

**Lake Carmi
Crisis Response Plan
Response to Comments
18 October 2018**

This document contains responses to comments received in response to the Lake Carmi [Crisis Response Plan](#), issued on August 22, 2018. If there are outstanding questions or if responses need clarification, the Department of Environmental Conservation welcomes a continued exchange of information. Please send additional questions or comments by email to ANR.WSMDLakes@vermont.gov or by USPS to:

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General Comments

Comment: The document addresses who has the authority, responsibility, and accountability for categories of actions needed, but not for fully resolving the Lake Carmi crisis.

Response: The Department of Environmental Conservation (DEC) of the Agency of Natural Resources) has the authority, responsibility, and ultimate accountability for resolving the Lake Carmi crisis.

Comment: The document has much useful information, but it does not have the essential elements of a plan; it does not include an estimate of time, money, and other resources needed; no near or long-term timeline tied to meeting specific objectives beyond 2019.

Response: The Plan does include estimated costs and timelines for the identified Critical Path Projects. DEC is in the process of developing a longer-term timeline, using the State's adaptive management approach, in conjunction with the Tactical Basin Planning process for the Missisquoi Basin (DEC 2016). Agency surface water management plans do not necessarily include time or money for strategies that depend on partners for the majority of implementation. We are confident that any necessary project to meet the P load reduction goals will be accomplished because we have committed to work with partners to identify funding sources as well as provide technical assistance to ensure that these projects happen. DEC will report on progress implementing the Lake Carmi Phosphorus TMDL in line with the Missisquoi basin Lake Champlain TMDL report cards. Additionally, the annual [Clean Water Initiative Investment Report](#) (DEC 2018) documents the way in which funds are distributed to partners for project implementation.

Comment: The tracking database needs to define all plans underway and allow identification of new actions needed to follow through on meeting TMDL targets, thereby tracking incremental improvements as they occur.

Response: The tracking database, known as the Watershed Projects Database, is used to track and prioritize actions associated with DEC Tactical Basin Plans, including actions needed to meet Lake Carmi TMDL targets. The Database is used to track incremental improvements associated with specific projects as projects are completed. In cases where clean water projects are constructed/implemented, the Database is used to estimate the annual average total phosphorus reduction expected to be achieved by the project. Currently, data are only available to track state and federally-funded clean water projects. For additional details of this tracking system and how it is currently being used, see the section titled “Quantifying Nutrient Pollution Reductions from Clean Water Projects” in the [Clean Water Initiative 2017 Investment Report](#) (DEC 2018). The Critical Path Project titled “Agricultural Conservation Practice Accountability” on Page 6 of the Crisis Response Plan will involve working with partners to more fully track agricultural conservation practices installed by farmers in the Lake Carmi watershed, including those installed by farmers voluntarily to comply with Required Agricultural Practices and to steward soil health and water quality.

Comment: The aeration project is a major, new initiative; otherwise, the implied/inferred message is "we will continue doing what we have been doing, but will try harder to do better."

Response: DEC continues to make sure all provisions of the 2015 Clean Water Act are applied in the Lake Carmi watershed as soon as possible. The Vermont Clean Water Act serves as a science-based road map toward restoring impaired waters in Vermont. Note that all of the projects listed as “Critical Path Projects” are new initiatives that take the work in the watershed and in the lake beyond requirements of the Vermont Clean Water Act.

Comment: A crisis is defined as a time of intense difficulty, trouble, or danger, an emergency, disaster, catastrophe, calamity. The plan does not consider the catastrophic situation we are in.

Response: DEC recognizes that catastrophic situation facing Lake Carmi and is committed to taking an aggressive approach to adaptive management. This means continually adjusting the plan of action as needed to make sure we restore the lake and its watershed as rapidly as possible. Improved monitoring of the lake, its tributaries and groundwater--as described in the Crisis Response Plan—allow us to continually assess and update the list of required actions.

Comment: The state must clearly understand legacy phosphorus to fully address Lake Carmi pollution.

State agencies including ANR, in partnership with the UVM research community, are actively working toward a more detailed understanding of legacy phosphorous dynamics in Lake Carmi, the Lake Carmi watershed, as well as the larger Missisquoi basin and in Missisquoi Bay.

