Town of Williston

Stormwater Management Program 2013

Williston Public Works Week 2013

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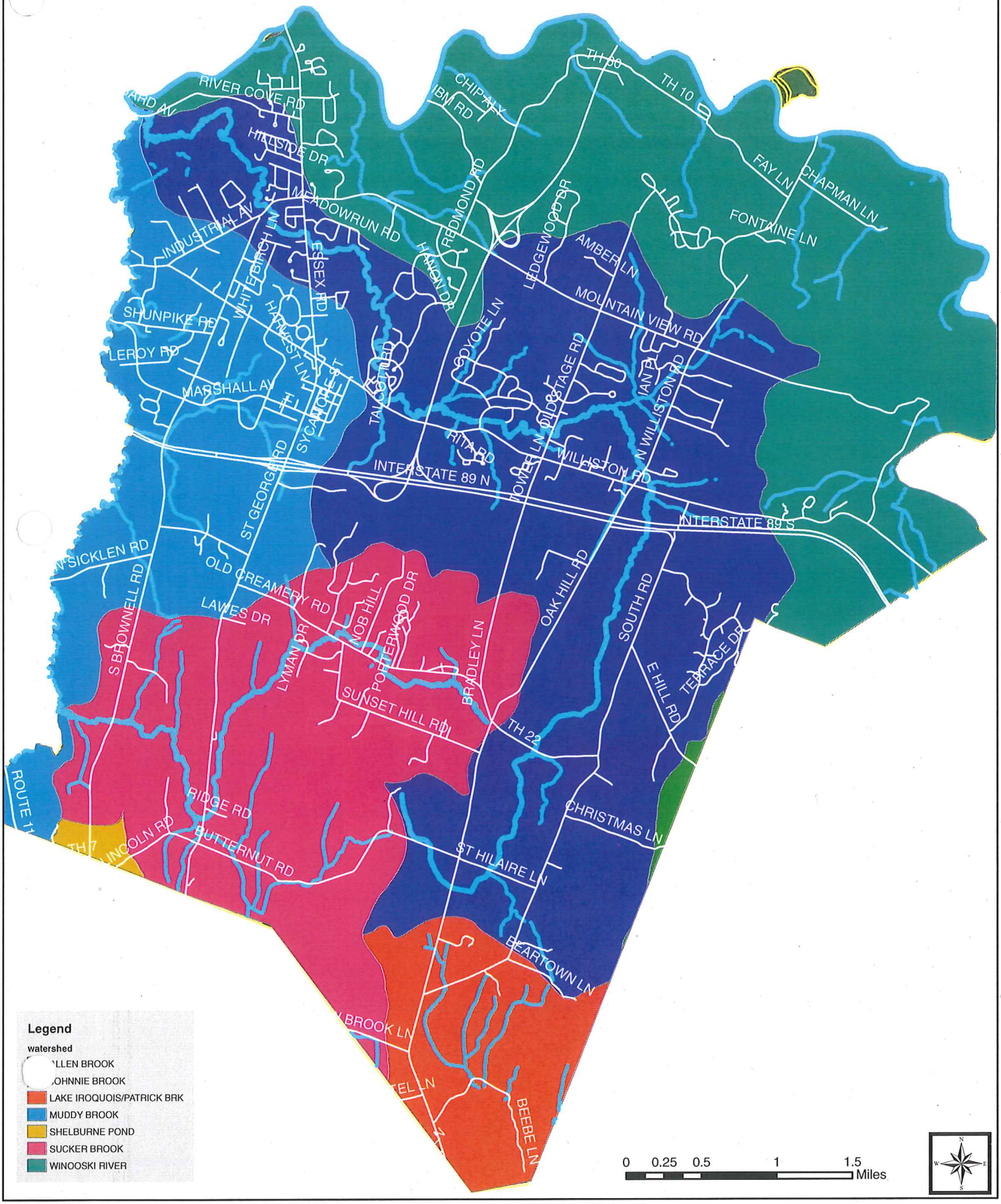
Williston Watersheds



The newly signed Small Municipal Separate Storm Sewer System (MS4) General Permit (3-9014) went into effect on December 5, 2012. The permit authorized MS4's to discharge pollutants to water of the State and the United States. MS4's must develop, implement and enforce a Stormwater Management Program (SWMP) to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) using Best Management Practices (BMPs) to protect water quality and to satisfy requirements of the 1972 Clean Water Act.

This SWMP corresponds to the many sections within the MS4 Permit to allow the reader to better understand the Town of Williston Stormwater Management Program and the MS-4 Permit. This will also ensure that the Town covers all the new mandates within the new Permit.

I. Coverage Under This Permit

A. Permit Coverage

Small MS4's in urbanized areas and in the watersheds of stormwater-impaired waters and small MS4s in such area as defined by the Secretary. Including the following: Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, Winooski the University of Vermont, the Burlington International Airport and the Vermont Agency of Transportation.

B. Small MS4s Covered and Eligible Discharges

A small MS4 is authorized to discharge if they are designated an MS4 and as long as they submit a Notice of Intent (NOI). Stormwater discharges are authorized and the following Non-stormwater discharges: Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, flows from riparian habitats and wetlands and discharges from fire- fighting activities.

C. Limitations on Coverage

Not authorized: Discharges mixed with Non-stormwater discharges, discharges or activity that results in the prohibited take of any threatened or endangered species. Discharges that fail to reduce pollutants to the MEP. Discharges of any pollutant to any water with a Water Quality Remediation Plan or a Total Maximum Daily Load (TMDL)

D. Application for Permit Coverage

A NOI and a SWMP must be submitted within 180 days of December 5, 2012 - June 3, 2013

E. Waivers from Permit Coverage

1. Population less than 1,000 and the system is not contributing substantially to the pollutant loadings and if the system discharges any pollutants that have been identified as a cause of impairment of any water body to which it discharges, stormwater controls are not needed based on wasteload allocations establish in the TMDL that addresses the pollutants of concern.
2. Population less than 10,000 and all waters that receive a discharge from the small MS4 have been evaluated by the permittee, the Secretary determines that stormwater controls are not needed. Pollutants of concern include Biochemical Oxygen Demand (BOD), sediment, stormwater, pathogens, oil and grease and any other pollutant that has been identified as an impairment. The Secretary determines that future discharges do not have potential to reduce water quality standards.

3. Secretary may rescind a waiver when evidence has changed. Secretary will consider a waiver if petitioned to.

F. Additional Authorities

Discharges not covered by this permit: Stormwater activity associated with industrial activity, stormwater during construction and stormwater with post-construction management.

II. Notice of Intent Requirements (NOI)

A. Deadlines for Submission of Notice of Intent

NOI & SWMP is due 180 days of December 5, 2012 – June 3, 2013

B. Content of the Notice of Intent

NOI must be signed and include the following information:

Name, mailing address and phone number of the entity. Provide name of person responsible for overall coordination of SWMP. Include an estimate of the area in the small MS4. Identify names of all known waters that receive a discharge from the MS4, their impairments and number of outfalls. Identify any supporting entities. Provide information on BMP's and measurable goals for the 6 (Minimum Control Measures) MCM a time frame for implementing them and who is responsible. Provide TMDL implementation requirements.

C. Submittal of Permit Fees - $1,320

D. Where to Submit NOI

MS4 Permit Coordinator, VT Department of Environmental Conservation
Watershed Management Division, Stormwater Management Program
Main Building, Second Floor
One National Life Drive
Montpelier, Vermont 05620-3522

E. Co-Permittees Under a Single NOI

Permittee may partner with another MS4 to develop and implement its SWMP

III. Stormwater Management Program

The SWMP shall provide measurable goals for the development and implementation of the six MCM's. The Flow Restoration Plan (FRP) will be incorporated into the SWMP once approved.

IV. Discharge Requirements

A. Water Quality Based Requirements

Reduce discharge of pollutants to the MEP protect water quality and to satisfy the Clean Water Act.

B. Requirements to Meet Water Quality Standards

Discharges shall not cause or contribute to an exceedance in the Vermont Water Quality Standards. Any discharges that do contribute to an exceedance shall within 60 days eliminate the conditions. If elimination in 60 days is not feasible then it shall be documents in the SWMP what measures will be taken and a timeframe to eliminate the condition. Once eliminated the measures used must be documents within 30 days in the SWMP. It must be documented in the annual report thoroughly.

C. Discharges to Impaired Waters

Impaired waters are those identified by the Secretary on the Section 303(d) list as not meeting the Vermont Water Quality Standards with or without an Approved TMDL. Stormwater impaired waters include water identified by the Secretary as impaired primarily due to stormwater runoff.

1. Discharges to Impaired Waters with an Approved TMDL: Discharges shall be controlled and consistent with the assumptions and requirements of any Wasteload Allocations (WLA) in the TMDL. The SWMP shall include all measures that will address the WLA. The SWMP and the Annual Reports shall include control measures and the rationale that have been or will be implemented to control discharges as per the TMDL.

Develop and submit a comprehensive Flow Restoration Plan (FRP) for the watershed within three years of the issuance of the authorization to discharge that will outline measures necessary to achieve the flow restoration targets in the TMDL. The FRP shall contain:

- Identification of Required Controls,
- Design and Construction Schedule (maximum of 20 years from 12/5/2012),
- Financial Plan,
- Regulatory Analysis,
- Identification of Regulatory Assistance,
- Third-Party Implementation.

Once approved by the Secretary the FRP becomes part of the SWMP.

Once Authorization to discharge is approved, a reporting schedule will be issued by the Secretary. Semi -annual reports on FRP status are required. Reports shall include a statement signed by a designer that any BMP built or implemented was constructed in accordance to approved plans. Report shall also include phosphorus reduction as a result of any implementations.

Month three:	A flow Monitoring Plan – Amendment to SWMP to follow, still awaiting coordination from the State. MS4's wishes to contribute funding to have the State organize and facilitate this.
Month six:	Plan to address expired permits & verification of implementation of flow monitoring – Amendment to SWMP to follow, still awaiting coordination from the State. MS4's wishes to contribute funding to have the State organize and facilitate this
Month 12:	Semi-annual report of FRP status
Month 18:	Semi-annual report of FRP status and schedule for completion
Month 24:	Submit report that all expired permits are in compliance Amendment to SWMP to follow
Month 30:	Semi-annual report of FRP status
12/5/2032	Complete implementation of FRP

Develop a program that will identify and provide technical assistance to landowners on Low Impact BMPs within two years after authorization to discharge. Amendment to SWMP to follow

Develop and submit to the State a report on legal authorities or strategies that have been adopted to protect and regulate development in the stream corridors of stormwater impaired waters. Amendment to SWMP to follow

Develop a plan for outlining options for enhanced protection of stream corridors, including a map showing converted impervious surfaces and undeveloped areas while reviewing riparian buffer and stream fluvial geomorphological information.
For corridors not developed or converted to impervious surface Plans shall include: Minimum width of stream channel buffers, minimum setback requirements, policies or codes to enhance protection of undeveloped stream corridors. Identify stream corridor restoration, including buffers and relocating development outside corridor. Amendment to SWMP to follow

Implement and fund a Flow and precipitation Monitoring Plan. Amendment to SWMP to follow

The SWMP assessment will be based on the implementations and maintenance of the BMPs identified in the FRP and flow monitoring, not on the measurements of pollutant loading.

2. Discharges to Impaired Waters without an Approved TMDL: The SWMP and annual reports shall address how any discharges that have the potential to cause or contribute to the impairment will be controlled so that they do not cause or contribute to the impairment. The plan should reflect the magnitude and complexity of the impairment and any potential to contribute to the impairment.
The Muddy Brook is listed on the 2012 303(d) Part A, list as impaired water without a TMDL, see Appendix 5. Muddy brook is impaired for nutrients and temperature from the mouth to seven miles upstream.
The Town is currently working on developing a Watershed Improvement Plan for all watersheds within the Town. We will also coordinate with South Burlington on the development of a TMDL, since this watershed is shared. Both plans will warrant that any work within the Muddy Brook Watershed will not cause further impairment to nutrients and toxins.

Tributary #4 to the Muddy Brook 0.5 miles is listed as impaired for Toxics, including TCE and Vinyl Chloride. This Tributary is also identified on the Federal List of Superfund Sites. See Appendix 6 for segments from the EPA's, 2011 Data Summary for what is identified as the Commerce Street Plume. The 303(d) list identifies that the TMDL for this tributary is a Low Priority and it is expected that the EPA will coordinate the TMDL with any Superfund solutions that they have already approved.

