

Development of a Phosphorus Control Plan for the Lake Champlain Basin



Services / Expertise

TMDL Implementation Support
Phosphorus Control Planning
Stormwater BMPs
Regulatory Compliance
Spatial Analysis and Mapping
ArcGIS Online
Mobile Field Application

Market

State Government
Regional Planners

Project Location

Vermont

Date Completed

2016–present

Project Owner

Vermont Agency of Transportation
Highway Division
Maintenance & Operations Bureau

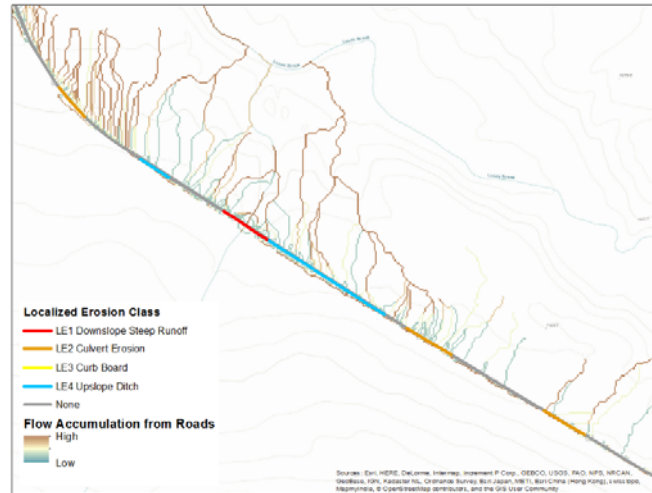
Project ID#

16-091

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Using high resolution lidar data, flow runoff (accumulation) from roads was calculated and combined with supplemental datasets to determine risk areas for localized erosion. Four classes of localized erosion risk were derived and field validated using Collector for ArcGIS. These areas will be prioritized for applying stormwater management measures within the Phosphorus Control Plan.

THE Lake Champlain Phosphorus TMDL was finalized by the EPA in June 2016 for the 12 segments in the Vermont portion of the Lake Champlain Basin (LCB). In fulfilling a requirement established in the Phase 1 TMDL Implementation Plan, the Vermont Department of Environmental Conservation (DEC) issued a permit to the Vermont Agency of Transportation (VTTrans) for stormwater discharges from the state transportation separate storm sewer system (TS4) in December 2016, with the latest revision effective November 29, 2017. Among other requirements, the TS4 permit requires VTTrans to develop and implement Phosphorus Control Plans (PCPs) for each Lake segment within the Vermont portion of the LCB. The PCPs, developed in phases, will identify and document a suite of best management practices (BMPs) that should collectively achieve the required reductions in phosphorus loading from VTTrans stormwater discharges.

Since late 2016, Stone has worked in collaboration with VTTrans and DEC to develop supporting datasets and an implementation framework for the VTTrans PCPs. Beginning in the Missisquoi Bay basin, Stone first defined the “PCP Area,” including roadway miles and non-road impervious areas, using best-available GIS datasets. We then identified road segments and VTTrans facilities (airports, garages, park and rides, etc.) that may produce the greatest reductions in phosphorus loads as a result of BMP implementation, emphasizing practices and locations well-suited to infiltration. Through this analysis, Stone developed innovative techniques to identify areas of significant hydrologic connectivity, substantial runoff accumulation, and potential localized erosion along state managed roadways.

To validate the results, Stone and VTTrans conducted field validation using ArcGIS Online and Collector for ArcGIS. The approach piloted in the Missisquoi basin was extended to other VTTrans-controlled lands throughout the entire LCB as basin-wide LiDAR and other supporting datasets became available in 2017.



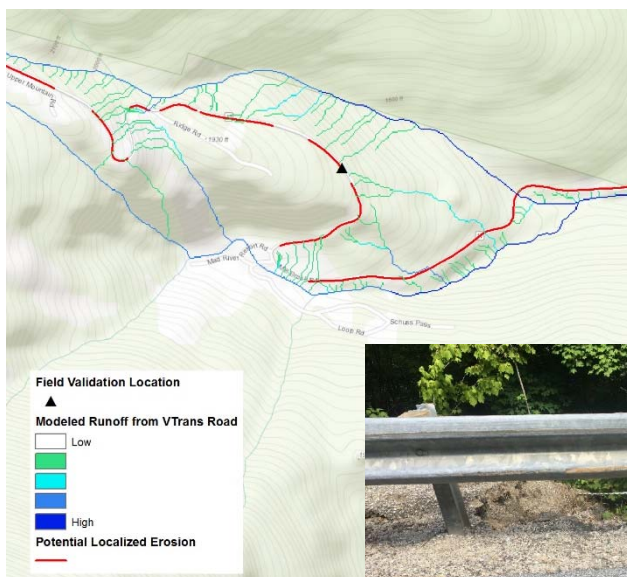
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Stone delivered a final version of the GIS datasets developed to define the PCP areas to DEC in December 2017, and DEC provided draft phosphorus base loads with required reductions based on the delivered PCP areas in March 2018. Review and concurrence by both agencies on the phosphorus base loads and required reductions resulted in agreement prior to the April 1, 2018 regulatory deadline established in the Phase 1 Implementation Plan.

Stone continues to work with VTrans and DEC to meet interim milestones that will inform the development of the basin-wide generalized PCP, including:

- *Leveraging datasets developed in previous project phases to investigate phosphorus loading factors that will inform the prioritization of retrofit projects:* Phosphorus loading factors are being developed based on roadway characteristics—most importantly, road slope and the level of hydrologic connectivity of each road segment. The Stone team reviewed available literature to identify possible strategies for assigning phosphorus loading factors throughout the TS4. Based on the analysis of hydrologic connectivity and literature reviewed, a spreadsheet framework was developed to distribute the phosphorus base load provided by ANR according to varying levels of road slope and hydrologic connectivity. Stone submitted a complete GIS inventory of phosphorus loading factors to comply with PCP requirements in October 2018.
- *Developing coefficients for loading rates across the TS4 for the various transportation land uses:* With a set of established loading factors, the Stone team will develop and apply coefficients for P loading rates across the TS4's impervious cover and right-of-way areas within the LCB that total to the baseline phosphorus load for each watershed. It is anticipated that the coefficients developed within the spreadsheet described above will be displayed as a GIS layer that will be provided to VTrans upon completion of this task (Spring 2019).



In addition, Stone is working with MOB staff and ANR to explore how the rich data on maintenance operations contained in the VTrans Maintenance Activities Tracking Database (MATS) can be leveraged to demonstrate compliance with road drainage condition standards within the PCP framework, similar to the approach being developed for local roads under ANR's Municipal Roads General Permit.

Stone worked with Vtrans MOB Stormwater Technicians to verify areas of localized erosion along state managed highways that were identified at the screening level using a methodology. Here, Stone identified areas of significant hydrologic connectivity, substantial runoff, and potential localized erosion in Fayston, Vermont. VTrans staff visited the site and performed field validation using ArcGIS Online and Collector for ArcGIS, confirming significant 'project level' erosion.