

State of Vermont Proposal for a Clean Lake Champlain

Draft for Discussion

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Vermont Department of Environmental Conservation

Vermont Agency of Agriculture, Food, and Markets

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1.0. Introduction

Vermonters value a clean Lake Champlain. We swim and fish in the lake, we boat on it, we drink its water, and we generally like being around it. A clean lake attracts businesses and tourists to the region and provides a major driver of the state's economy.

Phosphorus pollution is the greatest threat to clean water in Lake Champlain. Phosphorus is a nutrient that stimulates excessive growth of algae in the lake, turning the water green and making it unsuitable at times for swimming or drinking. Phosphorus is found in eroded sediment and runoff from farm fields, barnyards, roads, parking lots, and streambanks, and in wastewater discharges.

Efforts to reduce all these sources of phosphorus have accelerated over the past ten years but the lake has been slow to recover. There are many reasons for this and some are beyond our immediate control, but the biggest reason is that we have not done enough.

In 2002, the U.S. Environmental Protection Agency (EPA) approved a Lake Champlain Phosphorus Total Maximum Daily Load (TMDL) prepared by the states of Vermont and New York. The TMDL placed a cap on the amount of phosphorus allowed to enter Lake Champlain, and allocated that maximum amount among the various sources within each major watershed draining to the lake. In 2011, the EPA revoked its approval of the Vermont portion of the Lake Champlain TMDL and is in the process of developing a new TMDL.

Phosphorus loading to Lake Champlain is dominated by “nonpoint sources,” which are generated by runoff and erosion across the landscape, as opposed to “point sources” such as wastewater and certain stormwater discharges that are conveyed by a pipe and are more closely regulated. For a TMDL to be approved in this situation, the EPA must find “reasonable assurances” that the necessary nonpoint source phosphorus reductions will actually occur. Insufficient reasonable assurance was the primary reason given by the EPA for reversing its approval of the 2002 TMDL.

In order to ultimately achieve a clean Lake Champlain and to provide reasonable assurances in the new Lake Champlain TMDL, the Vermont Agencies of Natural Resources and Agriculture, Food, and Markets are proposing the following set of policy commitments for consideration. These proposed policies address all major sources of phosphorus to Lake Champlain and involve new and increased efforts from nearly every sector of society, including state government, municipalities, farmers, developers, and homeowners. All of us contribute to the phosphorus problem and we must commit to act together. We expect that these proposed policies will be discussed and refined during the coming months. Reasonable schedules should be established that give municipalities, farmers, developers, and the State time to plan for the higher levels of effort and expense that will be required. This proposal is a first step in this process.

2.0. Agricultural Programs

2.1. Water Quality Permitting Programs – LFO, MFO, CAFO

Description

Vermont has three permitting programs to assist farmers with managing their waste to prevent contamination of surface waters – the Medium and Small Farm Operation Rules and supporting Medium Farm Operations (MFO) General Permit and the Small or Medium Farm Individual Permits, the Large Farm Operations (LFO) Rules and Individual Permits, and a Concentrated Animal Feeding Operations (CAFO) Permit.

The Medium and Small Farm Operational Rule, managed by the Vermont Agency of Agriculture, Food and Markets (VAAFAM), applies a Vermont state general permit to farms with animal numbers that meet the minimum thresholds, such as dairy farms with 200-699 mature animals, 300-999 cattle or cow/calf pairs, 150-499 horses, 16,500-54,999 turkeys, and 25,000-81,999 laying hens without liquid manure handling system. The rules also provide for an individual permit for small or medium farms that meet specific tests, such as utilizing new or innovative technologies or a history of non-compliance.

The Medium and Small Farm Operation Rule prohibits and prevents discharges of wastes from a farm's production area to waters of the state and requires manure, compost, and other wastes to be land applied according to a nutrient management plan. VAAFAM is required by law to inspect all farms permitted under these rules at least once every five years. However, many farms are visited more often, due to permit compliance needs. The MFO general permit has been in existence since February, 2007 and was revised in 2012. Currently, there are 155 farms under the MFO general permit throughout Vermont, and 116 of these farms are in the Vermont portion of the Lake Champlain Basin.

The LFO program, also managed by the VAAFAM, applies an individual permit to farms with animal numbers that meet the minimum thresholds, such as having more than 700 mature dairy cows, 1,000 beef cattle or cow/calf pairs, 1,000 young-stock or heifers, 500 horses, 55,000 turkeys, or 82,000 laying hens without a liquid manure handling system. An LFO permit prohibits and prevents the discharge of wastes from a farm's production area to waters of the state and requires the farm to land apply manure, compost, and other wastes according to a nutrient management plan. An LFO permit also regulates odor, noise, traffic, insects, flies, and other pests, construction siting, and setbacks. VAAFAM inspects all LFOs throughout Vermont and the Lake Champlain Basin annually. The LFO Rules have been in effect since 1999, and were updated in 2007. There are 20 permitted LFOs in Vermont, 13 of which are in the Lake Champlain Basin.

The CAFO general permit is a federal Clean Water Act permit for MFOs managed by the Vermont Department of Environmental Conservation (VDEC). It requires farms to properly

design, construct, operate, and maintain production areas to control waste. The permit prohibits a discharge of manure, litter, or wastewater, except when direct precipitation equivalent to or greater than a 25-year, 24-hour storm event causes a discharge. Any farm, regardless of size, that directly discharges to a surface water body could be required to obtain a CAFO individual permit.

Implementation Mechanism

VAAFM and VDEC will maintain adequate staffing to implement the three permitting programs as designed and prepare annual compliance reports. The compliance reports will contain state-verified information including but not limited to compliance with nutrient management plan requirements and the nature of any documented discharges. VAAFM will continue to inspect all LFOs annually and all MFOs at least once every five years. VDEC currently conducts a minimum of 12 inspections annually.