D. New Discharges (Applicable Only to "Non Traditional MS4s")

E. Discharges to High Quality Waters

No new or increased discharge to waters unless they are consistent to the anti-degradation policy.

F. Obligations Under Permitting Programs

G. Requirements to Reduce Pollutants to the Maximum Extent Practicable – "The Six Minimum Measures"

Develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the small MS4 to the MEP to protect water quality and to satisfy water quality requirements of the Clean Water Act. The implementation of the SWMP must be complete by (12/5/2017, the end of the Permit period).

THE SWMP must include: Responsible Party for implementing the BMPs, the BMPs that will satisfy the measure, measurable goals including the duration for implementation as appropriate and a rationale for how and why each BMP was selected. A rationale of why some BMPs were not picked. Changes necessary to implement the BMP and expected water quality outcomes.

H. Minimum Control Measures

1. *Public Education and Outreach on Stormwater Impacts: The permittee must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies. The program shall include the steps that the public can take to reduce pollutants in stormwater runoff including an explanation of the problem of stormwater volume and solutions for reducing the amount of runoff volume reaching waters of the state.*

BMP #1: The Town will continue to maintain a web site with local relevant stormwater information. The website can be found at: http://www.town.williston.vt.us/index.asp?Type=B_BASIC&SEC={ACC6B21E-0FDB-497F-8A5A-62CDFF871272}

Responsibility: The Public Works Department will be responsible for maintenance to the Town website.

Measurable Goal: A Google Analytics tracking mechanism has been installed on the web site that will document the number of visitors.

Rationale: The Town's web site has had success in the past for reaching out to the community and the counter being recently installed will allow Williston to continue to track the number of hits on the web site.

BMP # 2: The Town will continue to participate and assist in funding in the Regional Stormwater Education Program (RSEP) as witnessed by the recent signing of the Memorandum of Understanding (MOU) with the Chittenden County of Regional Planning Commission (CCRPC), see Appendix 1 for MOU.

Responsibility: The Public Works Department will be responsible for participating and funding this BMP.

Measurable Goal: The marketing firm hired by RSEP will provide a summary of educational information made available and its productivity to be included in the

Town's annual reports. Educational documentation from RSEP can be found at: http://www.smartwaterways.org/.

Rationale: The regional approach has proven to be successful for over the past and allows us to educate a larger group of individuals.

BMPs #3-5 were not pursued since the history of BMP #1 & #2 have proven to be successful.

2. *Public Involvement/Participation: The permittee must implement a public involvement/participation program, which at a minimum, complies with State and local public notice requirements.*

   BMP #9: The Town will continue to participate in the Chittenden County Stream Team (CCST). See Appendix 2 for a signed MOU with CCRPC through 2016. The CCST is designed to engage the community in projects that contribute to the reduction of non-point source pollution and stormwater volume at the regional level. The project utilizes social networking tools to form a cadre of concerned citizens and professionals interested in hands-on activities to reduce the harmful effects of stormwater.

   Responsibility: The Public Works Department will be responsible for participating in and funding this BMP.

   Measurable Goals: The Winooski Natural Resource Conservation District (WNRCD) has been contracted by CCST to engage citizens in projects at a local level, see Appendix 7 for contract. They will provide CCST with quarterly reports and an annual report summarizing the number of attendees at the multiple activities scheduled throughout the previous year as well as a work plan for the upcoming year. All reports will be available on both the Town and CCST websites: http://ccstreamteam.org/.

   Rationale: This regionalized public involvement program was piloted in 2010 and proved to work well for the participating MS4s. Like the regionalized effort of RSEP, the CCST will build off momentum from each consecutive year.

   BMPs #1-8 were not investigated because the CCTS was designed specifically to satisfy the criteria under MCM#2.

3. Illicit Discharge Detection and Elimination:

   BMP #1: Develop, implement and enforce a program to detect and eliminate illicit discharges.

   Williston will continue its program of stormwater outfall monitoring and assessment via systematic field surveys. When a potential illicit discharge is identified during these surveys, it will be tested for optical brighteners (OBs) and/or other potential pollutants. Suspicious outfalls that test negative will be re-tested during the same or the next season. Outfalls testing positive for OBs or other pollutants will be investigated to pinpoint the source of the discharge. Confirmed illicit discharges will be eliminated through voluntary compliance or using the enforcement mechanisms provided in the Williston's Unified Development Bylaw (WDB), Chapter 29, Appendix 8. Williston will survey at least 25 outfalls each year. Efforts will focus on new outfalls, outfalls that have not been surveyed within five years, and outfalls that were

previously identified as potential, suspect, or obvious sources of an illicit discharge. Outfalls that are identified as suspect or obvious sources of an illicit discharge in the sampling year will be tested for OBs and other pollutants such as ammonium. Samples will be tested at the Essex Wastewater Treatment facility.

Responsibility: The Public Works Department will be responsible for implementing BMP #1 with assistance from the Planning and Zoning Office and the Essex Wastewater Treatment Facility.

Measurable Goals: A computer data base and location map of outfall monitoring will be maintained and updated annually. Test results, data base, and outfall map will be submitted in the annual report. Where voluntary compliance cannot be attained, the Town may levy fines and or request a court order requiring elimination of the illicit discharge as provided by WDB Chapter 7, Appendix 11.

Rationale: All alternatives must be addressed under MCM #3.

BMP #2: Develop and maintain a storm sewer map of the Town, showing the location of all outfalls and the names and location of all waters of the State & US that received discharges from those outfalls.

Responsibility: The Public Works Department will be responsible for the continuation of updating the existing Utility Map, including all stormwater infrastructures. New construction data will be collected from as-built plans submitted by the contractor once the Town takes ownership of the development.

Measurable Goals: The existing map will continue to be updated for the annual reports.

Rationale: All alternatives must be addressed under MCM #3.

BMP #3: The Town shall implement, prohibit and enforce, as law permits, non-stormwater discharges into the MS4 system.

Responsibility: The Public Works Department will be responsible for the inspection of any possible non-stormwater discharges and work closely with the Planning and Zoning Department to administer and enforce the watershed health regulations that have been adopted as Chapter 29 of WDB and the enforcement mechanisms that have been adopted in Chapter 7.

Measurable Goals: The Public Works Department will keep a list of any violations found and will report any possible issue in the annual report as discussed in BMP#1 above.

Rationale: All alternatives must be addressed under MCM #3.

BMP #4: Develop and implement a plan to detect and address non-stormwater discharges, with emphasis on outfalls in the stormwater impaired watershed and random illegal dumping to the system.

Responsibility: The Public Works Department will utilize the Highway Department to continue to be aware of any suspicious activity on a daily basis. Highway staff is out on

the roads many hours a day and are therefore the best department to detect non-stormwater discharges. We will also utilize the Towns web site and social media to allow people to anonymously report any suspicious activities. Any reported activity will be immediately investigated and proper action will be taken to cease the activity as necessary.

Measurable Goals: Any reported discharges and actions taken will be included in the Annual Report.

Rationale: All alternatives must be addressed under MCM #3.

BMP #5: Inform public employees, businesses and the general public of hazards associated with illegal discharges and improper disposal of waste.

Responsibility: The Public Works Department will utilize the Town's, RSEP's and CCST's websites to continue to inform the public and businesses about the hazards of illegal discharges. Public employees will attend state offered workshops on stormwater when they are available locally. The Town will continue to mark and remark "no dumping" on catch basins. Developers are now required to mark them during construction in accordance to the Williston Public Works Standard Specification.

Measurable Goals: Reports provided through RSEP & CCST will be included in the annual reports. Any attendance to seminars, trainings and conferences by town employees will also be documented and submitted in the annual reports.

Rationale: All alternatives must be addressed under MCM #3.

BMP #6: Address the following categories of non-stormwater discharges only if they are significant contributors of pollutants to the MS4: Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, flows from riparian habitats and wetlands and discharges from fire fighting activities.

Responsibility: The Public Works Department will be responsible to address these discharges if they become a significant contributor of pollutants.

Measurable Goal: If these discharges become significant contributors they will be identified and reported in the Annual Report. The Town will develop a process on how to prevent them from becoming a pollutant at that time. This SWMP will be amended to include any new procedures developed.

Rationale: All alternatives must be addressed under MCM #3.

BMP #7: Provide the Secretary with an annual status report of monitoring activities conducted and corrective actions taken. The final annual report required by this permit shall summarize the monitoring activities and corrective actions taken during the course of this permit.

Responsibility: The Public Works Department will complete and submit all Annual Reports as necessary to the Secretary, as described in BMP #1.

Measurable Goals: The Annual Reports will summarize all IDDE activities from the preceding year. Data bases, maps and test results will be provided every year.

Rationale: All alternatives must be addressed under MCM #3.

4. *Construction Site Stormwater Runoff Control: Develop and enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. If a construction project with a potential to discharge stormwater, which results in a land disturbance of equal to or greater than one acre does not qualify for coverage under the MS4 General Permit 3-9014 OR the Construction General Permit 3-9020.*

   BMP #1: Develop and implement procedures to assure that construction activities undertaken by the permittee are properly permitted and implemented in accordance with the terms of the construction permit.

   Responsibility: The Public Works Department will be responsible for inspection of construction activities for proper erosion control measures. The watershed health regulations of WDB Chapter 29 require that development projects between a ¼ acre and 2 acres of land are subject to simple runoff and erosion control standards. Development projects that are greater than 2 acres of area will be required to complete and submit a runoff and erosion control plan along with their permit application. The Public Works Department will review plans prior to permit approval.

   Measurable Goals: A list of construction projects reviewed and or inspected will be submitted with the Annual Report.

   Rationale: Williston has found that there are many projects being constructed that fall below the States one acre threshold and therefore adopted the runoff and erosion control standards of WDB Chapter 29 to regulate development projects disturbing greater than a ¼ acre of land.

   BMP #2: The Town shall review existing policies; planning, zoning and subdivision regulations; and ordinances to determine their effectiveness in managing construction-related erosion and sediment and controlling waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at construction sites that may cause adverse impacts to water quality for consistency (or more stringent) with the States general permit and for construction erosion guidelines for low impact development.

   Responsibility: The Public Works Department will review existing rules, policies and ordinances to ensure consistency with, or more strict than, State requirements. Chapter 11 of Williston's 2016 Comprehensive Plan includes seven policies that address watershed health and stormwater management. Those policies are reflected in Williston's current development standards, which are more stringent than state standards for construction projects since runoff and erosion control is required for

development projects ¼ acres or greater. The Williston Public Works Standard Specification will be reviewed and amended as necessary to incorporate additional construction-related concerns.

Measurable Goals: If amendments to policies and development standards occur, those amendments will be submitted in the Annual Report and this SWMP will be amended to incorporate them. Construction site inspections will be conducted as discussed in BMP #1.

Rationale: The General Permit dictates this BMP be utilized.

BMP #3: Develop and implement an erosion control ordinance or zoning or subdivision regulation or other regulatory mechanism which, at a minimum, regulations development activities not subject to state or federal erosion control requirements.

Responsibility: The Public Works will be responsible for inspection of construction activities for proper erosion control measures. WDB Chapter 29 regulates development projects greater than a ¼ acre. Development projects that are greater than 2 acres will be required to complete and submit a runoff and erosion control plan along with their permit application. The Public Works Department will review plans prior to Planning and Zoning granting a permit. Weekly construction meetings will be scheduled with contractors and developers for larger projects.

Measurable Goals: A list of construction projects reviewed and or inspected will be submitted with the Annual Report.

Rationale: Williston has found that there are many projects being constructed that would fall below the States one acre threshold and therefore adopted the runoff and erosion control standards of WDB Chapter 29 to regulate development projects greater than a ¼ acre.

5. *Post-Construction Stormwater Management for New Development and Redevelopment:*

BMP #1: The Town shall review existing policies; planning, zoning and subdivision regulations; and ordinances to determine their effectiveness in managing stormwater runoff that discharges into MS4 from new development and redevelopment projects to prevent adverse impacts to water for consistency (or more stringent) to the State Operational .