Comment: For Lake Carmi to achieve water quality standards, the state must use its power under the Lake in Crisis provisions to make mandatory otherwise voluntary actions to reduce non-point source discharges.

The agencies understand that making voluntary actions mandatory is a provision of the Lake in Crisis legislation. If the current plans for action do not achieve the anticipated level of acceleration toward meeting goals of the TMDL, then the ANR and AAFM Secretaries will use this authority to implement the requirements of the Plan. This includes the issuance of Lake in Crisis Orders.

Comment: The critical path projects titled “Agriculture Conservation Practice Accountability” and “Project Agronomy and Conservation State and Partner Technical Assistance” appear to be redundant.

Response: The titles appear redundant but the projects are dramatically different as indicated in the critical paths project description. Agriculture Conservation Practice Accountability refers to the tracking and accounting for phosphorus reductions that are achieved with the implementation of agricultural practices. This is critical to documenting our progress in meeting the goals of the TMDL. Agronomy and Conservation Practice State and Partner Technical Assistance refers to the people providing the technical and financial assistance to implement the agricultural practices and conservation plans on farms.

Comment: Has a contractor been hired to analyze agricultural practices in the watershed? Has the recruitment started? Has money been allocated?

Response: A contractor (University of Vermont) has been awarded funding to conduct extensive work in the Carmi watershed, evaluating nutrient management plans, looking at additional project opportunities, and addressing phosphorus mass balance in the watershed. The contract is being finalized at this time. In addition, the organizations funded through the Agronomy and Conservation Practice State and Partner Technical Assistance project and USDA/NRCS (including UVM Extension and the Franklin Watershed Committee) are also evaluating and assessing agricultural practices, including the need for implementation and the monitoring and tracking.

Lake Carmi P TMDL

Comment: The Lake Carmi P TMDL needs to be re-opened and re-modeled based on current land use/land cover data and current water quality standards.

Response: DEC has provided extensive information about the value of the original Lake Carmi P TMDL and how it is consistent with current water quality standards (see the [Lake Carmi TMDL Technical FAQ](#) and [Lake Carmi TMDL Presentation](#)). The DEC is currently focused on accurately assessing progress made toward reducing phosphorus loading from the watershed

across all sectors and, where more work is needed, accelerating progress toward meeting reduction goals.

Comment: *The target of 22 ppb seems high given that the Lake Memphremagog target is 15 ppb.*

Response: Lake Memphremagog is a deep lake, with historical pre-impairment records of lower nutrient levels; while Lake Carmi is a shallower lake with historical pre-impairment records showing more moderate nutrient levels. Indeed, Lake Carmi’s moderate nutrients support the diverse biological community that makes it a popular destination for anglers and bird watchers. For further comparison, see details of the Lake Champlain TMDLs, where targets range from 10 ppb (0.010 mg/l) to 54 ppb (0.054), depending on the historical pre-impairment nutrient levels across lake segments. For a description of how Lake Champlain’s targets were established see the publication titled “[Analysis and Application of Lake User Survey Data](#)” by Smeltzer and Heiskary (1990).

Table 1. Phosphorus targets for the 12 TMDL segments of Lake Champlain (from USEPA 2016).

Lake Segment	Total Phosphorus Criterion (mg/l)*
Main Lake	0.010
Malletts Bay	0.010
Burlington Bay	0.014
Shelburne Bay	0.014
Northeast Arm	0.014
Isle LaMotte	0.014
Otter Creek	0.014
Port Henry	0.014
St. Albans Bay	0.017
Missisquoi Bay	0.025
South Lake A	0.025
South Lake B	0.054

*The Vermont Water Quality Standards specify that these criteria shall be achieved as the annual mean total phosphorus concentration in the photosynthetic depth (euphotic) zone in central, open water areas of each lake segment.

Comment: *New permits support reopening the TMDL*

Response: New permits required under the 2015 Vermont Clean Water Act have already led to acceleration of progress toward meeting Lake Carmi Phosphorus TMDL targets and will continue to do so. The Lake Carmi TMDL Implementation Team formed in 2015 in part to ensure that partner organizations working in the lake’s watershed were aware of these new permits and prepared to meet new standards that accompany them, such as the requirements in the new Municipal Roads General Permit standards.