VDEC finalized the CAFO general permit on June 21, 2013. VAAFM and VDEC commit to the continued implementation of the agricultural water quality permitting programs.

Implementation Steps

1. VDEC, in cooperation with VAAFM, will conduct CAFO inspections statewide;
2. VAAFM will inspect all LFOs within the Lake Champlain Basin;
3. VAAFM will inspect MFOs within the Basin;
4. VDEC and VAAFM will conduct on-farm multi-agency inspections to insure consistency in the inspection process;
5. VDEC and VAAFM will hold trainings for inspection staff; and,
6. VAAFM and VDEC will produce annual compliance reports.

2.2. Accepted Agricultural Practice Rule Update and Compliance

Description

The Vermont Accepted Agricultural Practice Rule (AAPs), initially adopted in 1995 and updated in 2006, require that all farms in the state, regardless of size and type of operation, adopt and implement a set of minimum conservation practices to protect water quality. The program is not inspection-based like the MFO and LFO programs due to limited resources. Rather this program is essentially driven by internal or external notifications of possible violations. State-initiated and public notifications about suspected rule violations result in site investigations to determine compliance with the rule.

VAAFMM performs approximately 120 investigations annually. The investigations target specific complaints or obvious violations; they do not involve evaluating the entire farm operation to determine extent of AAP compliance. As described above, VAAFMM administers compliance inspection programs for MFOs and LFOs.

Vermont recognizes that further reductions of agricultural nonpoint source pollution will necessitate the following actions pertaining to the AAPs to reduce water pollution and achieve a more consistent and equitable regulatory environment for all farms:

1. Modify the AAPs Rule and Implementation Strategies to:
 - a. Conduct whole farm inspections of small farm to improve overall AAP compliance;
 - b. Initiate an AAP compliance certification process for all small farms;
 - c. Include additional and improved farming management practices on lands planted to annual crops, such as a minimum 25 foot vegetated buffers (in grass or trees) along all perennial streams and 10-foot vegetated buffers (in grass or trees) along field ditches;
 - d. Include a requirement for all farms to complete a nutrient management plan (NMP) matrix, which will direct farms that meet a specific threshold to develop and implement a 590 NRCS standard NMP;
 - e. Include a requirement to stabilize field gully erosion caused by site-specific agricultural management practices;
 - f. Explicitly exclude livestock from perennial streams where erosion is prevalent and in all production areas (see livestock exclusion program below);
 - g. Improve soil quality, further reduce soil loss, and decrease the impacts of soil erosion on water quality by: adopting a standard less than or equal to an average soil loss tolerance of “T,” as defined by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), for the prevalent soil type and applied to all farm fields in annual crop production;

VAAFM will need to offer greater oversight and assistance to farms to improve AAP compliance. To enhance effectiveness of BMP implementation, VAAFM will need to prioritize effort, focusing on potential “critical source areas” – areas at risk of causing or contributing to phosphorus loading – in impaired watersheds or watersheds determined by VDEC as having water quality concerns from agricultural runoff. VAAFM assumes the operational capacity of key federal partners such as the US Department of Agriculture Natural Resource Conservation Service (NRCS) remains constant at current levels.

Implementation Mechanism

VAAFM will undertake a rule-making process to update the AAPs rule with additional practices and achieve substantial compliance with AAPs by all livestock-based small farms in agriculturally impaired watersheds within the Lake Champlain Basin.

Implementation Steps

1. Support AMP and BMP implementation on small farms using key partners including UVM extension, NRCS, non-profit organizations, VACD;
2. Establish financial incentives for BMP implementation using state cost share rates (including combined federal and state rates) and technical assistance from partner organizations, structured to encourage early adoption of BMP practices;
3. Complete inspections of small livestock farms in agriculturally impaired watersheds;
4. Complete inspections of small livestock farms in agriculturally impaired watersheds throughout Vermont;
5. Report on SFOs compliance with the AAPs; and,
6. Continue to perform investigations into suspected AAP violations with VAAFM enforcement agents.

2.3. Livestock Exclusion from Surface Waters Program

Description

Livestock with unmanaged access to streams cause phosphorus, nitrogen, sediment, and pathogen pollution by depositing manure in the water and by trampling and destabilizing the stream banks. Reducing this source of pollution requires installation of fencing, water systems and crossings, or other control methods.

Confinement of dairy operations has reduced the number of livestock with access to surface water. Additionally, farms operating under a VAAFMM permit are required to fence livestock out of streams in all production areas. The AAPs currently require that adequate vegetation must be maintained. This regulation could result in the need for livestock exclusion fencing. The extent of livestock access to streams beyond these changes to farming operations and rules is unknown. A 2010 Report on Livestock Access to Streams¹ estimated that the minimum total cost of excluding all livestock (such as dairy, beef, and equine) is approximately \$33-\$78 million, depending on the type of fencing. Therefore, the program will evaluate the need and direct outreach and implementation resources to the highest priority areas.

The use of incentives has the potential to secure early participation in the program. Therefore, the program will adopt a declining cost-share with time provision following the inspection and identification of the need. The provision will offer 90 percent cost-share for the first year following inspection, declining to 75 percent and 50 percent in the subsequent second and third years of the program. The program will maintain a 50 percent cost share thereafter.

Implementation Mechanism

VAAFMM will design and implement a livestock exclusion incentive program that consists of a declining scale cost-share policy to encourage early adoption of livestock exclusion practices at unmanaged and unstable riparian areas.

VAAFMM will: (a) revise the AAPs to include specific language referencing livestock exclusion on perennial streams where erosion is present and in all production areas, regardless of farm size or type; (b) develop a performance-based policy for a livestock exclusion program, in cooperation with VDEC and other partners; and (c) exclude livestock from all eroding perennial streambanks.