Responsibility: The Public Works Department will be in charge of inspecting the construction projects upon final completion to make sure it has been constructed in accordance to the approved plan. All construction projects within the Town are required to submit a Development Agreement and/or Escrow prior to beginning construction, DBL Chapter 7. These legal documents ensure that the project be constructed in accordance to the approved plans and if it is determined that they were not, funds will not be released.

The Public Works Department will also review existing policies to determine if they are effective in the overall operation of stormwater management.

Measurable Goals: A data base will be developed to monitor projects after

construction, a final walk through prior to Town acceptance of any roads and infrastructure will ensure properly installed stormwater treatment facilities. We also require a sign off from the Design Engineer that everything is constructed in accordance to approved plans. Revised or newly created regulations will be submitted with the Annual Report once accepted by the Towns governing body. This SWMP will also be amended.

Rationale: The General Permit requires that this BMP be implemented.

BMP #2: The Town shall assess existing policies; planning, zoning and subdivision regulations; and ordinances to determine their support of Low Impact Design Options, (LID) for new development and redevelopment projects to prevent adverse impacts to water.

Responsibility: Chapters 23 and 29 of the WDB encourages the use of LID, see Appendix 8 & 9. LID BMP's include: pervious pavement, filter strips, swales, parking lot landscaping and rain gardens. The Public Works Department will review site plans that are submitted to Planning and Zoning prior to receiving permit approvals. The Public Works Department will be responsible for the inspection of LID BMPs after construction to ensure they were built as designed and are functioning properly. If Public Works determines that a proposed BMP was not constructed or installed in accordance to the approved plans, Planning and Zoning will be immediately notified and a notice of violation will be issued if the developer does not voluntarily rectify the issue. A Certificate of Occupancy will not be provided until these required improvements are made.

Measurable Goals: Public Works will create a list of projects that include any LID BMPs in the Annual Report.

Rationale: The General Permit requires that this BMP be implemented.

BMP #3: Asses whether changes can be made to current street design and parking lot guidelines and other local requirements that affect the creation of impervious surfaces to support low impact design options.

Responsibility: The Public Works Department will be responsible for reviewing the Roadway Standard Specifications to see if they can incorporate LID BMPS. WDB Chapter 14 - Off Street Parking & Loading (see Appendix 10), already includes LID BMPs, but may need to be strengthened so that developers are more likely to select low impact deign options.

Measurable Goals: If any changes to the standard specifications or the bylaws are necessary to encourage more LID BMPS the Annual Report will include new language. Public Works will also begin a data base of LID projects in Town to monitor their effectiveness.

Rationale: The General Permit requires that this BMP be implemented.

BMP #4: Develop, implement and enforce a program to identify and regulate post-construction stormwater runoff, preventing or minimizing water quality impacts for projects disturbing greater than one acre.

Responsibility: Planning and Zoning currently documents all permit applications in an excel data base. The Public Works Department will review existing ordinances and regulations to determine compliance with minimizing the water quality impacts after construction. If it is determined that additional ordinances, regulations or specifications are required to cover projects that will disturb less than an acre of land are required to have a post construction plan to protect water quality, this SWMP will be revised to include newly accepted programs.

Measurable Goals: Annual Reports will include a list of projects that must comply with this BMP. Any amended regulations will be submitted with the Annual report as they become accepted, once approved we will revise this SWMP.

Rationale: The General Permit commands that this BMP be implemented.

BMP #5: Develop and implement procedures for inspection development and redevelopment projects for compliance with the conditions for the regulations.

Responsibility: The Public Works Department will be responsible for inspecting construction sights periodically for the duration of construction. Larger projects often involve weekly construction meetings in which any issues may be discussed with the Owner and the Contractor. If there appears to be any violations of permit approvals and/or regulations the Owner/Contractor will be contacted immediately. If they are not willing to rectify the situation, Planning and Zoning will be notified and violations may be issued according to WDB Chapter 7.

Measurable Goals: Public Works will utilize the excel spread sheet developed by Planning and Zoning to document all permit applications. If there are any noted construction concerns Public Works will document them in the annual report identifying the concern and the resolution.

Rationale: The General Permit commands that this BMP be implemented.

BMP #6: Develop and implement procedures to assure that development and redevelopment activities undertaken by the permittee, including road projects, are properly permitted and constructed and maintained in accordance with the terms of the procedures.

Responsibility: The Public Works Department has Standard Operations of Procedure (SOP's) for the Highway Department to follow during any in house construction activities. The Highway Department often participates in outside trainings through Vermont Local Roads to stay informed and up to date on any and all regulations. MCM # 6, Pollution Prevention/Good Housekeeping for Municipal Operations further emphasizes this BMP.

Measurable Goal: The Public Works Department keeps in house records of any outside trainings attended by all employees. Attendance of seminars, conferences and trainings will be submitted in the Annual Reports.

Rationale: The General Permit commands that this BMP be implemented.

6. Pollution Prevention/Good Housekeeping for Municipal Operation

BMP #1: Describe the operation and maintenance program for preventing or reducing pollutant runoff from operations, including at a minimum:

- New construction and land disturbance,
- Maintenance of fleet and buildings, all municipal garages, parks, open space, construction and maintenance practices for gravel backroads, snow disposal and stormwater systems,
- Training and Maintenance schedule and inspection procedures for long term structural controls,
- The prohibiting of phosphorus containing fertilizers on Town owned land.

Responsibility:

- The Public Works Department has Standard Operations of Procedure (SOP's) for the Highway Department to follow during any in house construction and maintenance activities. The Highway Department often participates in outside trainings through Vermont Local Roads to stay informed and up to date on any and all regulations.
- A Municipal Compliance Assistance Program (MCAP) audit was conducted in 2010. This audit is only necessary as a requirement of the MS4; therefore, the next audit will be required again in 2015. The Town of Williston continues to store road salt within a fully enclosed facility, eliminating any possible exposure to the elements and preventing runoff. The plow truck loading area is paved, allowing 100% collection by the loader operator and preventing any of the material from entering the ground or surface water. The Towns standard practice is to not use any sand on paved roadways. This past winter we continued the use of liquid deicing solution, in hopes to reduce the amount of salt and better protect the environment
- The Public Works Department will utilize the well-educated Highway Department to continue to be aware of any areas in need of maintenance. They are out on the roads a many hours every day and are the best watch group and are trained on what to look for. Currently annual inspections for Town owned Stormwater systems are conducted and reports are submitted to the State. These inspections will continue and reports will now be submitted along with the Annual Reports.
- Street sweeping is subcontracted out twice a year, in the spring and in the fall. Catch basins are cleaned as determined by the inspection of the Highway Department with an average of 75 per year. A recent SOP for the street sweeping

and catch basin material was accepted by the Solid Waste Management Program. See Appendix 12 for a copy.

- The Public Works Standard Specifications clearly states that only Non-Phosphorus fertilizers shall be used in the Streets Section, 5. See Appendix 13 for a copy.

Measurable Goals:

- Attendance of seminars, conferences and trainings will be submitted in the Annual Reports.
- The results of the next MCAP will be submitted in the corresponding annual report with any necessary corrections made within the required 90 days of the report.
- Annual inspections on Town Owned Stormwater systems and maintenance reports will be submitted with the Annual Report each year.
- Street sweeping and catch basins cleaning soil testing results will be submitted annually.

Rationale: All these sub-BMPs are currently in operation and have been good measurements that this is an effective BMP.

BMP #2: The Town may participation in the Agency's Municipal Compliance Assistance Program (MCAP), provided that any deficiencies identified in the inspection be corrected and documented in 90 days.

Responsibility: A Municipal Compliance Assistance Program (MCAP) audit was conducted in 2010. This audit is only necessary as a requirement of the MS4; therefore, the next audit will be required again in 2015.

Measurable Goals: The results of the next MCAP will be submitted in the corresponding annual report with any necessary corrections made within the required 90 days of the report.

Rationale: The MCAP report deems very informative on ways to always improve any operation and provides great feedback without penalties.

BMP #3: Provide a list of all industrial facilities that the Town owns or operates that are subject to the Multi-Sector General Permit (MSGP).

Responsibility: The Public Works Department will be responsible for this BMP, currently the Town does not own or operate any industrial facilities.

Measurable Goals: If the Town does obtain any industrial properties in the future the required permits will be applied for at that time and a list will be provided in the next annual report.

Rationale: The General Permit commands that this BMP be implemented.

I. Sharing Responsibility

Measures may be shared or taken over by another entity if the control measure is implemented, the measure is at least as stringent as the NPDES permit requirement and a written obligation is required.

J. Reviewing and Updating Storm Water Management Programs

1. Annual review of the SWMP is required.
2. Updates/Amendments may be submitted at any time, adding (but not subtracting or replacing) requirements. Replacing ineffective or unfeasible BMPS must include and analysis of why it was ineffective and expectation of the effectiveness of the new proposed BMP.
3. The Secretary may require changes at any time as deemed necessary. All new areas added to the MS4 must be implemented in the SWMP within one year. Implementation may be phased. A plan for implementing must be within 90 days.
4. Transfer of Ownership, Operating Authority or Responsibility for the SWMP Implementation: Implemention on all new areas must be accomplished no later than one year.

V. Monitoring, Record Keeping, and Reporting

A. Monitoring

IDDE monitoring shall include: Date, exact location, time of sampling, who performed the sampling, dates analyses conducted and by whom, the analytical techniques or methods used and the results. Monitoring report shall be recorded on a Discharge Monitoring Report (DMR).

B. Record Keeping

All records shall be kept for at least three years or the duration of the Permit, whichever is longer. All records shall be made available to the Secretary and to the public if requested in writing.

C. Reporting

The Town will submit an annual report to the Vermont ANR on or before April 1 of each year. The report will detail the Town's efforts over the previous calendar year.

The report will include:

- The status of the Town's compliance with MS4 permit conditions
- An assessment of the appropriateness of the BMPs identified in the SWMP
- A report on progress towards implementation of the BMPs identified in the SWMP
- A report on the progress of FRP development and implementation
- A summary of stormwater activities that the Town plans to undertake during the next reporting cycle (i.e. calendar year)
- Proposed amendments to the Town's approved SWMP
- Notice that the Town will be relying on another entity to satisfy permit obligations if necessary

VI. Stand Permit Conditions

A. Duty to Comply

Failure to comply constitutes a violation.

B. Penalties for Violations of Permit Conditions

Fines vary from $10,000 to $100,000 and possibility of imprisonment.

C. Continuation of the Expired General Permit

Permit remains in place and active until a new permit is issued.

D. Need to Halt or Reduce Activity Not a Defense

E. Duty to Mitigate
Minimize or prevent any discharges in violation

F. Duty to Provide Information
Provide documentation if requested.

G. Other Information
Accidental omitted information shall be submitted promptly submitted.

H. Signatory Requirements
Principal Executive Officer shall sign the NOI and consent to statement:
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I. Property Rights
Permit does not convey any property rights.

J. Proper Operation and Maintenance
Permittee must properly operate and maintain all facilities and systems of treatment and control including laboratory controls and quality assurance.

K. Inspection and Entry
Secretary shall have access to facilities, activities, equipment, samples, monitoring data and records at reasonable times.

L. Permit Actions
Permit remains does not constitute a stay if it is being modified, reissued, revoke or terminated.

M. Permit Transfers
Transfer may be done by submitting a notice of transfer to the Secretary 30 days prior to the date of transfer.

N. Anticipated Noncompliance
Secretary must be notified immediately if Permittee is expected to not comply

O. State Environmental Laws

P. Severability

Q. Procedures for Modification and Revocation

R. Requiring an Individual Permit of an Alternative General Permit

S. General Permit Termination

T. Limitation

VII. Definitions

VIII. Rights to Appeal to the Environment Court

Town of Williston

Stormwater Management Program 2013

Appendix 1

CHITTENDEN COUNTY
REGIONAL STORMWATER EDUCATION PROGRAM
MEMORANDUM OF UNDERSTANDING
FOR THE PERIOD MARCH 10, 2013 THROUGH MARCH 9, 2018

This Memorandum of Understanding ("MOU") establishes an agreement among the Parties (as specified in Section 1) for a group of Municipal Separate Storm Sewer Systems ("MS4s") to contract to operate a Regional Stormwater Education Program ("Program") that conforms with and satisfies the relevant requirements regarding Minimum Control Measure One ("Public Education and Outreach") of the Phase II NPDES Permit for Program Years 2013--2018), as established in General Permit 3-9014 (2012) (MS4 Permit") as continued or renewed by the Vermont Department of Environmental Conservation ("VTDEC").