Level of detail for agricultural and natural resource projects

Comment: More specificity is needed in project descriptions across agriculture and natural resource categories.

Response: DEC provided details that we were able to compile and report by the deadline for issuance of the Crisis Response Plan, and the Plan provides a comprehensive plan for the management of Lake Carmi in order to improve water quality and mitigate harm to the public health and damage to the environment as a result of total phosphorous loading. . Through regular check-ins with agency partners we will gather additional details as they become available, provide reports to the community at quarterly Lake Carmi Implementation Team meetings, and post updates on the Restoring Lake Carmi web page (dec.vermont.gov/watershed/cwi/restoring/carmi).

Agricultural projects (responses provided by AAFM)

Comment: Why is there no mention of Best Management Practices or a reduction in the quantity of nitrogen/phosphorus imported into the watershed?

Response:

Best Managed Practices (BMPs) are required as part of the VAAFMM Water Quality program. The Required Agricultural Practices (RAPs) are management standards to be followed by all persons engaged in farming in this State. These standards address activities which have a potential for causing agricultural pollutants to enter the groundwater and waters of the State, including dairy and other livestock operations plus all forms of crop and nursery operations and on-farm or agricultural fairground, registered pursuant to 20 V.S.A. § 3902, livestock and poultry slaughter and processing activities.

The RAPs include, as well as promote and encourage, practices for farmers with the purpose of preventing agricultural pollutants from entering the groundwater and waters of the State when engaged in animal waste management and disposal, soil amendment applications, plant fertilization, and pest and weed control. Persons engaged in farming who are in compliance with these practices shall be presumed to not have a discharge of agricultural pollutants to waters of the State. RAPs shall be designed to protect water quality and shall be practical and cost-effective to implement, as determined by the Secretary.

Where the Secretary determines, after inspection of a farm, that a person engaged in farming is complying with the RAPs but there still exists the potential for agricultural pollutants to enter the waters of the State, the Secretary shall require the person to implement additional, site-specific on-farm conservation practices (BMPs) designed to prevent agricultural pollutants from entering the waters of the State. When requiring implementation of a conservation practice under this subsection, the Secretary shall inform the person engaged in farming of the resources available to

assist the person in implementing the conservation practice and complying with the requirements of this chapter.

The Agency of Agriculture, as well as non-regulatory partners, works with farmers one-on-one to determine the best practices for their specific farm operation. Farms are diverse, and no single set of practices is appropriate for all farms, though many practices, such as cover crops, are widely used and encouraged. Each practice that is implemented is verified and a phosphorus reduction value attached to it for documentation in meeting the goals of the Carmi TMDL. References to various agricultural BMPs are made throughout the Response Plan.

Nutrients that are imported into the watershed are quantified and addressed in the farm's individual nutrient management plan and must be accounted for in records of field applications.

Page 8 of the Response plan indicates that we are committing an additional \$200,000 for contracted work in the Carmi watershed. This contract has been awarded to the University of Vermont (a collaboration of the Extension system and the College of Agriculture). A priority in this contract is to conduct a nutrient mass balance for the watershed to evaluate the nutrient inputs and outputs to and from the watershed. In addition, UVM will be quantifying the agricultural activities in the watershed, tracking progress, and providing quarterly reports.

Comment: Implementation of specific agricultural practices needs to be incorporated into the plan, including no till, cover cropping, widening buffer zones, injecting manure, and finding other outlets for manure besides spreading.

Response: The RAPs are specific farm and land management practices that will control and reduce agricultural nonpoint source pollution and subsequent nutrient losses from farm fields and production areas to surface and ground waters of the State or across property boundaries. The RAPs also establish minimum construction and siting requirements for farm structures in floodplains, floodways, river corridors, and flood hazard areas.

The standards promulgated in the RAPs are intended to improve the quality of all of Vermont's waters by reducing and eliminating cropland erosion, sediment losses, and nutrient losses through improved farm management techniques, technical and compliance assistance, and, where appropriate, enforcement. This rule strives to balance the complexity, variability, and requirements of farm management with the need to improve that management in order to meet the State's goals in improving and protecting water quality.