¹ 2010 report conducted by Vermont agricultural field staff, farmers, researchers and agency personnel.

Implementation Steps

1. Add performance-based livestock exclusion policy in revised AAPs;
2. Create, market, and implement a livestock exclusion incentive program that consists of a declining scale cost-share with a time provision to encourage early adoption of livestock exclusion practices;
3. Include the use of third party certified livestock grazing plans in the livestock exclusion policy;
4. Mandate livestock exclusion from perennial streams where an eroding bank exists and where adequate vegetative cover is not maintained (except at defined crossings and lands managed under approved livestock grazing plans);
5. Mandate livestock exclusion from surface waters in production areas (except at defined crossings and lands managed under approved livestock grazing plans); and,
6. Use inspections and develop resource plans to increase technical assistance.

2.4. Nutrient Management Plan (NMP) Assistance and Requirements

Description

The current nutrient management planning program delivers technical assistance to help all farmers manage soils, apply fertilizers, and manage animal waste in ways to improve crop yield and quality, reduce the costs of fertilizer, reduce phosphorus loss from farm fields, and reduce runoff that can contaminate water quality. Implementation of nutrient management plans have been shown to save farmers money. The program involves farmer outreach, training, and certification, and applicator training workshops. The program focuses on the source, rate, method, placement, and timing of nutrient applications, with an emphasis on assisting small farms.

Nutrient management plans contain many aspects of land management, including tolerable soil loss erosion requirements, nutrient indices, nutrient application rates, and additional conservation practices. The tolerable soil loss requirement for specific soil types caps the amount of soil erosion that is allowed to occur in a field. In order to meet the soil loss requirements, farms may be required to use conservation practices such as cover cropping, reduced tillage and alternative planting methods. The NMP also requires that fields with a phosphorus and/or nitrogen index that demonstrate higher risk of nutrient losses must adopt alternative conservation practices to reduce the risk of phosphorus and/or nitrogen losses. Examples of additional management practices that may be required to reduce the risk of nutrient losses include: installing edge of field buffers, limiting the number of manure applications, and in cases where the indices are very high, stopping manure or fertilizer application until the risk of nutrient losses is reduced.

All farms benefit from nutrient management planning, and some farms are already required to develop and implement NMPs. Medium Farm Operations (MFOs), Large Farm Operations (LFOs), and those small farms that have received NRCS cost-share assistance for waste management are required to have NMPs that follow the “590 NMP Practice Standard” contained in the NRCS Field Office Technical Guide. Other small farms have developed their own NMPs through University of Vermont Extension educational programs or the VAAFV Nutrient Management Incentive Grant Program. However, many small farms need additional technical assistance in conducting nutrient management planning.

Revisions to the AAPs will increase the number of producers that are developing and implementing 590 standard NMPs, by creating a screening process for evaluating plan needs based on criteria such as animal numbers, density and location.

Adjustments in nutrient management planning in the areas of livestock exclusion, buffers, and winter spreading may be allowed in site-specific instances, where producers have demonstrated adherence to all state and federal regulations, and have situations where these practices will in no way cause negative impacts to water quality. These adjustments may positively affect water

quality by allowing more targeted, appropriate nutrient application and would allow for more cost-effective use of limited resources:

(a) Livestock exclusion grazing management plans

A universal livestock exclusion policy, compared to a targeted livestock exclusion policy, is extremely costly, and may not be cost-effective or environmentally beneficial in all circumstances. A farm prioritizes the environmental impacts of their operation, targeting the highest ranking concerns. In some instances, livestock exclusion of a few animals on a large number of acres may not be the most beneficial practice to implement from a cost and long-term operation and maintenance perspective. Furthermore, there are farms that have demonstrated that they can effectively use intensive grazing strategies to manage the environmental impacts of grazing a pasture adjacent to a stream. In order to allow flexibility, the VAAFMM is proposing that farms that are fully compliant with the AAPs and, if applicable, the MFO and/or LFO rules, may utilize a third-party certified livestock grazing management plan. This plan allows for prescribed streambank grazing where there is a demonstrated need to utilize this management strategy.

(b) Winter spreading ban

The current winter spreading ban poses the unintended consequence of increasing the risk of soil compaction as well as spreading during the wetter times of the year. The ban forces farmers to spread manure at very high rates using heavy tractors and tanks in the spring -- the time of year when the soils are often wet and the risk of increases in runoff and concurrent bankfull flows are the greatest. For AAP and state permit-compliant farms, a third party Technical Service Provider (TSP) can develop a NMP that identifies fields that: (a) are not adjacent to surface waters or contains setbacks greater than 150 feet; and, (b) have slopes of 3 percent or less and ensure manure application rates are no greater than 3,000 gallons per acre.

(c) Field-Specific Buffers

Site specific buffers that seek to minimize runoff potential make better use of the productive land while enhancing environmental goals. Buffers may be greater than 25' in high risk areas, and a minimum of 10' where water does not leave the field. Field specific buffers would only be allowed with a certified NMP.

Implementation Mechanism

VAAFMM will revise the AAPs

VAAFMM will redesign and implement a nutrient management planning assistance program. Actions include: (a) revising the AAPs to include NMP requirements; (b) developing a NMP matrix which will determine which farms are required to complete a 590 standard NMP. (The

goal of the matrix is to ensure that only farms that have resource concerns and potential for water quality issues are required to develop and implement NMPs); (c) revising the MFO and LFO programs to include site specific NMP requirements; (d) developing and implementing educational materials; (d) working with NRCS to implement the NMP TSP training and certification program; (e) creating site-specific NMP TSP program standards; (f) enhancing the current level of courses offered for farms to develop their own NMPs under the supervision of a certified TSP; and (g) achieving substantial compliance with NMPs by all livestock farms in agriculturally impaired watersheds within the Lake Champlain Basin.