1. **Parties to the MOU** – The parties to this agreement are:

   a. **MS4s** – the undersigned municipalities and other entities and any other MS4 that may execute this agreement following approval of that MS4's inclusion as a party to this MOU by a 2/3^{rds} majority of the voting members of the Steering Committee and

   b. **Lead Agency** – the Chittenden County Regional Planning Commission ("CCRPC"), unless a majority of the Steering Committee favors a different lead agency or the CCRPC no longer wishes to act as the Lead Agency.

2. **Steering Committee**

   a. **Composition** – The voting members of the Steering Committee shall consist of one representative from each of the MS4s who are signatory to this Agreement as designated by each MS4. The voting members may, by a 2/3^{rds} majority vote, invite one or more other organizations to each appoint a representative to serve as a new member, a non-voting member or as an advisory member of the Steering Committee. Such organizations may include, but not be limited to, the Lake Champlain Committee, the Champlain Water District, the Chittenden Solid Waste District, other MS4s, or other municipalities.

   b. **Duties** – The voting members of the Steering Committee shall advise the Lead Agency on the development and performance of Program Services and on matters bearing on the administration of this agreement. The Steering Committee will endeavor to meet, quarterly or more often as needed.

3. **Lead Agency**

   a. **Duties** – The Lead Agency will provide Administrative Services in terms of administering this MOU and agreements with contractors (including executing contracts, receiving and disbursing funds, and monitoring the provision of services) on behalf of the MS4s. The Lead Agency shall not provide services related to this program for entities outside of the MS4 signatories. Additional coordination shall be only at the direction of the Steering Committee or its chair. The Lead Agency may also provide other Non-Administrative services (including, but not limited to, public education and outreach activities, public relations, grant writing, web site editing, etc.) as

directed by the Steering Committee and at a level consistent with each year's Program Budget as described in Section 6.a. The Lead Agency is not a guarantor that services will be performed.

b. **Compensation** – The MS4s agree to compensate the Lead Agency for the actual costs of performing Administrative and Non-Administrative duties defined in Section 3.a. Compensation shall be for hourly wages, appropriate overhead and expenses. Compensation for Administrative Duties shall not exceed ten (10%) percent of the Program Budget as specified in Section 6 without prior approval of a simple majority of the Steering Committee present at the time of the vote or by email response. Personnel costs for Lead Agency staff engaged in Administrative or Non-Administrative Duties shall be calculated at a rate of salary plus fringe. The Lead Agency shall submit invoices no more frequently than monthly. Invoices shall provide a description of work tasks completed by the Lead Agency for that billing period with sufficient detail to the satisfaction of the steering committee.

4. **Selection of Contractors** – In general, the Steering Committee shall competitively bid for contract(s) for Program Services that collectively satisfy the requirements for Minimum Control Measure One ("Public Education and Outreach") of the Phase II NPDES Permit for Program Years 2013 – 2018 as established by the MS4 Permit and as defined in Section 5. All contracts shall be awarded based on qualifications, price, and the ability of the entity to provide services that meet the relevant MS4 Permit requirements. However, upon consent of the majority of the voting members of the Steering Committee present, the RSEP may waive the bid process for select contracts. Contracts may be up to 5 years in length and shall include, but not be limited to, language specifying the right of the RSEP to cancel a contract if services are not being adequately provided and language specifying that payments to contractors shall be made only for services rendered.

5. **Program Services** – The Steering Committee, assisted by the Lead Agency and contractors, will implement a media advertising campaign and provide stormwater education services that satisfy the requirements of Minimum Control Measure One ("Public Education and Outreach") of the Phase II NPDES Permit for Program Years 2013 – 2018), as established by the MS4 Permit, in accordance with Section 5.a..

   a. Program Content – The Program Content for each Program Year will be as defined in the Communications Plan for that year as approved by a majority of the Steering Committee. Annual Program elements will include, at a minimum: 1) operation of the Program's website, www.smartwaterways.org or its equivalent, 2) the hosting of occasional educational seminars open to the public concerning stormwater pollution prevention and related topics, and 3) advertisements in various media.

6. **Program Budget, Costs, and Payments**

   a. **Program Budget**

      1) The annual Program Budget shall consist of the sum of the annual $5,000 payments for a given Program Year made by participating MS4s plus any Public Participation payment as described below in Sections 6b and 6c, respectively.

      2) Prior to March 1st of every year, the Steering Committee shall adopt a Program Budget governing expenditures for the subsequent program year. Budget categories shall include, but not be limited to: Lead Agency Administrative Duties, Lead Agency Non-Administrative Duties, Media Advertising Purchases, Media Marketing Consulting Services, and Other Contractual Services.

b. **Participating MS4 Maximum Annual Costs and Payments** – Except as otherwise provided for in this section or in section 12c, each MS4 that is a party to this MOU shall by July 30 of each program year make a single annual payment of $5,000 to pay for Program Services (as defined in Section 5) and Lead Agency services (as defined in Section-3.a.). In the event that costs are less than anticipated or that grants or other funding sources become available, a majority of the voting members of the Steering Committee may decide to reduce each MS4's payment by an equal amount. The Steering Committee may require additional dues from new members joining after March 9, 2013 to help defray program development costs incurred since the Program's inception.

c. **Public Participation Payments** – Any payments made by an MS4 (regardless of whether or not the MS4 is a Party to this MOU) to the Lead Agency as a part of compliance with Section 4.2.2.1 of the MS4 Permit (governing payments in lieu of undertaking specific Public Involvement/Participation Activities) shall pay for Program Services as defined in Section 5.

d. **Other Funds** – Any funds made available to the Program other than Participating MS4 Costs and Payments (pursuant to Section 6.b.) or Public Participation Payments (pursuant to Section 6.c.) shall be dedicated to reducing the annual costs of each MS4 participating in the Program, except as a majority of the voting members of the Steering Committee may decide.

e. **Excess Funds** – Any funds remaining at the end of a Program Year, less any earmarked set aside funds (such as survey funds, etc), shall be carried over to the next Program Year, unless a 2/3^{rds} majority of the voting members of the Steering Committee decides otherwise. Following the payment for all Program Services and Lead Agency services at the end of Program Year 2018, any funds remaining shall be carried forward for successive years where program services continue under successive agreements. Any funds refunded to the MS4s participating in this MOU shall be refunded based upon a prorated portion depending upon the number of months of participation by that MS4, except that any additional payments made by a member beyond its $5,000 annual payments shall be first refunded in full, except for payments made in lieu of performance of Minimum Measure #2.

f. **In-Kind Services** – Program Services (as defined in Section 5) that are provided by a member may be used to offset the Participating MS4 Costs and Payment of that member by such amount as may be determined by a majority of the voting members of the Steering Committee.

7. **Contracts Required** – All contracts with Contractors to provide Program Services shall be conditioned upon approval by a 2/3^{rds} majority of the voting members of the Steering Committee.

8. **Withdrawal Prohibited** – No MS4 that is a party to this MOU may withdraw from this MOU, except for early termination as defined in Section 9 of this MOU. Early termination of a signatory may be considered by the Steering Committee with 12 months' notice of withdrawal for cause and with a 2/3^{rds} majority approval of the voting members of the Steering Committee

9. **Early Termination** – This MOU shall become null and void with no further obligation of the parties if:
   a. a majority of the voting members of the Steering Committee does not approve one or more contracts for the provision of Program Services within 90 days after execution of this MOU or

b. VTDEC determines that the Program outlined in this MOU does not meet the requirements for minimum control measure #1 ("Public Education and Outreach") of the Phase II NPDES Permit for Programs Years 2013 – 2018) and the parties to this MOU are unable to craft a Program to satisfy VTDEC.
c. alternate contractual arrangements for MM1 compliance are developed and a vote to dissolve this MOU is approved by a 2/3^{rds} majority approval of the voting members of the Steering Committee.

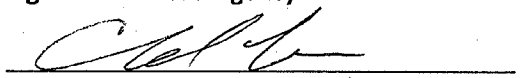
10. **Automatic Termination** – This MOU will terminate at the end of Program Year 2018.

11. **Amendment** – Unless a specific section of this MOU provides otherwise, this MOU may be amended only upon the unanimous consent of all of the Parties.

12. **Adding New MS4 Entities** – New MS4 entities shall be allowed to become party to this MOU with a 2/3^{rds} majority approval of the voting members of the Steering Committee. The new party agrees to:
    a. pay for costs directly associated with re-evaluation and reconfiguration of the Program's existing Communications Plan to ensure that planned media advertising purchases appropriately cover the geographic area served by their MS4, unless waived by a 2/3^{rds} majority approval of the voting members of the Steering Committee. The new MS4 shall coordinate this work with the Lead Agency and RSEP Chair using existing RESP program contractors.
    b. The new MS4 obtains approval from the permitting agency indicating that their participation in the established Program would satisfy their requirements under minimum control measure #1 ("Public Education and Outreach") of the Phase II NPDES Permit for Programs Years 2013 – 2018)
    c. The new MS4 makes five additional annual payments of $ 500.00 to the Program in recognition of Program development costs incurred since the program's inception.

13. **Counterparts** – This MOU may be executed in multiple counterparts, each of which is deemed an original and all of which constitute one and the same document. Each such counterpart may be a facsimile copy and such facsimile copy shall be deemed an original.

Signature of Lead Agency



Charles Baker, Executive Director
Chittenden County Regional Planning Commission

5/1/13
Date

Signatures of Members

Gene Richards, Interim Director of Aviation
Burlington International Airport — Date: 3-26-13

Steven Goodkind, Director of Public Works
The City of Burlington Department of Public Works — Date

Bryan K. Osborne, Director of Public Works
The Town of Colchester — Date

Dennis E. Lutz, PE, Public Works Dir. / Town Engineer
The Town of Essex — Date

Authorized Signer
The Village of Essex Junction — Date

Brian M. Palaia, Town Manager
The Town of Milton — Date

Dean Pierce, Director of Planning and Zoning
The Town of Shelburne — Date

Bob Rusten, Interim Temporary City Manager
The City of South Burlington — Date

Brian Searles, Secretary of Transportation
The Vermont Agency of Transportation — Date

Linda Seavey, Director, Campus Planning Services
The University of Vermont — Date

Richard McGuire, Town Manager
The Town of Williston — Date

Katherine Decarreau, City Manager
The City of Winooski — Date

Signatures of Members

Gene Richards, Interim Director of Aviation Burlington International Airport	Date
Steven Goodkind, Director of Public Works The City of Burlington Department of Public Works	3/27/13 Date
Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	Date
Authorized Signer The Village of Essex Junction	Date
Brian M. Palaia, Town Manager The Town of Milton	Date
Dean Pierce, Director of Planning and Zoning The Town of Shelburne	Date
Bob Rusten, Interim Temporary City Manager The City of South Burlington	Date
Brian Searles, Secretary of Transportation The Vermont Agency of Transportation	Date
Linda Seavey, Director, Campus Planning Services The University of Vermont	Date
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Gene Richards, Interim Director of Aviation
Burlington International Airport — Date

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The City of Burlington Department of Public Works — Date

Bryan K. Osborne, Director of Public Works
The Town of Colchester — 4/23/13 Date

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Dennis E. Lutz, PE, Public Works Dir. / Town Engineer
The Town of Essex — 4/18/13 Date

Authorized Signer
The Village of Essex Junction — Date

Brian M. Palaia, Town Manager
The Town of Milton — Date

Dean Pierce, Director of Planning and Zoning
The Town of Shelburne — Date

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The Town of Williston — Date

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The City of Winooski — Date

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Gene Richards, Interim Director of Aviation Burlington International Airport	Date
Steven Goodkind, Director of Public Works The City of Burlington Department of Public Works	Date
Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	Date
Susan McNamara-Hill, Interim Co Mgr. Authorized Signer The Village of Essex Junction	4/24/13 Date
Brian M. Palaia, Town Manager The Town of Milton	Date
Dean Pierce, Director of Planning and Zoning The Town of Shelburne	Date
Bob Rusten, Interim Temporary City Manager The City of South Burlington	Date
Brian Searles, Secretary of Transportation The Vermont Agency of Transportation	Date
Linda Seavey, Director, Campus Planning Services The University of Vermont	Date
Richard McGuire, Town Manager The Town of Williston	Date
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The City of Burlington Department of Public Works — Date