Requiring broad based agricultural practices beyond those required in the RAPs is not the most cost-effective or environmentally effective process for accelerating water quality improvement. Once farmers have attained the level of compliance required by the RAPs, site specific recommendations can and should be made to increase beneficial BMP implementation. To that end, DEC has recently contracted with the University of Vermont to identify specific areas of improvement in the Carmi watershed, where additional BMPs, or conservation practices such as wetland restoration, river corridor protection or land use changes will result in a targeted and effective water quality value. Following identification of these recommendations, DEC and AAFM will use all available tools to incentivize, or where appropriate, require additional

protective measures.

VAAF and partner organizations provide education, outreach, technical assistance and financial assistance to support farmers to adopt conservation practices that not only ensure compliance with the RAPs but also to exceed the baseline management requirements. The phosphorus reductions from farmers' participation in voluntary conservation programs can be found on page 6 of the Lake in Crisis Response Plan.

The agricultural Critical Path Projects include extensive funding (both continued and new) to support technical assistance to increase implementation of all appropriate water quality practices on farms in the Carmi watershed (\$450,000)

Comment: Is some of the manure spread in the watershed still being transported from sources outside the watershed? If so, is this practice necessary?

Response:

Manure that is entering the watershed from other sources must be documented and accounted for through farm record keeping. RAPs Section 6.03 (f) requires all farms to maintain records of manure or other agricultural waste application on a field-by-field basis including date, field location, application rate, source of nutrients applied, and weather and field conditions.

The farm's NMP provides recommended nutrient application rates based on a variety of field parameters, such as soil tests and crop type. Manure applied from sources outside the watershed may be necessary on specific fields where manure is needed for crop nutrient requirements.

Comment: On page 42, more detail is needed regarding certified custom manure applicators. Is 125 a lot? Are they farmers, private industry, or both? Which agency oversees the program? How are they certified?

Response: Certified custom manure applicators include both private industry and farmers applying nutrients who charges or collects other consideration for the service. The Vermont Agency of Agriculture, Food and Markets oversees the certification program which includes a minimum of 8 hours of training every five years, and a demonstrated knowledge of the RAPs and all other applicable agricultural rules and permits. Details of the certification program are available here - <http://agriculture.vermont.gov/water-quality/regulations/custom-applicator>.

Comment: Why not consider purchasing farmland around the lake and restoring it to forest?

Response: Purchasing farmland for other purposes is being considered in Lake Carmi and in other parts of the state. This is dependent on the landowner being willing to sell, and the State having the funds to purchase this land and maintain it.

Comment: *What are the best practices for tile drain management and when will they be applied in the Lake Carmi watershed?*

Response:

The December 5, 2016 amendment of the RAPs includes eight regulatory requirements that apply to Tile Drainage in the Lake Carmi Watershed. VAAFM has proposed additional requirements for agricultural subsurface tile drainage in the RAP Rule Amendment filed with the Legislative Committee on Administrative Rules on August 21, 2018. The latest draft of the Final Proposed Rule can be found here: <http://agriculture.vermont.gov/sites/ag/files/3-Annotated-Text-LCAR-RAP-Rule-Subsurface-Tile-Drainage-08202018-final.pdf> . The final proposed rule includes requirements for the prohibition of the installation of surface inlets, requirements for manure stacking adjacent to tile lines, and requirements for the siting of barnyards or feedlots over tile lines.

The eight regulatory requirements in the RAPs that are now in effect and apply to fields which have subsurface tile drainage are outlined below:

Manure & Fertilizer Application

1. Issue: Manure and Fertilizer Application: “Manure or fertilizer applications to soils prone to preferential flow, close in time to storm events *or at rates in excess of crop need can lead to significant P losses.*” (LCBP, 5)
 - a. Solution: Overapplication of Nutrients Prohibited in RAPs
 - i. RAP 6.05(h) Manure or other agricultural wastes shall not be applied in exceedance of nutrient recommendations such that it ceases to be useful or beneficial for plant uptake.
2. Issue: Weather and Soil Conditions: “Manure or fertilizer applications to soils prone to preferential flow, *close in time to storm events* or at rates in excess of crop need can lead to significant P losses.” (LCBP, 5)
 - a. Solution: Application before or during storm events prohibited in RAPs
 - i. RAP 6.05(d) Manure or other agricultural wastes shall not be applied when field conditions are conducive to flooding, runoff, ponding, or other off-site movement, or can be reasonably anticipated to result in flooding, runoff, ponding, or other off-site movement, regardless of NMP recommendations.
3. Issue: Manure Application Setbacks from Surface Inlets: P losses tend to be equivalent to those representative of surface runoff, higher than typical of tile drainage. (LCBP, 39)
 - a. Solution: Treat surface inlets as surface water pathway in RAPs
 - i. RAP 2.34 Surface Inlet or Open Drain means an aboveground structure that receives, collects, or redirects field runoff water to other underground drainage or ditches.
 - ii. RAP 6.07(c) Surface inlets or inlets of open drains shall be buffered from croplands by 25 feet of perennial vegetation.

4. Issue: Elevated Soil Test P Leads to Greater Concentrations of P in Tile Drainflow: “A soil test P threshold (i.e. “change point”) is believed to exist, above which a unit increase in soil P results in higher P concentrations and losses in drainflow.” (LCBP, 6)
 - a. Solution: At “Excessive” [20 ppm] changepoint on MM Soil Test P have a drawdown strategy
 - i. RAP 6.03(d) Owners and operators of annual cropland, perennial grass land, or hay land who are required to implement a USDA 590 standard nutrient management plan and who have soil analyses demonstrating greater than 20 parts per million (ppm) phosphorous shall implement appropriate provisions of an approved nutrient management plan that balances excessive soil phosphorus levels with management strategies to reduce those levels, including eliminating or reducing manure applications.
5. Issue: Fundamental Nutrient Management Practices improve tile drain water quality: Numerous management measures have been proposed to reduce P loads delivered by subsurface drainage, starting with fundamental nutrient management practices – apply manure and fertilizers at the right rate, in the right location, and at the right time (e.g., not when tile lines are flowing). [LCBP, 6]
 - a. Solution: Exceptional NMP Standards Required in RAPs
 - i. RAP 6.03(a) All Certified Small Farm Operations as defined in Section 4 of this rule and all permitted Medium and Large Farm Operations managing manure, agricultural wastes, or fertilizer for use as nutrient sources shall implement a field-by-field nutrient management plan consistent with the requirements of the USDA NRCS Nutrient Management Practice Code 590 or other equivalent standards approved by the Secretary.
 - ii. P-Index v6.0 required for 590: The revised P-Index tool, whose revision was led by the University of Vermont Extension, has been updated to predict phosphorus losses from system pattern tile drained fields, and the revised tool is required to be completed by all LFO, MFO and CSFO farms beginning for crop season 2018.

Nutrient Storage

6. Issue: Manure Stacking Setbacks from Surface Inlets: P losses tend to be equivalent to those representative of surface runoff, higher than typical of tile drainage. (LCBP, 39)
 - a. Solution: Treat surface inlets as surface water pathway in RAPs
 - i. RAP 2.34 Surface Inlet or Open Drain means an aboveground structure that receives, collects, or redirects field runoff water to other underground drainage or ditches.
 - ii. RAP 6.02(e)(4)(D) Field stacking of manure or other agricultural wastes on sites not approved consistent with USDA NRCS standards, or otherwise approved by the Secretary: shall not be sited within: 100 feet from a ditch or *conveyance* to surface water.

Soil Management

7. Issue: In-Field Agronomic and Conservation Practices to reduce nutrient losses to waters from tile drains
 - i. Issue: In addition to the assessment of individual management practices, information is needed on the cumulative effect of multiple in-field and edge-of-field practices on

P transport. This could lead to identifying a set of practices that result in the greatest decreases in P delivery to surface waters. Although the general consensus is that these practices are directionally correct, comprehensive assessments of P loss in surface runoff and subsurface drainage are required. (King, JEQ, 480)

- a. Solution: Improve Soil Health and Reduce Surface Erosion in RAPs
 - a. RAP 6.04(a) Soil management activities that increase organic matter, reduce compaction, promote biological activity, reduce erosion, and maintain appropriate nutrient levels shall be considered and implemented as practicable.
 - b. RAP 6.04(b) Cropland shall be cultivated in a manner that retains soil in the field and promotes soil health while minimizing visible erosion into buffer strips, across property boundaries, or that creates gully erosion. The performance management standard for the soil **must result in an average soil loss less than or equal to the soil loss tolerance (T)** for the prevalent soil type as calculated through application of the Revised Universal Soil Loss Equation 2 or through the application of similarly accepted models.