Implementation Steps

1. Develop a small farm NMP matrix;
2. Expand the availability of small farm NMP development course;
3. Develop and offer a NMP training program for TSPs;
4. Develop and offer a training program for contractors (e.g., manure applicators);
5. Contract with organizations to develop and implement annual nutrient management planning workshops; and,
6. Conduct assessments of all livestock farms in agriculturally impaired watersheds for compliance with regulations.

2.5. Small Farm Certification Program

Description

Owners or operators of small farms, as defined in the revised AAPs, will need to certify every five years that they comply with the Accepted Agricultural Practices (6 V.S.A. Chapter 215). The certification will document the number and type of animals and acreages in agriculture. The certification will also specify that the farm does not directly discharge wastes into surface waters from a discrete conveyance such as a pipe or ditch.

Implementation Mechanism

VAAFMM will complete the AAP update that will include a small farm AAP certification program and enable increased sharing of agricultural data within state government.

Implementation Steps

1. Create a certification form for all small farms that would document animal units, acreage, and certify compliance with AAP's. Document would provide information and assistance where producer is unsure or unable to self-certify;
2. Update agricultural water quality statutes, which will include enforcement provisions to prevent false certification or failure to certify compliance;
3. Amend legislation to allow VAAFMM access to information about farm locations known by other agencies of state government;
4. Work with partners and contracted staff to provide targeted outreach to areas in agriculturally impaired watersheds within the Lake Champlain Basin; and,
5. Conduct outreach to other agriculturally impaired watersheds outside of the Lake Champlain Basin.

3.0. Stormwater Management

Stormwater runoff from roads, and existing developed lands will be addressed in a staged and prioritized manner through a system of watershed-based stormwater permitting using a combination of state law and NPDES-based regulatory authority.

3.1. Stormwater from Roads: State Highways

Description

The first stage of implementation will include permitting all state and municipal roads to achieve the necessary level of pollutant reduction to meet TMDL targets. Permitting will generally involve requirements to develop management plans, followed by an implementation scheduled informed by the relative significance of the source, on a watershed basis.

The State highway system may be addressed via a TS4 Stormwater General Permit. The TS4 is a NPDES-based Transportation Separate Storm Sewer System (TS4 GP) General Permit designed to regulate stormwater discharges from the entire state-operated transportation system. The TS4 would regulate all stormwater discharges from the transportation network by consolidating the permit requirements from the existing Municipal Separate Storm Sewer System (MS4), Multi-sector General Permit (MSGP) and Post-construction stormwater permits. Implementation of comprehensive TS4 GP approach could allow for the prioritization of maintenance, upgrade of stormwater infrastructure, and implementation of remediation activities based on environmental benefit.

Implementation Mechanism

The State will establish a TS4 Stormwater General Permit.

Implementation Steps

1. Issue a Letter of Intent;
2. Issue draft permit; and,
3. Establish TS4 General Permit.

3.2. Stormwater from Roads: Municipal Roads

Description

The first stage of implementation will include permitting all state and municipal roads to achieve the necessary level of pollutant reduction to meet TMDL targets. Permitting will generally involve requirements to develop management plans, followed by an implementation schedule informed by the relative significance of the source, on a watershed basis.

Vermont municipalities maintain approximately 11,000 miles of road; three-quarters of these municipal roads need erosion control improvements. Two-thirds of these roads are unpaved gravel or unimproved roads, and nearly all require ditches and culverts for water drainage. Road structures, particularly along gravel roads, can cause erosion and sedimentation into adjoining streams. A recent study published by the Lake Champlain Basin Program indicates that Vermont's unpaved roads contribute up to 30 percent of the annual suspended sediment load and up to 11 percent of the annual total phosphorus load to the Vermont portion of Lake Champlain (LCBP, 2013; UVM, 2013). Stormwater runoff from paved roads can accumulate and deliver debris, oils, salts, and other chemicals, sediment, nutrients, and other pollutants to surface waters. Paved roads can also affect the volume of stormwater runoff being generated, which in turn, can alter the hydrology and ecological health of receiving waters.

The Department will issue a stormwater general permit covering municipal roads. The permit will require development of management plans based on local road conditions including road slope, connectivity to receiving waters, and other factors, that identify the type and scope of BMPs necessary for the municipality. The management plan will include an implementation schedule informed by sub-watershed phosphorus-reduction priorities. At a minimum, BMPs shall be as protective as those identified in the Town Road and Bridge Standards.

Implementation Mechanism

VDEC will use existing authorities to develop a permit program for issuing a municipal road stormwater permit and reporting requirements. The program will emphasize the use of road-related best management practices. The State will first issue a letter of intent prior to the issuance of the new permit.

Implementation Steps

1. Issue a Letter of Intent;
2. Establish a state stormwater permit pertaining to road-related Best Management Practices; and,
3. Complete road erosion needs inventories to identify and prioritize implementation.

3.3. Existing Developed Lands

Description

Stormwater runoff from existing developed land will be addressed in a staged and prioritized manner through a system of watershed-based stormwater permitting using a combination of state law and NPDES-based regulatory authority.

The first stage of implementation will require permit coverage for all stormwater discharges on sites where impervious surfaces exceed (3) acres. Additionally, impervious surfaces discharging to municipal stormwater systems where such impervious surfaces exceed 15 acres, in aggregate, and the density of impervious surface is greater than 7%, shall be addressed by a stormwater permit, issued to the municipality and requiring implementation of a stormwater management and phosphorus control plan.