Bryan K. Osborne, Director of Public Works
The Town of Colchester — Date

Dennis E. Lutz, PE, Public Works Dir. / Town Engineer
The Town of Essex — Date

Authorized Signer
The Village of Essex Junction — Date

Brian M. Palaia, Town Manager
The Town of Milton — 3/27/13 Date

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Dennis E. Lutz, PE, Public Works Dir. / Town Engineer
The Town of Essex — Date

Authorized Signer
The Village of Essex Junction — Date

Brian M. Palaia, Town Manager
The Town of Milton — Date

Paul W. Bohne III — 3/28/13
Paul Bohne, Town Manager — Date
The Town of Shelburne

Bob Rusten, Interim Temporary City Manager
The City of South Burlington — Date

Brian Searles, Secretary of Transportation
The Vermont Agency of Transportation — Date

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The City of Winooski — Date

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Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
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Authorized Signer The Village of Essex Junction	Date
Brian M. Palaia, Town Manager The Town of Milton	Date
Dean Pierce, Director of Planning and Zoning The Town of Shelburne	Date
Bob Rusten, Interim Temporary City Manager The City of South Burlington	4/1/13 Date
Brian Searles, Secretary of Transportation The Vermont Agency of Transportation	Date
Linda Seavey, Director, Campus Planning Services The University of Vermont	Date
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Dean Pierce, Director of Planning and Zoning The Town of Shelburne	Date
Bob Rusten, Interim Temporary City Manager The City of South Burlington	Date
Brian Searles, Secretary of Transportation The Vermont Agency of Transportation	03/29/13 Date
Linda Seavey, Director, Campus Planning Services The University of Vermont	Date
Richard McGuire, Town Manager The Town of Williston	Date
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Brian Searles, Secretary of Transportation
The Vermont Agency of Transportation — Date

Linda Seavey — 3.26.13
Linda Seavey, Director, Campus Planning Services
The University of Vermont — Date

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The Town of Williston — Date

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The City of Winooski — Date

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Katherine Decarreau, City Manager The City of Winooski	Date

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Linda Seavey, Director, Campus Planning Services
The University of Vermont — Date

Richard McGuire, Town Manager
The Town of Williston — Date

Katherine Decarreau, City Manager
The City of Winooski — 4.11.13 Date

Town of Williston

Stormwater Management Program 2013

Appendix 2

CHITTENDEN COUNTY
REGIONAL STORMWATER PUBLIC INVOLVEMENT AND PARTICIPATION PROGRAM
MEMORANDUM OF UNDERSTANDING
FOR THE PERIOD JULY 2011 THROUGH JUNE 2016

This Memorandum of Understanding ("MOU") establishes an agreement among the Parties (as specified in Section 1) for a group of Municipal Separate Storm Sewer Systems ("MS4s") to contract to operate a Regional Stormwater Public Involvement and Participation Program ("Program") that conforms with and satisfies the relevant requirements regarding Minimum Control Measure Two ("Public Involvement and Participation) of the Phase II NPDES Permit for Program Years 2011 -2016), as established in General Permit 3-9014 (MS4 Permit") as continued or renewed by the Vermont Department of Environmental Conservation ("VTDEC").

1. **Parties to the MOU** – The parties to this agreement are:

   a. **MS4s** – the undersigned municipal MS4s and non-traditional MS4s and any other MS4 that may execute this agreement following approval of that MS4's inclusion as a party to this MOU by a majority of the voting members of the Stream Team Steering Committee as defined in Section 2.a. below and

   b. Lead Agency – the Chittenden County Regional Planning Commission ("CCRPC"), unless a majority of the Steering Committee favors a different lead agency or the CCRPC no longer wishes to act as the Lead Agency and withdraws it services pursuant to Section 9 below.

2. **Steering Committee**

   a. **Composition** – The voting members of the Steering Committee shall consist of one representative from each of the MS4s who are full level signatory members to this Agreement as designated by each MS4. The voting members may, by a majority vote, invite organizations to appoint a representative to serve as a non-voting, advisory member of the Steering Committee.

   b. **Duties** – The voting members of the Steering Committee shall advise the Lead Agency on the development and performance of Program Services and on matters bearing on the administration of this agreement. The Steering Committee will attempt to meet quarterly or more often as needed.

3. **Lead Agency**

   a. **Duties** – The Lead Agency will provide Services in terms of administering this MOU and agreements with contractors (including executing contracts, receiving and disbursing funds, and monitoring the provision of services) on behalf of the MS4s. The Lead Agency may also provide other Services (including, but not limited to, public involvement and participation activities, public relations, grant writing, etc.) as directed by the Steering Committee and at a level consistent with each year's Program Budget as described in Section 6.a.

b. **Compensation** – The MS4s agree to compensate the Lead Agency for the actual costs of performing Duties defined in Section 3.a. Compensation for Duties shall not exceed ten (10%) percent of the Program Budget as specified in Section 6 without prior approval of a majority of the Steering Committee. Personnel charges for Lead Agency staff shall be calculated at a rate of salary plus fringe.

4. **Selection of Primary and Sub-Contractors** – In general, the Steering Committee shall competitively bid for contract(s) for Program Services that collectively satisfy the requirements for Minimum Control Measure Two ("Public Involvement and Participation) of the Phase II NPDES Permit for Program Years 2011 – 2016 as established by the MS4 Permit and as defined in Section 5. All contracts shall be awarded based on qualifications, price, and the ability of the entity to provide services that meet the relevant MS4 Permit requirements. Contracts may be up to 5 years in length and shall include, but not be limited to, language specifying the right of the Committee to cancel a contract if services are not being adequately provided and language specifying that payments to contractors shall be made only for services rendered.

   Contracting for services under this MOU will comply with the Fair Employment Practices and Americans with Disabilities Act: the Steering Committee agree to comply with the requirement of Title 21 V.S.A Chapter 5, Subchapter 6, relating to fair employment practices, to the full extent applicable. The Steering Committee shall also ensure, to the full extent required by the Americans with Disabilities Act of 1990 that qualified individuals with disabilities receive equitable access to the services, programs,and activities provided by the Steering Committee under this MOU. This provision will also be included in all contracts and subcontracts executed under this MOU involving state or federal funds.

   The Steering Committee recognizes the important contribution and vital impact which small businesses have on the state's economy. In this regard, the Steering Committee will ensure a free and open bidding process that affords all businesses equal access and opportunity to compete. The Steering Committee also recognizes the existence of businesses owned by minorities and women and will make a good faith effort to encourage these firms to compete for contracts involving state or federal funds.

5. **Program Services** – The Steering Committee, assisted by the Lead Agency and contractor(s), will implement a public involvement and participation campaign known as the Chittenden Country Stream Team (CCST) that satisfies the relevant requirements of Minimum Control Measure Two ("Public Involvement and Participation) of the Phase II NPDES Permit for Program Years 2011 – 2016), as established by the MS4 Permit, in accordance with Section 5.a.

   a. **Program Content** – The Program Content for each Program Year will be as approved by a majority of the Steering Committee. Annual Program elements will include, at a minimum:
      i. operation of the Program's website www.ccstreamteam.org or its equivalent.
      ii. the hosting and/or organization of workshops, projects and other events to engage the public.

iii. the recruitment of volunteers to engage in and promote public involvement and participation.
iv. end of MS4 permit year annual reporting on Minimim Control Measure 2 compliance efforts to the MS4s for inclusion in MS4 annual reports to ANR.

6. **Program Budget, Costs, and Payments**

a. **Program Budget**
1. The annual Program Budget shall consist of the sum of the annual $1,800 payment for each Program Year made by participating MS4s plus any other funds available to the Program by majority vote of the Steering Committee as specified in Section 6.c below. Prior to February of every year, the Steering Committee shall adopt a Program Budget governing expenditures for the subsequent program year. Budget categories shall include, but not be limited to: Lead Agency Duties, Contractual Services and Expenses.

b. **Participating MS4 Maximum Annual Costs and Payments** – Except as otherwise provided for in this section, each MS4 that is a party to this MOU shall by July 30 of each program year make a single annual payment of $1,800 to pay for Program Services (as defined in Section 5) and Lead Agency Services (as defined in Section 3.a.). In the event that costs are less than anticipated or that grants or other funding sources become available, a majority of the voting members of the Steering Committee may decide to reduce each MS4's payment by an equal amount or to credit the following Program Year assessment to each MS4. Any MS4 is allowed to join in prior to April 1, 2012 without penalty. The Steering Committee may require additional dues from new members joining on or after April 1, 2012 to help defray program development costs incurred since the Program's inception.

c. **Other Funds** – Any funds made available to the Program shall be dedicated to reducing the annual costs of each MS4 participating in the Program, except as a majority of the voting members of the Steering Committee may decide.

d. **Excess Funds** – Any funds remaining at the end of a Program Year shall be carried over to the next Program Year, unless a majority of the voting members of the Steering Committee decides otherwise. Following the payment for all Program Services and Lead Agency Services at the end of Program Year 2016, any funds remaining shall be carried forward for successive years where Program Services continue under successive agreements. Any funds refunded to the MS4s participating in this MOU shall be refunded based upon a prorated portion depending upon the number of months of participation by that MS4, except that any additional payments made by a member beyond its $1,800 annual payment shall be first refunded in full.

7. **Contracts Required** – All contracts with Contractors to provide Program Services shall be conditioned upon approval by a majority of the voting members of the Steering Committee and consistent with Section 4 above.

8. **MS4 Withdrawal Prohibited** – No MS4 that is a party to this MOU may withdraw from this MOU, except for early termination as defined in Section 10 of this MOU.

9. **Termination of Lead Agency**
   The CCRPC or the Steering Committee by a majority vote of its full membership may elect to terminate the Agreement for Lead Agency Services by providing 90 days written notice to the other party.

10. **Early Termination** – This MOU shall become null and void with no further obligation of the parties if:
    a. a majority of the voting members of the Steering Committee does not approve one or more contracts for the provision of Program Services within 120 days after execution of this MOU or
    b. VTDEC determines that the Program outlined in this MOU does not meet the relevant requirements for Minimum Control Measure Two ("Public Involvement and Participation") of the Phase II NPDES Permit for Programs Years 2011 – 2016) and the parties to this MOU are unable to craft a Program to satisfy VTDEC.

11. **Automatic Termination** – This MOU will terminate at the end of Program Year 2016.

12. **Amendment** – Unless a specific section of this MOU provides otherwise, this MOU may be amended only upon the unanimous consent of all of the Parties.

13. **Counterparts** – This MOU may be executed in multiple counterparts, each of which is deemed an original and all of which constitute one and the same document. Each such counterpart may be a facsimile or PDF copy and such facsimile or PDF copy shall be deemed an original.

