Lamoille	Eden	Cooper Hill Phase 1	\$10,000	B
Lamoille	Johnson	Foot Brook Road Erosion	\$10,000	B
Lamoille	Stowe	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	Benson	Parkhill Road Erosion	\$10,000	B
Rutland	Middletown Springs	Coy Hill Ditching	\$9,013	B
Rutland	Pittsford	Depot Hill Road	\$5,208	B

County	Partner	Summary Title	Funding	Category
Rutland	Castleton	Culvert Inventory/Capital Plan	\$4,000	A
Rutland	Danby	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	Middletown Springs	Road Inventory/Culvert Update	\$4,000	A
Rutland	Pittsford	Culvert/Structure Inventory	\$3,200	A
Rutland	Poultney	Village Road, Culvert Inventory/ Capital Plan	\$4,000	A
Rutland	Tinmouth	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	West Haven	Road Erosion Inventory/Capital Budget Plan	\$4,000	A
Rutland	Chittenden	Road Inventory/Culvert Update	\$4,000	A
Washington	Cabot	TH#30 Bank Stabilization	\$10,000	B
Washington	Calais	Mirror Lake Road	\$6,648	B
Washington	Duxbury	Hayes Road Culvert	\$10,000	B
Washington	Warren	West Hill, Lincoln Slide	\$10,000	B
Washington	Duxbury	Road Erosion Assessment	\$4,000	A
Washington	Middlesex	Gravel Roads Erosion Assessment	\$4,000	A
Washington	Moretown	Road Erosion Assessment	\$4,000	A
Washington	Waitsfield	Gravel Roads Assessment	\$4,000	A

Vermont Agency of Transportation

Transportation Alternatives Program Grants Awarded in SFY2016 in the Lake Champlain Basin³

County	Partner	Summary Title	Funding
Chittenden	Essex	Sydney Drive Detention Pond Stormwater Treatment Retrofit	\$243,953
Chittenden	Essex	Village-Owned Road Gravel Wetland Stormwater Treatment System	\$142,456
Chittenden	South Burlington and Shelburne	Shelburne Bay Gravel Wetland Stormwater Treatment System	\$87,000
Chittenden	South Burlington	Butler Farms and Oak Creek Village Undersized Culvert Replacements	\$300,000
Franklin	Fairfield	Salt Shed Construction near the Black River	\$300,000

³ VTrans Transportation Alternatives federal funds were allocated through the State legislature specifically for stormwater mitigation projects in 2016.