Implementation Mechanism

The State will establish a general permit program to address stormwater from existing developed land.

Implementation Steps

The State will develop a program to expand the regulation of stormwater discharges within the Lake Champlain Basin:

1. Identify affected parcels and municipalities;
2. Develop regulatory/treatment standards;
3. Implement education and outreach program;
4. Issue a Letter of Intent;
5. Issue draft permit;
6. Issue general permit;
7. Receive Notices of Intent; and,
8. Issuance of Permit Authorizations.

3.4. Non-Regulatory Stormwater Management for Non-MS4 Municipalities

Description

About three percent of the land area in the Lake Champlain Basin is impervious surface (such as driveways, sidewalks, streets, and parking lots), but these areas generate a disproportionate amount of the phosphorus loading to Lake Champlain. Only six percent of this impervious surface area in the Basin is currently subject to regulation under a state operational stormwater permit, and only 12 percent of the impervious area is covered by the Municipal Separate Storm Sewer System (MS4) permit.

Stormwater master planning is an analytical process designed to prevent and reduce stormwater runoff from the impervious area that is currently not regulated by the VDEC. The process serves as the basis for targeting management actions at areas in the developed landscape thought to be critical sources of phosphorus. The process also directs actions using Green Infrastructure and Low Impact Development approaches and promotes municipal adoption of the Vermont League of Cities and Town's model stormwater ordinance to protect water quality and save municipalities money by avoiding the increasing costs of collecting and treating stormwater runoff. Recommended actions identified by a stormwater master planning process are then integrated into Tactical Basin Plans.

Implementation Mechanism

VDEC is using existing authorities to manage the program. VDEC will develop, employ, and offer trainings for municipalities and other partners on the stormwater master planning protocol as a tool to identify and prioritize stormwater remediation actions.

Implementation Steps

1. Establish a VDEC Green Stormwater Infrastructure program to provide technical assistance to municipalities;
2. Develop and finalize a standardized Stormwater Master Planning protocol;
3. Provide technical assistance to municipalities on stormwater master planning and integrate project priorities into tactical basin planning process;
4. Provide technical and financial assistance to municipalities on stormwater project implementation; and,
5. Enhance outreach and technical assistance to support municipal adoption of model stormwater ordinances to prevent or minimize stormwater impacts from future development.

3.6. Green Infrastructure Initiative

Description

Since 2009, the Vermont Agency of Natural Resources (VANR) has supported a Green Infrastructure (GI) Coordinator position within VDEC through various funding mechanisms. This position plays a critical role in coordination of Vermont's Green Infrastructure Initiative, a statewide effort that seeks to increase the adoption of low impact development (LID) principles and implementation of green stormwater infrastructure (GSI) practices. The Initiative works to implement strategies identified within the GSI Strategic Plan, which was developed by the Green Infrastructure Roundtable, an ad hoc group of individuals from the public and private sector who come together on a quarterly basis. The Plan targets four key audiences and lists major objectives for each:

1. Design Professionals: Design professionals (Engineers, Landscape Architects, Architects, Design/Build Contractors) statewide are trained in, promoting and utilizing LID principles and GSI practices;
2. Municipalities: Help municipalities recognize the impacts from stormwater runoff and work to mitigate the effects;
3. Property Owners: Property owners voluntarily implement GSI practices on their property(s); and,
4. State Agencies: State Agencies secure and commit funding to develop policies and programs to support GSI.

The Strategic Plan was followed by the signing of Executive Order 06-12 (EO) in March of 2012. The EO further defines the role of State Agencies and calls for the creation of an Interagency Green Infrastructure Council which includes the secretaries of the agencies of Natural Resources, Transportation, Commerce and Community Development, and the Commissioner of Buildings and General Services or their designees. The Council is tasked with identifying opportunities for integration of GSI practices in existing programs, initiating a process for developing GSI technical guidance, establishing a plan for implementing GSI on state properties and projects, identifying agency liaisons, identifying and undertaking GSI research and monitoring, and identifying sustainable funding sources. Members of the Council are also tasked with developing a GSI Implementation Work Plan for their respective Agency/Department. Work plans were completed on July 1, 2013 and lay out opportunities and strategies for moving the GSI initiative forward over the course of the next year. The EO is in effect for five years.

Finding ways to incorporate LID and GSI into the framework of the Vermont Stormwater Management Manual is an identified task in ANR's Implementation Work Plan. The existing manual has been seen as a barrier to GSI implementation for some time. In response to this, the Stormwater Program is currently undergoing a process to revise the manual. The purpose of this

is two-fold: to incorporate and incentivize LID and GSI concepts and to enhance nutrient removal. The revised Stormwater Manual will be adopted via rulemaking.

Implementation Mechanism

VDEC will continue to support the Green Infrastructure Initiative to implement the GSI Strategic Plan and the ANR Implementation Work Plan.

VDEC will revise the Vermont Stormwater Management Manual to include a wider array of LID and GSI practices. VDEC will require greater pollutant removal requirements. Those changes will be formally adopted via rule-making.

Implementation Steps

1. Support the Green Infrastructure Initiative:
 - a. Review existing state processes and programs and develop a plan for incorporating GSI concepts;
 - b. Provide training opportunities to ANR staff and external partners to increase knowledge of GSI;
 - c. Provide technical assistance and financial support for GSI projects;
 - d. Develop process for auditing GSI on state properties and explore opportunities to enhance or utilize additional practices;
 - e. Work with partners to enhance and disseminate model LID Bylaws;
 - f. Revise and redistribute Vermont Low Impact Development Guide for Residential and Small Sites;
 - g. Develop GSI design standards for downtowns, subdivisions, and state owned properties; and,
 - h. Continue to administer the Green Infrastructure Roundtable and Green Infrastructure Council.
2. Revise the Vermont Stormwater Management Manual
 - a. Convene a stakeholder process; and,
 - b. Commence adoption of revised Stormwater Management Manual via rulemaking.