Signature of Lead Agency

Charles Baker, Executive Director
Chittenden County Regional Planning Commission

5/1/2011
Date

Signatures of Members

Robert McEwing, Interim Director of Aviation The Burlington International Airport	5/3/11 Date
Steven Goodkind, Director of Public Works The City of Burlington Department of Public Works	Date
Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	Date
David Crawford, Village Manager The Village of Essex Junction	Date
Brian Palaia, Town Manager The Town of Milton	Date
Bernard T. Gagnon, Public Works Director The Town of Shelburne	Date
Sanford I. Miller, City Manager The City of South Burlington	Date
Brian Searles, Secretary of Transportation Vermont Agency of Transportation	Date
Linda Seavey, Director, Campus Planning Services The University of Vermont	Date
Richard McGuire, Town Manager The Town of Williston	Date
Katherine R. Decarreau, City Manager The City of Winooski	Date

Signatures of Members

Robert McEwing, Interim Director of Aviation The Burlington International Airport	Date
Steven Goodkind, Director of Public Works The City of Burlington Department of Public Works	4/15/11 Date
Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	Date
David Crawford, Village Manager The Village of Essex Junction	Date
Brian Palaia, Town Manager The Town of Milton	Date
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Robert McEwing, Interim Director of Aviation The Burlington International Airport	Date
Steven Goodkind, Director of Public Works The City of Burlington Department of Public Works	Date
Bryan K. Osborne, Director of Public Works The Town of Colchester	Date
Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	24 March 2011 Date
David Crawford, Village Manager The Village of Essex Junction	Date
Brian Palaia, Town Manager The Town of Milton	Date
Bernard T. Gagnon, Public Works Director The Town of Shelburne	Date
Sanford I. Miller, City Manager The City of South Burlington	Date
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Dennis E. Lutz, PE, Public Works Dir. / Town Engineer The Town of Essex	Date
David Crawford, Village Manager The Village of Essex Junction	3/23/2011 Date
Brian Palaia, Town Manager The Town of Milton	Date
Bernard T. Gagnon, Public Works Director The Town of Shelburne	Date
Sanford I. Miller, City Manager The City of South Burlington	Date
Brian Searles, Secretary of Transportation Vermont Agency of Transportation	Date
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Robert McEwing, Interim Director of Aviation
The Burlington International Airport — Date

Steven Goodkind, Director of Public Works
The City of Burlington Department of Public Works — Date

Bryan K. Osborne, Director of Public Works
The Town of Colchester — Date

Dennis E. Lutz, PE, Public Works Dir. / Town Engineer
The Town of Essex — Date

David Crawford, Village Manager
The Village of Essex Junction — Date

Brian Palaia, Town Manager
The Town of Milton — 4-5-11 Date

Bernard T. Gagnon, Public Works Director
The Town of Shelburne — Date

Sanford I. Miller, City Manager
The City of South Burlington — Date

Brian Searles, Secretary of Transportation
Vermont Agency of Transportation — Date

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Brian Searles, Secretary of Transportation Vermont Agency of Transportation	Date
Linda Seavey Linda Seavey, Director, Campus Planning Services The University of Vermont	4.20.11 Date
Richard McGuire, Town Manager The Town of Williston	Date
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Katherine R. Decarreau, City Manager The City of Winooski	Date

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Vermont Agency of Transportation — Date

Linda Seavey, Director, Campus Planning Services
The University of Vermont — Date

Richard McGuire, Town Manager
The Town of Williston — Date

Katherine R. Decarreau, City Manager
The City of Winooski — 3.29.11 Date

Town of Williston

Stormwater Management Program 2013

Appendix 3

Total Maximum Daily Load

To Address Biological Impairment in

Allen Brook (VT08-02)

Chittenden County, Vermont

September 2008

Approved by USEPA: August 21, 2008

Prepared By:
Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408
(802) 241-3770

Submitted to:
U.S. Environmental Protection Agency-Region 1
One Congress Street
Suite 1100 (CVT)
Boston, MA 02114-2023

Table of Contents

Introduction

Section 303(d) of the Federal Clean Water Act requires each state to identify waters not attaining water quality standards, and to establish total maximum daily loads (TMDLs) for such waters for the pollutant of concern. The TMDL establishes the allowable pollutant loading from all contributing sources at a level necessary to attain the applicable water quality standards. TMDLs must account for seasonal variability and include a margin of safety that accounts for uncertainty of how pollutant loadings may impact the receiving water's quality. Once the public has had an opportunity to review and comment on the TMDL, it is submitted to the U.S. Environmental Protection Agency (USEPA) for approval. Upon approval, the TMDL is incorporated into the state's water quality management plan.

This TMDL establishes a scientifically based water quality target for Allen Brook that, when attained, will allow the stream to meet or exceed the established Vermont Water Quality Standards (VTWQS) for which it is impaired. This TMDL has been established in accordance with Section 303(d) of the Federal Clean Water Act, implementing regulations (40 CFR §130) regarding TMDL development, and other relevant USEPA guidance documents.

The basis for this TMDL was initially explained in the final report produced by the Vermont Water Resources Board Investigative Docket (Vermont Water Resources Board, 2004). More specifically, Appendix A of that document ("*A Scientifically Based Assessment and Adaptive Management Approach to Stormwater Management (Stormwater Cleanup Plan Framework)*") outlined the necessary steps to develop a scientifically sound approach in creating TMDLs for stormwater-impaired waters. Henceforth, this approach is referred to as the "Framework". The Vermont Department of Environmental Conservation (VTDEC) adhered to the Framework's approach for developing cleanup targets in this TMDL.

Several investigations have been conducted by multiple parties to derive the necessary information called for in the Framework. Significant results and findings of those investigations are summarized in this TMDL. Additionally, frequent interaction between VTDEC and the VTDEC-convened Stormwater Advisory Group (SWAG) yielded useful guidance for the development of this TMDL.

Description of Waterbody

Allen Brook and its watershed are located in Chittenden County, and are wholly contained within the municipality of Williston (Figure 1). Allen Brook is a low to moderate gradient stream that flows into the Winooski River and drains an increasingly developed landscape on formerly agricultural lands.

The headwaters of the stream flow in a northerly direction through sparsely developed and forested land until it intersects Interstate Route 89. North of the Interstate, the stream flows in a westerly and then a northerly direction through areas of significant residential, commercial and industrial land uses. The impairment of Allen Brook begins at river mile

2.4 and extends upstream to river mile 5.0, which generally corresponds to theses more developed areas of the watershed. The entire Allen Brook watershed draining to the Winooski River is approximately 37.5 km^2 while the size of the watershed draining to the impaired reach is 26.9 km^2.

The entire stream and its tributaries are Class B waters designated as cold water fish habitat pursuant to the Vermont Water Quality Standards. The land use breakdown of the watershed draining to the impaired reach is 26% developed lands, 33% agricultural or open lands and 41% forested.

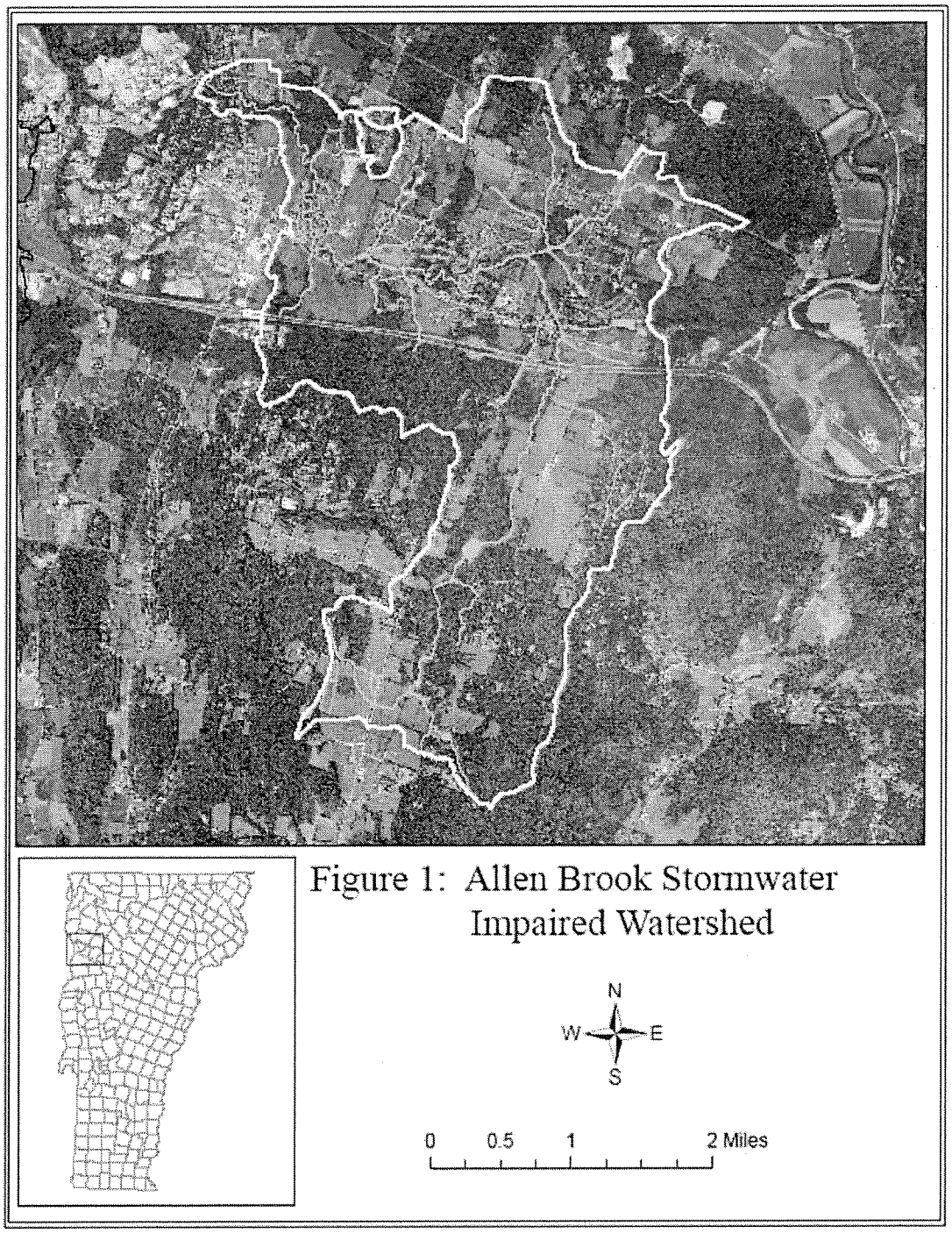


Figure 1: Allen Brook Stormwater Impaired Watershed

Priority Ranking/303d List of Impaired Waters

Allen Brook is designated as impaired on the 2006 Vermont 303(d) List from river mile 2.4 (from the mouth) upstream to river mile 5.0 (Talcott Road) due to non-support of aquatic life designated uses. Since all tributaries and the upstream main stem drain to the impaired lower portion of the stream, the entire Allen Brook watershed upstream from river mile 2.4 is considered to contribute to its impairment. The source of the impairment is multiple impacts associated with excess stormwater runoff.

According to the 2006 Vermont 303(d) List, TMDL development priority for Allen Brook is high and scheduled for completion within 1-3 years from the 2006 listing cycle. In the 2006-2007 Legislative session, the Vermont Legislature amended the Vermont stormwater statute, 10 VSA §§1264 and 1264a, to require the issuance of a general or individual permit implementing a TMDL approved by EPA by January 15, 2010 for Vermont's stormwater impaired streams. VTDEC agrees with the Legislature that TMDL development and the issuance of general or individual permits to implement TMDLs for these streams is a high priority and is an integral component of the remediation process.

Description of Impairment

Biological Monitoring

In all the stormwater-impaired streams in Vermont, aquatic life use support (ALS) impairments are detected through the use of biological monitoring of fish and/or macroinvertebrate communities. The biological monitoring program relies on data from reference sites to define biological community goals for a given stream type. This approach is provided for in the VTWQS and specific numeric biological criteria have been established for several stream types to indicate compliance with the VTWQS.

The monitoring is extremely useful in that it directly measures the health of the aquatic life community and is reflective of environmental conditions that occur in the stream over an extended period of time (i.e. months) including the effects of intermittent discharges such as stormwater. However, biological monitoring is limited when trying to identify the specific pollutant stressor(s) and the extent to which they might contribute to the impairment.

The biological assessment information used to determine impairment has been collected throughout the watershed on the mainstem of the brook from near the mouth at river mile 0.6 up to river mile 8.2. Delineation of the upper and lower boundaries of the impaired reach, RM 2.4 to 5.0, is based the information in Table 1. Fish community data from RM 0.6 show three years of data indicating good biological condition and meeting applicable ALS criteria. Fish and macroinvertebrate data collected since 2002 at RM 6.0 and RM 6.5 on seven occasions showed a good condition. In 2002 both sites were rated as fair-good condition. Additionally, macroinvertebrate data at RM 8.2 rated good to excellent on four occasions. Fish data at RM 2.4 and fish and macroinvertebrate data at RM 4.3 continue to show fair biological conditions not meeting applicable Aquatic Life Uses.

Table 1. Biomonitoring site locations and overall Aquatic Life Use Support (ALS) assessment using the fish and/or macroinvertebrate community, by site and year, on Allen Brook. All data either collected by VTDEC or by an outside party (*) will submittal and approval by VTDEC.