Mapping / Identification

8. Issue: There is a lack of available information about the presence of tile drains in farm fields in Vermont; mapping of drainage systems has been proposed as a means to quantify the extent and density of tile drainage throughout the State. Once the extent has been captured, decisions about management strategies can be made that will work towards improving water quality. For VAAFMM to make informed decisions regarding tile drain mapping, it has been clearly stated that more data and access to information are crucial.

- a. Solution: P-Index (v6.0) requires field ID for system tile – Part of 590 NMP.
 - i. The option for mapping tile systems through the submission of information gathered by the P-Index and farm field boundary shapefiles, could be required of farms as part of their annual planning process. A mapping technique focused on presence/absence of tile drainage systems in fields, and includes reporting total tiled acres on farms, would provide VAAFMM with usable data, fill knowledge gaps, and allow for decision making to occur in a more timely manner with a significantly smaller financial burden. This information could be collected by requiring electronic submission of NMP data annually for certified and permitted farms.

Comment: The manure spreading ban dates need to be changed. The start of the ban should be moved from from December 15th to November 1st and the end of the ban should be moved from May 1st to April 1st.

Response: The winter manure spreading ban dates are set by statute (6 V.S.A. § 4816). Manure or other agricultural wastes shall not be applied between December 15 and April 1. The Secretary may prohibit the application of manure to land in the State following adequate notice to the agricultural community between December 1 and December 15 and between April 1 and April 30 of any calendar year when the Secretary determines that due to weather conditions, soil conditions, or other limitations, application of manure to land would pose a significant potential of runoff to waters of the State. The Agency of Agriculture supports farms to build sufficient

manure storage through technical and financial assistance programming so that farmers can have adequate storage to last the winter spreading ban and into prime crop growing season.

Comment: There are three participants in a farm, the owner, the person leasing the land and the one that administers nutrients. In describing the size and the farmer being educated, who do you recognize in your activity plan?

Response: In the RAPs, a Farm means a parcel or parcels of land owned, leased, or managed by a person and devoted primarily to farming, as defined in Section 2.16 of this rule, and that meets the threshold criteria as established in Section 3 of this rule, provided that the lessee controls the leased lands to the extent they would be considered as part of the lessee's own farm. Indicators of control may include whether the lessee makes day-to-day decisions concerning the cultivation or other farming-related use of the leased lands and whether the lessee manages the land for farming during the leased period.

Section 5 of the RAPs includes requirements for agricultural water quality training for owners or operators of certified small farms, permitted farms, and permitted large farms. Training shall provide information regarding: (1) the prevention of discharges; (2) the mitigation and management of stormwater runoff; (3) statutory and regulatory requirements of the operation of a large, medium, or small farm and financial resources available to assist in compliance; (4) the mechanical application of manure or nutrients and methods or techniques used to minimize the runoff of applied manure or nutrients to waters of the State; (5) weather and soil conditions that increase the risk of runoff of manure or nutrients to waters of the State; and (6) standards for nutrient management including nutrient management planning. Large Farm Operations, Medium Farm Operations, and Certified Small Farm Operations shall obtain four hours of approved training at least once in every five years.

Section 10 of the RAPs includes requirements for custom manure applicator certification. A "Custom Applicator" means a person who is engaged in the business of applying manure or other agricultural wastes to land and who charges or collects other consideration for the service including full-time employees of a person engaged in the business of applying manure or agricultural wastes to land.

The Vermont Agency of Agriculture, Food and Markets oversees the Custom Manure Applicator certification program which includes a minimum of 8 hours of training every five years, and a demonstrated knowledge of the RAPs and all other applicable agricultural rules and permits. Details of the certification program are available here - <http://agriculture.vermont.gov/water-quality/regulations/custom-applicator>.