4.0. River Channel Stability

4.1. Minimizing River Corridor and Flood Plain Encroachments

Description

Managing rivers to attain and maintain equilibrium (or natural vertical stability) conditions provide for greater flood resilience and public safety while reducing sediment and nutrient pollution. Avoiding new buildings or public infrastructure in river corridors and floodplains and maintaining native plant-vegetated buffers are essential to attaining and maintaining equilibrium conditions. Avoiding new encroachments increases the capacity to store floodwaters and decreases phosphorus and sediment loading. Floodplains and meanders with vegetated buffers: (a) dampen the erosive energy and soil erosion by moderating stream flow velocities when floodwaters spill onto them during storm events; (b) allow for sediment deposition on floodplains during floods, which account for the greatest volumes of sediment over time; and, (c) moderate streambank failures due to the root strength, root depth, and root density of the vegetated buffer.

Implementation Mechanism

VDEC will: (a) undertake a formal rule-making process to enhance the floodplain protection and restoration through the state regulation of activities currently exempt from municipal regulation; (b) establish a regional certified floodplain technician program; (c) expand its river corridor planning and mapping program with statewide maps and River Corridor Procedures that establish river corridor best management practices; (d) establish the Flood Resilient Communities Program with funding and technical assistance incentives for municipalities to adopt regulations in floodplains and river corridors (e.g., the Emergency Relief and Assistance Fund (ERAF), effective in October, 2014, will increase the state cost share recovery in municipalities where enhanced bylaws have been adopted); and, (e) establish Memoranda of Understandings (MOUs) with sister agencies and departments that they will regulate floodplain activities and developments within their respective jurisdictions.

Implementation Steps

1. Establish the State floodplain rule that addresses all developments exempt from municipal regulation and establish Memoranda of Understanding (MOUs) with other state agencies to regulate developments within their purview to be consistent with the new state floodplain rule;
2. Prepare river corridor procedures for maintaining a statewide river corridor map layer, regulating Act 250 developments, and establishing river corridor BMPs;

3. Establish a regional Certified Floodplain Technician Program to increase the regulatory and technical assistance capacity for floodplain protection;
4. Provide technical assistance to a minimum number of communities each year on the importance of active floodplain protection and promote enhanced model bylaws that exceed the NFIP minimum requirements;
5. Develop better floodplain mapping for municipal and state agency use by seeking to obtain Light Detection and Ranging (LiDAR) data to modernize inundation mapping for streams and lakeshores;
6. Complete river corridor mapping for the State;
7. Update and complete River Corridor Planning to include “local flood hazard analyses” (LFHA), targeting floodplain restoration and large-scale flood hazard mitigation in the most sensitive streams;
8. Increase the role of land conservation in river corridor protection; secure river corridor easements;
9. Establish the “Flood Resilient Communities Program to increase Vermont municipal adoption of enhanced floodplain and river corridor protection bylaws through an incentives-based program; and,
10. Modify the Emergency Relief and Assistance Fund (ERAF) rule to contain added incentives for towns to adopt river corridor or enhanced floodplain bylaws.

4.2. Preventing Adverse River Channel Modifications

Description

Widespread and historic stream channelization (i.e., dredging, berming, straightening, and armoring) has resulted in increasing sediment and nutrient loading. Structural controls such as riprap or concrete may prevent erosion at one site, but increase erosion downstream and contribute to destabilizing the stream system. These activities increase the power of floods thereby increasing stream bed and bank erosion, property damages, and risks to public safety. Stream alteration activities that result in conditions that depart from, further depart from, or impede the attainment of an equilibrium condition (i.e., an equilibrium standard) should be limited.

Implementation Mechanism

VDEC will: (a) develop standard river management practices (SRMP) for disaster response; (b) undertake rule-making and complete the update to the stream alteration general permit to establish equilibrium-based performance standards (i.e., as stated above) and regulate emergency actions; (c) promote the municipal adoption of the new Vermont Transportation Agency's (VTrans) Road and Bridge Standards which require stream crossings to meet the state's technical standard established in the VANR stream alteration general permit; (d) develop 3 tiered outreach and training program by offering instream training courses to VTrans Operations Technicians, municipal roads workers, contractors, and other river technicians; and (e) as opportunities arise, implement projects to remove river, river corridor, and floodplain encroachments (e.g., floodplain fills, undersized stream crossings, flood-damaged structures, or dams).

Implementation Steps

1. Develop a set of Standard River Management Procedures for state disaster response efforts;
2. Adopt new rule and update general permits to address stream alterations and emergency in-stream work;
3. Develop and implement a set of training programs to meet SRMPs and Emergency River Management rules;
4. Adopt codes and standards to achieve FEMA recognition of state-adopted technical standards for conducting emergency protective measures, replacing infrastructure, such as culverts with adequately sized structures;
5. Establish a network of river scientists, engineers, and habitat restoration specialists, to assist VTrans and municipalities as resident experts on larger disaster recovery sites; and,
6. Continue to target restoration and protection funds to high priority critical source areas identified in tactical basin plans or river corridor plans, recognizing that restoration measures will vary from passive to active interventions, depending on site characteristics and plan recommendations.

5.0. Forest Management

5.1. Forestry Accepted Management Practices

Description

Vermont adopted rules in 1987 for Acceptable Management Practices (AMPs) for Maintaining Water Quality on Logging Jobs in Vermont. The AMPs are intended and designed to prevent any mud, petroleum products and woody debris (logging slash) from entering the waters of the state and to otherwise minimize the risks to water quality. The AMPs are scientifically proven methods for loggers and landowners to follow for maintaining water quality and minimizing erosion.