Site River Mile	Date	Overall ALS determination	Fish Assessment	Macroinvertebrates Assessment
0.6	9/24/1997	Good	Good	-
	8/28/1998	Good	Good	-
	10/17/2000	Good	Good	-
2.4	10/12/1999	**Fair**	-	**Fair**
	10/5/2000	Good	-	Good
	10/21/2002 *	**Poor**	**Poor**	Good
	10/4/2003*	**Poor**	**Poor**	Vg-Good
	9/5/2003	**Poor**	**Poor**	Good
	10/13/2004*	**Fair**	**Fair**	G-Fair
	10/4/2005	**Fair**	**Fair**	Good
	10/12/2005*	**Fair**	**Fair**	Good
2.9	8/17/1987	**Poor**	**Poor**	
	8/21/1991	**Poor**	**Poor**	Good
4.3	10/12/1999	**Fair**	**Fair**	
	10/22/2002*	**Fair**	**Fair**	**Fair**
	9/5/2003	**Fair**	**Fair**	**Fair**
	10/4/2003*	**Fair**	**Fair**	Vg-Good
	10/13/2004*	**Fair**	**Fair**	Good
	10/4/2005	**Fair**	**Fair**	**Fair**
	10/12/2005*	**Fair**	**Fair**	Good
4.6	8/17/1989	**Fair**	**Fair**	-
6.0	10/22/2002*	G-Fair	Good	G-Fair
	10/4/2003*	Good	Good	Vg -Good
	10/13/2004*	Good	Good	Good
	10/12/2005*	Good	Good	Vg -Good
6.5	10/22/2002*	G-Fair	Good	G-Fair
	10/4/2003*	Good	Good	Vg- Good
	10/132004*	Good	Good	Vg Good
	10/6/2005	Good	Good	Vg-Good
	10/12/2005*	Good	Good	Vg- Good
7.6	8/7/1989	**Fair**	**Fair**	-
8.2	9/5/1992	Vg- Good	NA	Vg-Good
	10/11/1995	Vg-Good	NA	Vg-Good
	10/5/2000	Excellent	-	Excellent
	10/4/2005	Good	-	Good

Pollutants of Concern and Other Stressors

In streams draining developed watersheds, biological communities are subjected to many stressors associated with stormwater runoff. These stressors are related either directly or indirectly to stormwater runoff volumes and include increased watershed pollutant load (e.g. sediment), increased pollutant load from in-stream sources (e.g., bank erosion), habitat degradation (e.g. siltation, scour, over-widening of stream channel), washout of biota, and loss of habitat due to reductions in stream base flow. The stressors associated with stormwater runoff may act individually or cumulatively to degrade the overall biological community in a stream to a point, as in Allen Brook, where aquatic life uses are not fully supported and the stream does not attain the VTWQS.

Surrogate Measure for Multiple Stressors

This TMDL utilizes the surrogate of stormwater runoff volume in place of the traditional "pollutant of concern" approach. The combination of stressors is represented by the surrogate of stormwater runoff volume. First, the use of this surrogate has the primary benefit of addressing the physical impacts to the stream channel caused by stormwater runoff such as sediment release from channel erosion and scour from increased flows. These physical alterations to the stream are substantial contributors to the aquatic life impairment. Also, reductions in stormwater runoff volume will help restore diminished base flow (increased groundwater recharge), another aquatic life stressor. This surrogate is also appropriate because the amount of sediment and other pollutants discharged from out of channel sources is a function of the amount of stormwater runoff generated from a watershed.

Fluvial Geomorphic Considerations

Where biological impairment of a stream is principally the result of physical stressors, such as in Allen Brook, the natural and anthropogenic factors controlling physical form and process may be quantified, and the strategies for restoring modified fluvial processes may be devised.

According to McCrae (1991), channel morphology and fluvial processes are primarily controlled by a) watershed inputs from the production zone of the watershed; b) the valley morphology of the stream reach; and c) the boundary material characteristics of the channel (Figure 2).

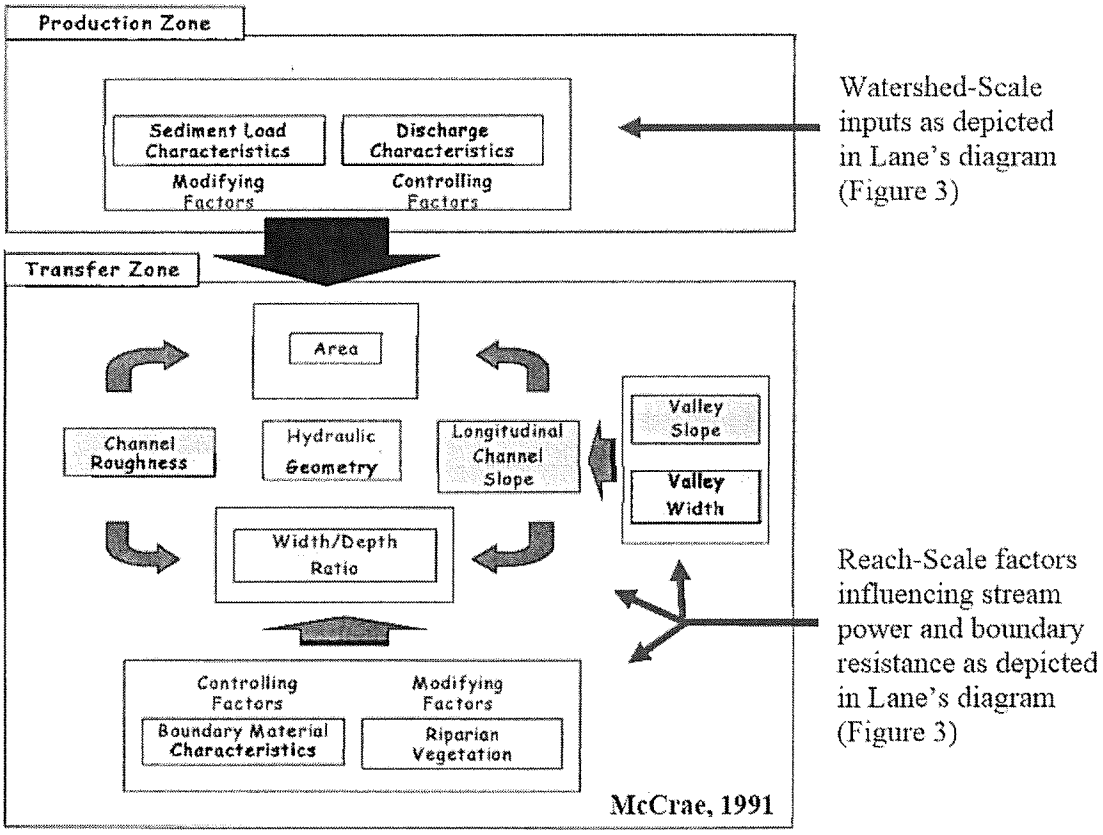


Figure 2. Diagram explaining the watershed and reach-scale controlling and modifying factors affecting the hydraulic geometry and fluvial processes of a stream.

In turn, channel and floodplain modifications and changes to the controlling factors of discharge and boundary materials, brought about by watershed and riparian land use modifications, place stress on biological communities by altering key physical habitat features of the stream network, including: hydrology; longitudinal and lateral connectivity; temperature; and the transport and retention of sediment, large wood, and organics.

Where the overall goal in the stormwater-impaired watersheds is to reduce physical stressors on key habitat features, the primary objective is to cost effectively manage toward the "reference" hydraulic geometry conditions of the stream channel where the energy grade or stream power, ***as influenced by stream flow (discharge characteristics)***, is in balance with the resistance of the natural boundary materials (Figure 3).

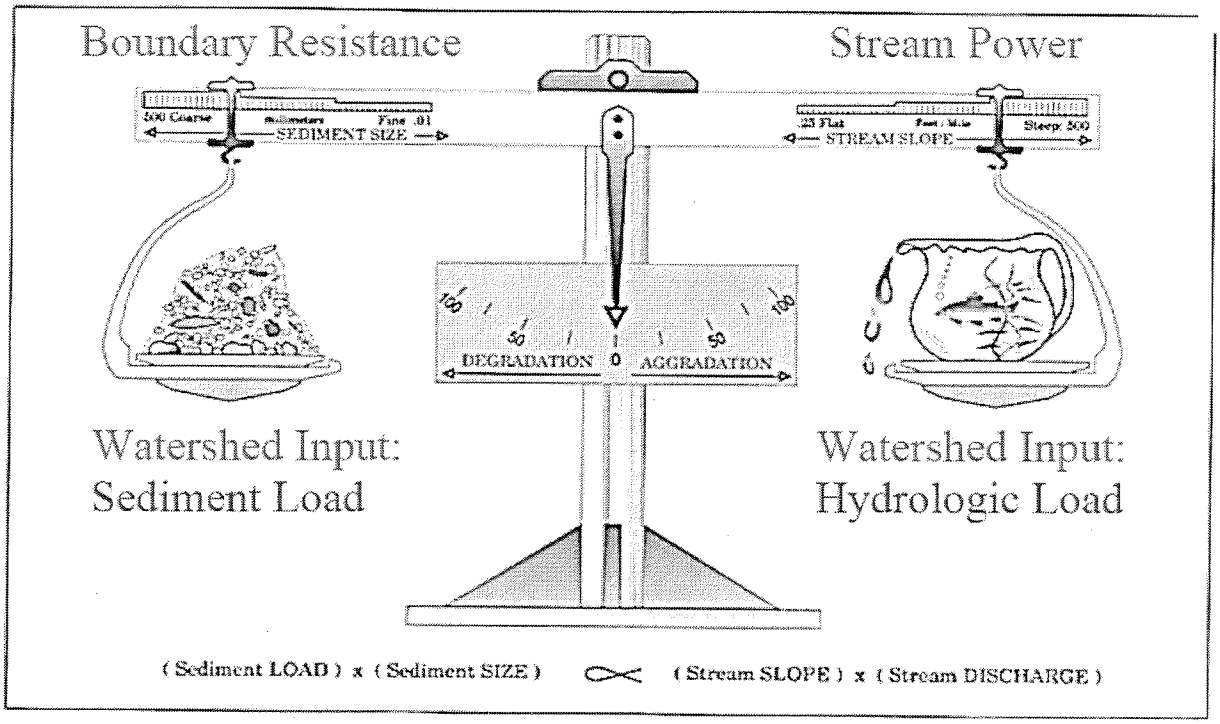


Figure 3: Lane's Diagram (1955) from Rosgen 1996 explaining the balance of stream energy grade with boundary resistance as controlled by hydrologic and sediment load.

The first priority in managing energy grade is to look at stream flow characteristics (Figure 2. production zone input) as the primary controlling factor influencing hydraulic geometry and stream power. To meet the stated goal, alterations to watershed inputs (i.e., stormwater) must be addressed before attempts to remediate other reach-scale (transfer zone) factors affecting hydraulic geometry are undertaken (e.g., dealing with river corridor encroachments to change artificial valley constraints affecting channel plan form and slope and/or restoring floodplain connection to reduce flood depths).

Additionally, sediment load from the production zone may also be a controlling factor to channel hydraulic geometry (Figure 2). In the case of stormwater-impaired streams in Vermont, production zone contributions (colluvial and runoff generated) are far outweighed by the sediment contributions at the transfer zone or reach scale (channel bed and banks), due to channel degradation and widening initiated by stormwater increases.

Stream geomorphic assessment data specific to Allen Brook confirms the significance of the instream sediment generation, as opposed to production zone sediment inputs, and its resultant negative impact on aquatic biota habitat. Results from a 2005 geomorphic assessment in Allen Brook indicate that the stream channel is highly unstable and that the potential for more degradation is high (Fitzgerald 2006). Of 15 reaches assessed in the Allen Brook watershed, 1 was rated as being in "poor" geomorphic condition, 11 rated as being in "fair" condition and 3 rated as "good". In the same 15 reaches, sensitivity to

further channel instability was rated as "very high" in 11 reaches, "high" in 3 reaches and "moderate" in the remaining reach. These conditions in turn reflect a generally degraded aquatic habitat whereby 10 reaches were rated as having "fair" habitat conditions with the remaining 5 rated as "good".

The goal of this TMDL is to address the controlling factor of instream sediment production by determining the departure of existing discharge characteristics in Allen Brook from attainment stream discharge characteristics and setting flow reduction targets to allow for the reestablishment of good habitat conditions throughout the stream in order to meet VTWQS.

Reduced Base Flow

Increased impervious cover and the resulting increase in surface runoff reduces the amount of rainfall that infiltrates pervious (e.g., vegetated) areas to recharge groundwater. For many streams, groundwater recharge is the predominant source of stream base flow. Diminished base flow can further stress aquatic life and cause or contribute to aquatic life impairments through loss of aquatic habitat (shrinking wetted perimeter) and increased susceptibility to pollutants.