The Agency of Agriculture provides education directly - as well as provides funding to partner organizations - to educate farmers directly on water quality requirements, agricultural Best Management Practices, and opportunities for technical and financial assistance for implementation of conservation practices which improve water quality

Comment: *All studies and documents including Nutrient Management Plans as well as any activities by any party in this watershed that are being funded by the State of Vermont, US Dept. of Agriculture or Environmental Protection Agency should be available to the public. After all, we have a right to know just what our taxes are paying for.*

Response: As a public agency subject to Vermont's Access to Public Records Law (1 V.S.A. § 315 *et al*), the Agency of Agriculture, Food & Markets (AAFM) and the Agency of Natural Resources (ANR) endeavor to make the fullest disclosure of public records as required by law and to prevent disclosure of records that are exempt under the law. Any copy of an NMP which VAAFMM currently has on file is a public document and subject to Vermont public record's law under 1 V.S.A. §315 *et al*.

Comment: *Eliminate the use of glyphosate in our watershed.*

Response:

The Agency of Agriculture has been testing for glyphosate and its breakdown products in surface and groundwater for over 10 years. Since 2016 the pesticide monitoring program has taken a total of 246 water samples statewide for glyphosate. The detection limit is hundreds of times below any level of environmental or health concern. We have not had a detection of glyphosate or its breakdown products in that time. Glyphosate has a strong affinity to organic matter and breaks down quickly. It's half-life in Vermont conditions is 28 days. Glyphosate, given its toxicity, and environmental fate and transport characteristics would not be a candidate for the elimination of use as a management option.

Comment: *Question regarding tracking of water quality improvements and status of funds released.*

Response: DEC's Clean Water Initiative Program prepares an annual Investment Report (<http://dec.vermont.gov/watershed/cwi/reports>) that summarizes the state investments to address priority water quality problems. This document details the nutrient reduction value of all projects as well as the economic investment.

Roads

Comment: *Studies of the two areas on Route 120 and 136, described by VTrans as critical path projects, should be complete by August 1st and actions planned accordingly.*

VTrans reports that the hydraulic studies of the two areas on Route 120 and 136 have been completed. VTrans is now working to secure funding to replace the culverts. There are several options for each replacement, as described below.

Replacement options for the VT 120 culvert:

1. A concrete box with a 6' wide by 6' high inside opening. The box invert should be buried 2'. That will result in a 6' wide by 4' high waterway opening above streambed, providing 24-sq. ft. of waterway area. Bed retention sills should be added in the bottom. Sills should be 12" high across the full width of the box. So the top of the sills will be buried 12' and not be visible. Sills should be spaced no more than 8'-0" apart throughout the structure with one sill placed at the inlet and one at the outlet. The box should be filled up to the stream bed level with stone graded to match the natural stream bed material that will keep flow above the surface. This structure will result in a headwater depth of 2.7' at 2% AEP and of 3.1' at 1% AEP.
2. A 6.5' diameter corrugated metal pipe with the invert buried 2' and 12" high bed retention sills and fill added as described for the box above. That will result in a 6.5' wide by 4.5' high waterway opening above streambed, providing about 25-sq. ft. of waterway area. This structure will result in approximate headwater depth of 2.2' at 2% AEP and of 2.5' at 1% AEP, with no roadway overtopping up to 1% AEP.
3. Any similar structure with a minimum clear span of 6' and at least 20 sq. ft. of waterway area, that fits the site conditions, could be considered. Any closed bottom structure should have bed retention sills and a buried invert as described above.

Replacement options for the VT 236 culvert:

1. A concrete box with an inside opening span of 4 feet and minimum opening height of 4 feet. This configuration provides 16 square feet of waterway area. This structure results in a headwater depth of 3.7 feet at 2% AEP and 4.1 feet at 1% AEP. We recommend the addition of 6-inch baffles as a means of roughening the interior surface. This retrofit will decrease velocities and extent of erosion at the outlet of the structure.
2. A corrugated metal pipe arch with a minimum clear span of 60 inches and clear height of 46 inches, providing a waterway area of 16 square feet. This structure results in a headwater depth of 3.6 feet at 2% AEP and 4.0 feet at 1% AEP. If a culvert slope over 6.5% is selected for replacement of this structure, we recommend the addition of 6-inch baffles as a means of roughening the interior surface. This retrofit will decrease velocities and extent of erosion at the outlet of the structure.
3. A minimum 4.5 foot diameter corrugated metal pipe, with 16 square feet of waterway area. This structure results in a headwater depth of 4.1 feet at 2% AEP and 4.5 feet at 1% AEP. We recommend the addition of 6-inch baffles as a means of roughening the interior surface. This retrofit will decrease velocities and extent of erosion at the outlet of the structure.