Vermont Department of Forests, Parks, and Recreation (FPR) has begun the process of updating the AMPs. Key modifications include:

- Require compliance with standards set forth in the state stream alteration general permit, described above in Section 3.2. Preventing Adverse River Channel Modifications and pursuant to 10 V.S.A. § 7501.
- Strengthen standards pertaining to stream crossing practices. The proposed standards include:
 - Better management of ditch water in approaches to stream crossings. The proposal is to prohibit drainage ditches along truck roads from terminating directly into streams and to specify a minimum distance for installing turn-outs. Drainage ditches approaching stream crossings must be turned out into the buffer strip a minimum of 25 feet away from the stream channel, as measured from the top of the bank.
 - Better management of surface water runoff from skid trails and truck roads on downhill approaches to stream crossings. The proposal is to prevent surface runoff from entering the stream at stream crossings from skid trails and truck roads and to specify a minimum distance for installing surface water diversion practices, such as drainage dips. Surface runoff is to be diverted into the buffer strip at a minimum distance of 25 feet from the stream channel, as measured from the top of the bank.
 - Better management of stream crossings after logging. The proposal is to prevent erosion and to specify a minimum distance from the stream for diverting runoff. Upon removal of the temporary stream crossing structures, the site is to contain water bars 25 feet from the stream channel on downhill approaches to the stream crossing to divert runoff into the buffer to capture sediment before entering the stream. Additionally, all exposed soil, at a minimum of 25 feet on each side of the crossing, must be stabilized with seed and mulch according to existing application rates.

- Include a new AMP to address the management of petroleum products and other hazardous materials on logging operations. Such materials must be stored in leak-proof containers, placed outside of buffer strips, and must be removed when logging is completed.

Sediment and other pollution discharges on logging jobs are subject to enforcement under the state's water pollution control statute (10 V.S.A. 1259(a)). The VDEC Compliance and Enforcement Division conducts necessary enforcement actions under a Memorandum of Understanding with FPR. The circumstances and outcomes of field inspections are documented and summarized in annual reports.

Vermont's Use Value Appraisal Program, also known as the "Current Use Program," provides property tax benefits to forest land owners enrolled in the program. To maintain eligibility in the Use Value Appraisal program, all timber harvesting operations on enrolled land must comply with the AMPs. Harvesting operations on forest land owned or controlled by the VANR and land enrolled in the Forest Legacy Program must also adhere to the AMPs. Similar water quality protection requirements apply to logging operations on Green Mountain National Forest land.

As shown in the table below, AMPs or equivalent requirements are mandatory on nearly 60 percent of the 4.6 million acres of forest land in the state, and a similar percentage applies to forest land within the Lake Champlain Basin in Vermont. This percentage is expected to increase over time as: (a) the U.S. Forest Service conducts new land acquisitions within the Green Mountain National Forest proclamation boundary; (b) the VANR acquires land and enrolls forest land into the Forest Legacy Program; and, (c) landowners enroll in the Current Use Program. Between 2007 and 2012, acreage enrolled in the Current Use Program within the Lake Champlain Basin increased from 600,207 acres to 679,207 acres, showing an approximate 12 percent increase.

Table: Amount of State and Lake Champlain Basin Forestlands		
Subject to Water Quality Management Practices		
Forest Land Category	State Acres (Approximate)	Lake Champlain Basin Acres (Approximate)
Use Value Appraisal	1,780,000	710,670
Agency of Natural Resources	475,650	186,570
Forest Legacy Program	50,630	11,570
Green Mountain National Forest	400,000	265,490
Sub-Total	2,706,280	1,174,300
Total forest in state	4,591,000	1,953,420

Implementation Mechanism

VFPR is undertaking a rule-making process to update of the AMP Rule and manual.

Implementation Steps

1. Form a Technical Steering Committee (TSC);
2. Complete initial draft revision;
3. Hold public stakeholder meetings;
4. Submit final recommendations of the TSC to Director of Forests; and,
5. Initiate State Rule-Making.

6.0. Watershed Protection and Restoration Programs

6.1. Ecosystem Restoration Program

Description

The VDEC's Ecosystem Restoration Program (ERP), first established in 2005, manages a competitive grant program to reduce nutrient and sediment pollution into the Lake Champlain Basin and other surface waters of the state from nonpoint sources. The grant program has received sustained funding over time. The program awards approximately 50 grants each year, totaling \$2 million of state capital construction funds. Grant recipients include municipalities, watershed and lake organizations, regional planning commissions, and other local and regional partners. Two-thirds of the grants are for projects within the Lake Champlain Basin.

Objectives of the ERP grant program are to:

- Reduce unmanaged stormwater runoff from developed areas;
- Reduce runoff from farms and timberlands;
- Upgrade road networks with best road-related stormwater management practices; and,
- Restore and protect floodplains, river corridors, wetlands, and riparian areas along rivers, streams, lakes, ponds, and wetlands.

Implementation Mechanism

The Program continues to seek annual state capital bill appropriations and dispensing funds for implementation of priority actions, as described in the Tactical Basin Plans and other state-sanction prioritization plans.

Implementation Steps

1. Develop an annual capital budget for clean water funding and addresses both point and nonpoint source needs;
2. Continue to manage the process for the awarding, monitoring, and reporting of grants and contracts; and,
3. Conduct technical assistance on stormwater management using green infrastructure and road best management practices.