Comment: *More specific data are needed regarding road conditions across the watershed and the extent to which additional improvements are needed.*

Response: DEC is working with the Town of Franklin and Northwest Regional Planning Commission to track progress toward achieving compliance with the [Municipal Road General Permit](#) (MRGP) Standards.

For example, we received the following information from the Northwest Regional Planning Commission, based on the 2017 Municipal Roads Erosion Inventory:

Of the 52 hydrologically connected road segments evaluated by NRPC for the 2017 Road Erosion Inventory of Municipal Roads,

6 segments “Do Not Meet” MRGP Standards

10 segments “Partially Meet” MRGP Standards

36 segments “Fully Meet” MRGP Standards

With the Erosion Inventory completed, the Town of Franklin was able to secure pilot funding during the launch of the [Municipal Roads Grant in Aid](#) program, and is well-positioned to secure additional funding as the program continues.

Aeration Project

Comment: *Funding for this project would be better spent elsewhere in the watershed*

Response: The Response Plan focused on projects in the Lake Carmi watershed and DEC anticipates securing additional funding for actions in the watershed, in concert with aeration of the lake. There is broad support across the scientific community for managing cyanobacteria blooms through cross-sector reductions of nutrient loading from the watershed combined with “carefully selected in-lake restoration methods” such as aeration (Nygren et al. 2017).

Comment: *What are the pros and cons of aeration?*

The Agency of Natural Resources continues to weigh the pros and cons of aeration as we prepare to issue a design/build request for proposals for installation of an aeration system in Lake Carmi.

In lakes, ponds, and reservoirs, biological processes that utilize oxygen, such as respiration, occur naturally throughout the water column and may be most intense near the lake bed, where plant and other organic materials are decomposed by bacteria. In stratified lakes, reduced oxygen levels in deeper water can be exacerbated during summer months, when the dense bottom lake layer is separated from sources of oxygen in the less-dense upper lake layer. As respiration occurs in the bottom layer, oxygen can become depleted, creating what are known as “anoxic” conditions. Anoxic conditions influence chemical reactions in the sediment that affect phosphorus concentrations in the water.

Monitoring data for Lake Carmi show that during the summer months when anoxic conditions occur, phosphorus is released from the sediments and accumulates in the bottom lake layer. When the bottom layer mixes into the upper lake layers in late summer or early fall during lake turnover events, the highly concentrated phosphorus from the bottom provides a supercharge of nutrients for cyanobacteria, intensifying blooms. DEC monitoring data show that lake turnover events frequently precede the most intense cyanobacteria blooms.

The primary benefit of the aeration method proposed is that it would prevent accumulation of phosphorus in the bottom layer by keeping the lake waters mixed during the summer months. Extensive modeling conducted by consultants shows that aeration will prevent development of an anoxic layer and prevent accumulation of phosphorus in the lowest layer. Secondly, artificial circulation would create physical conditions that discourage cyanobacteria growth by encouraging growth of diatoms and algae that do not produce cyanotoxins.

There may be drawbacks of aeration in Lake Carmi, including potentially: 1) changing the communities of phytoplankton, zooplankton and other primary food sources that larval and juvenile fish species rely on in their early life stages; 2) making nutrients more available to phytoplankton and aquatic plants, increasing their rate of growth; 3) decreasing availability of still water to those species that need it; or 4) increasing temperature throughout the water column due to the mixing of warm surface water downward.

For information about the range of in-lake treatments considered for Lake Carmi, including extensive modeling of the potential impacts of aeration on lake conditions, visit the “Restoring Lake Carmi” web page at dec.vermont.gov/watershed/cwi/restoring/carmi.

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