6.2. Vermont Clean Water Improvement Fund

Description

The Vermont Clean Water Improvement Fund is a concept to establish a dedicated source of funding that targets priority water quality improvement projects to help the State meet its' anticipated obligations under the Lake Champlain phosphorus TMDL. The fund can be created using existing resources and programs, and lays the foundation should additional resources become available. The fund would make strategic investments using existing programs to enable the State to effectively implement stormwater runoff control measures and river corridor protection strategies pertaining to TMDL implementation:

1. Manage direct loans and grants under the State Revolving Loan Fund (SRF), the fund supported by an annual EPA capitalization grant, state matching funds, and principal and interest repayments on past SRF loans. In addition to continuing to fund repair, replacement and operation of existing wastewater treatment systems, the fund could provide low interest loans, forgivable principal loans, or grant funding for:
 - a. Stormwater runoff pollution control projects, including green infrastructure projects;
 - b. Match for state grant-funded stormwater control projects;
 - c. Projects required by for stormwater permit or TMDL compliance;
 - d. Decentralized sewage treatment systems or onsite septic repair and replacement;
 - e. Agricultural runoff control projects, such as equipment purchase for direct seed/no till conservation practices;
 - f. Capital projects to improve municipal road networks; and,
 - g. Infrastructure planning and asset management for all water system infrastructure;
2. Support grant-making as part of the VDEC Ecosystem Restoration Program (ERP). The program offers municipalities, landowners, state agencies, and other partners increased access to funds for project implementation;
3. Support VTrans' Vermont Better Back Roads Program, a grant program to help municipalities implement best management practices pertaining to runoff from roads;
4. Bolster technical and educational assistance to municipalities, farmers, loggers and foresters, developers, businesses, and landowners in practices to reduce nonpoint source pollution runoff and improve flood resilience. The objective is to support:
 - a. Priority technical assistance initiatives, such as at the Vermont Agency of Natural Resources' (VANR) Green Infrastructure Initiative and tactical basin planning that targets highest priority capital projects;
 - b. Priority agricultural programs, such as an emerging small farm assistance program at the VAAF, the University of Vermont (UVM) Extension/Poultney-Mettowee Conservation District's Agronomy and Conservation Assistance Program (ACAP), and ongoing technical assistance from the state Conservation Districts that make up the Vermont Association of Conservation Districts;

- c. Watershed protection work of key partners including the regional planning commissions, the water resources coordinator at the Vermont League of Cities and Towns Municipal Assistance Program, the natural resources conservation districts, watershed-based groups, and lake associations;
- d. Technical assistance to loggers, landowners, and foresters about best management practices, such as the use of portable skidder bridges, for controlling runoff from timber harvesting operations; and,
- e. Educational assistance from organizations such as the Vermont Youth Conservation Corps, the Student Conservation Association, and the North Woods Stewardship Center.

Implementation Mechanism

VDEC will continue to work with the Administration and the Vermont General Assembly to investigate ways to support a Clean Water Improvement Fund.

Implementation Steps

1. Develop a concept paper on the elements of a Clean Water Improvement Fund;
2. Create a Clean Water Improvement Fund Advisory Committee; and,
3. Develop an administrative framework for managing the Fund.

6.3. Tactical Basin Planning and Critical Source Area Targeting

As part of the state's Surface Water Management Strategy, Vermont uses Tactical Basin Planning to identify the highest-priority opportunities for sediment and nutrient load reductions surface waters. Tactical Basin Planning uses monitoring and assessment results, combined with sector-specific planning processes, to identify and prioritize implementation projects. VDEC relies on tactical basin plans to ensure that limited funds are directed to the highest-merit opportunities based on identification, targeting, and treatment of specific sites on the landscape determined to be at greatest risk of delivering nutrient and sediment loading to surface waters. These critical sources are identified within land use categories including agricultural land, urban and developed land, road networks, and river corridors.

Tactical basin plans are developed on a five-year recurring cycle and reviewed biennially with public input to monitor progress or add emerging priority actions. The plan's implementation table outlines the priorities of VDEC, VANR, and partner organizations, for protection or restoration of specific stream or lake/pond segments affected by discrete and specific pollution sources. Tactical basin planning is VDEC's approach to implement actions for TMDL compliance.

The phosphorus reduction potential attributable tactical basin planning is a function of the specific projects identified within the supporting processes, which are found in other Sections of this document.

Implementation Mechanism

The mechanisms by which tactical basin plans are developed and implemented are described in detail in the Vermont Surface Water Management Strategy, Chapter Four, at: http://www.vtwaterquality.org/wqd_mgtplan/swms_ch4.htm. Municipalities and other local and regional partners can seek Ecosystem Restoration Program grants to help pay for priority actions, specified in the plans, to reduce nutrient and sediment loading from nonpoint sources.

Implementation Steps

The implementation timetable for tactical basin plans is also found in Chapter 4 of the Vermont Surface Water Management Strategy:

1. Complete or modify implementation tables of existing basin plans that are specific to Lake Champlain Basin, namely, South Lake Champlain, North Lake Direct, Missisquoi, Winooski, Otter Creek, and Lamoille; and,
2. Managing implementation of Tactical Basin Plans.

6.4. Phosphorus Detergent and Fertilizer Usage

Description

Vermont has had a law in effect since 1978 prohibiting the sale of household cleaning agents (e.g., laundry detergents) containing more than a trace amount of phosphorus (10 V.S.A §1382). Effective in 2010, the exemption given to automatic dishwasher detergents was removed from the statute. This change was estimated to reduce wastewater phosphorus loading to Lake Champlain by 0.8 - 3.2 metric tons per year.

Vermont adopted legislation effective in 2012 (10 V.S.A §1266b) that prohibits the application of phosphorus fertilizer to turf unless the grass is being established during the first growing season, or a soil test indicates the need for phosphorus. Fertilizer applications to impervious surfaces or within 25 feet of surface waters are prohibited.

Implementation Mechanism and Steps.

Vermont passed legislation. No additional action is necessary.