The loss in base flow is directly proportional to the increase in stormwater runoff volume. It is possible to reasonably estimate stormwater runoff and the amount being recharged. It can be far more complicated to estimate the relationship between groundwater recharge and stream base flow. However, simpler methods involving hydrologic models have been used to successfully predict stream base flow as a function of groundwater recharge. More difficult, however, is understanding and quantifying the net effect of diminished base flow on aquatic life for a given stream.

Water Quality Standards

Allen Brook is listed as impaired based on narrative criteria relating to aquatic biota. The impact of excessive stormwater flows into Allen Brook has resulted in a violation of the VTWQS §3-04(B)(4) which states that there shall be:

> *"No change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected."*

In Vermont, numeric biological indices are used to determine the condition of fish and aquatic life uses. Vermont's Water Quality Standards at 3-01(D)(1) and (2) provide the following regulatory basis for these numeric biological indices:

> *"(1) In addition to other applicable provisions of these rules and other appropriate methods of evaluation, the Secretary may establish and apply numeric biological indices to determine whether there is full support of aquatic biota and aquatic habitat uses. These numeric biological indices shall be derived*

from measures of the biological integrity of the reference condition for different water body types. In establishing numeric biological indices, the Secretary shall establish procedures that employ standard sampling and analytical methods to characterize the biological integrity of the appropriate reference condition. Characteristic measures of biological integrity include but are not limited to community level measurements such as: species richness, diversity, relative abundance of tolerant and intolerant species, density, and functional composition.

(2) In addition, the Secretary may determine whether there is full support of aquatic biota and aquatic habitat uses through other appropriate methods of evaluation, including habitat assessments."

Designated Uses

Allen Brook is a Class B waterbody. Section 3-04(A) of the VTWQS states:

Class B waters shall be managed to achieve and maintain a high level of quality that is compatible with the following beneficial values and uses: . . .

§3-04(A)(1):

aquatic biota and wildlife sustained by a high quality aquatic habitat with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation.

Since biomonitoring data does not meet the criteria for Class B standards, Allen Brook does not support the designated uses for Class B waters.

Antidegradation Policy

In addition to the above standards, the VTWQS contain the following General Antidegradation Policy in §1-03(B):

All waters shall be managed in accordance with these rules to protect, maintain, and improve water quality.

Numeric Water Quality Target

In a pollutant-specific TMDL, a stream's water quality target, or loading capacity, is the greatest amount of pollutant loading the water can receive without violating water quality standards. In this TMDL, because the "pollutant of concern" is represented by the surrogate measure of stormwater runoff volume, the loading capacity is the greatest volume of stormwater runoff Allen Brook can receive without violating the stream's aquatic life criteria. The challenge is to determine the maximum stormwater runoff target volume for the stormwater-impaired streams.

Target Setting Approach

The Framework identifies a reference watershed approach whereby hydrologic targets are developed by using similar "attainment" watersheds as a guide. The term "attainment" is used here rather than "reference" because reference tends to imply that the ultimate goal for the impaired stream approaches pristine. Instead, the attainment watershed(s), while meeting or exceeding the Vermont water quality standards criteria for aquatic life, should contain some level of development in order to better approximate the true ecological potential of the impaired stream. This TMDL uses the attainment watershed approach for target setting and identifies hydrologic targets for Allen Brook based on the hydrologic characteristics of similar watersheds where the VTWQS aquatic life criteria are currently met.

The first step in using the attainment watershed approach is to select appropriate attainment streams, which, ideally, are as similar to the impaired watershed as possible in physical makeup, such as slope, soils, climatic patterns, channel type, and land use/cover, etc. Since all of the lowland stormwater-impaired streams are located in the Lake Champlain Valley, a collection of similarly located streams was identified from which the most representative attainment watersheds could be selected for each stormwater-impaired watershed.

The Framework identifies flow duration curves (FDCs) as the best surrogate for defining hydrologic targets. FDCs are very useful at describing the hydrologic condition of a stream/watershed because the curves incorporate the full spectrum of flow conditions (very low to very high) that occur in the stream system over a long period of time. The FDCs also incorporate any flow variability due to seasonal variations. A comparison of FDC between an impaired and appropriate attainment stream/watershed can reveal obvious patterns. For example, a FDC for a stormwater-impaired stream/watershed will typically show significantly higher flow rates per unit area for high flow events and significantly lower flow rates per unit area for low-base flow conditions than the FDC for the attainment watersheds. The increased predominance of high flow events in the impaired watershed creates the potential for increased watershed stormwater pollutant loadings, increased scouring and stream bank erosion events, and the possible displacement of biota from within the system. Also the reduction in stream base flow revealed by the FDC can create a potential loss of habitat for low flow conditions.

A high flow value (0.3%) and a low flow value (95%) were selected as points along the continuum of the FDCs useful for setting specific hydrologic targets. The 0.3% exceedance flow closely matches the one year return flow and the 95% exceedance flow represents a low flow condition comparable to the 7Q10.

Since there is limited hydrologic data for either impaired or attainment streams, the Framework recommends developing synthetic FDCs by employing a calibrated rainfall-runoff model based on land use and cover. FDCs can then be developed for both impaired and attainment streams and the relative difference between the two is used to establish the flows needed to restore the stream's hydrology. In this TMDL, the

hydrologic targets are expressed as percentage reductions or increases relative to the attainment watersheds' FDCs at the representative high and low flow values.

Flow Duration Curve Development

Based on available data and the model outputs necessary to develop the FDCs, the P8-Urban Catchment Model (P8-UCM) was selected (Walker, 1990) to develop the synthetic FDC for both the stormwater impaired and attainment streams. Inputs to P8-UCM for hydrologic simulation include climatological data, percent watershed imperviousness, pervious curve number, and times of concentration for ground water base flow and surface runoff.

After initial calibration and review, additional changes were made to improve the low flow prediction capability of the model and refine the estimated surface runoff time of concentration. Upon final review and model verification, the calibrated model was used to develop FDCs for all impaired and attainment streams in the lowland areas. A complete discussion of the model setup, calibration, adjustments and results can be found in the report entitled *"Stormwater Modeling for Flow Duration Curve Development in Vermont"* (Tetra Tech, 2005). The complete FDC for Allen Brook along with expanded views of the high and low flow portions of the curve are given below in Figures 4 through 6.

Target Setting

With the FDCs for all attainment and impaired streams in hand, a process was developed to determine which attainment streams to use for setting appropriate hydrologic targets. A statistical approach was developed cooperatively by researchers at the University of Vermont and the VTDEC that allowed for the selection of the most appropriate attainment streams for each stormwater-impaired stream. A summary of this methodology is given below; however, the complete methodology and results can be found in a report under separate cover (Foley, 2005).

The first step in this target setting approach was a statistical analysis of the P8 input variables for each watershed to establish what are the most influential factors determining impairment/attainment in the sample of Lake Champlain Valley streams. The second step grouped impaired streams with the most similar attainment streams based on watershed features that were least likely to determine impairment based on step one. By doing this, watersheds were grouped based on intrinsic similarities that effect flow, resulting in attainment streams being grouped with the most similar stormwater-impaired streams. Within each group, the attainment stream FDCs represent a hydrologic regime that will most likely support healthy aquatic life and thus the attainment of the VTWQS for each stormwater-impaired stream.

Due to the relatively small sample size of attainment streams (15) relative to the number of lowland stormwater-impaired streams (12), the concept of a range of appropriate FDC values is useful to alleviate some uncertainty associated with selecting the single best matching watershed. While the entire range of flows within each attainment group represents flow regimes associated with attainment conditions (i.e. supporting VTWQS

criteria for aquatic life), the selection of the mean value provides an intrinsic margin of safety that the selected target represents an attainment condition. The group of attainment streams best matched with Allen Brook is given in Table 2 with FDC flows at the high and low flow intervals. Figures 4 through 6 graphically represent the FDCs for Allen Brook and associated attainment streams (complete FDC, high flow and low flow respectively).

Table 2. Attainment streams matched with Allen Brook and corresponding flows.

	Status	Q 0.3% (cfs/mi^2)	Q 95% (cfs/mi^2)
Allen Brook	Impaired	11.7358	0.2015
Alder Brook	Attainment	11.3340	0.2240
Allen Brook-attain	Attainment	11.2050	0.2172
Mean flow of attainment streams		11.2695	0.2206
Difference between Allen Bk. and mean attainment flows		0.4663	0.0191

Figure 4. Flow duration curves for Allen Brook and attainment streams.

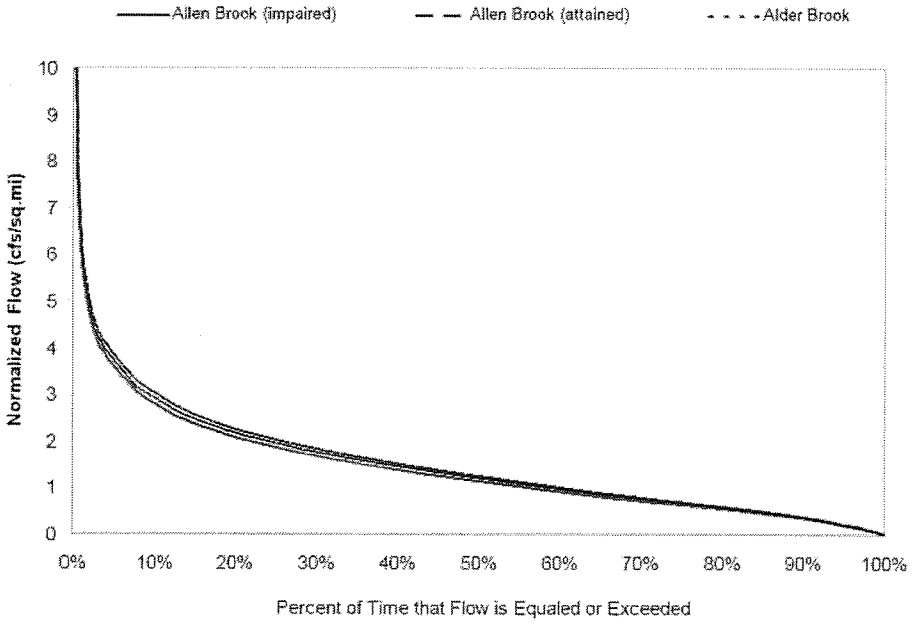


Figure 5. High flow portion of the flow duration curves for Allen Brook and attainment streams

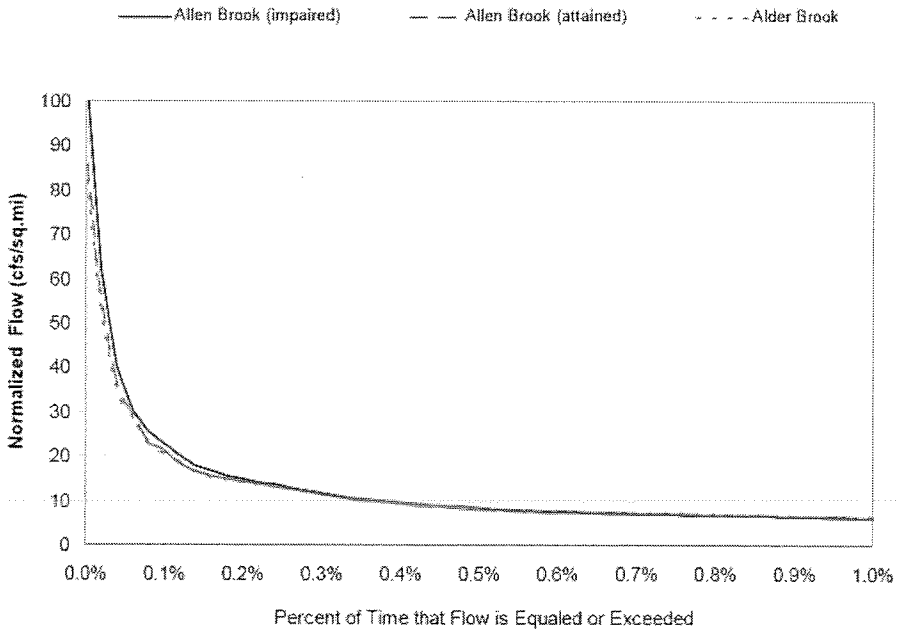
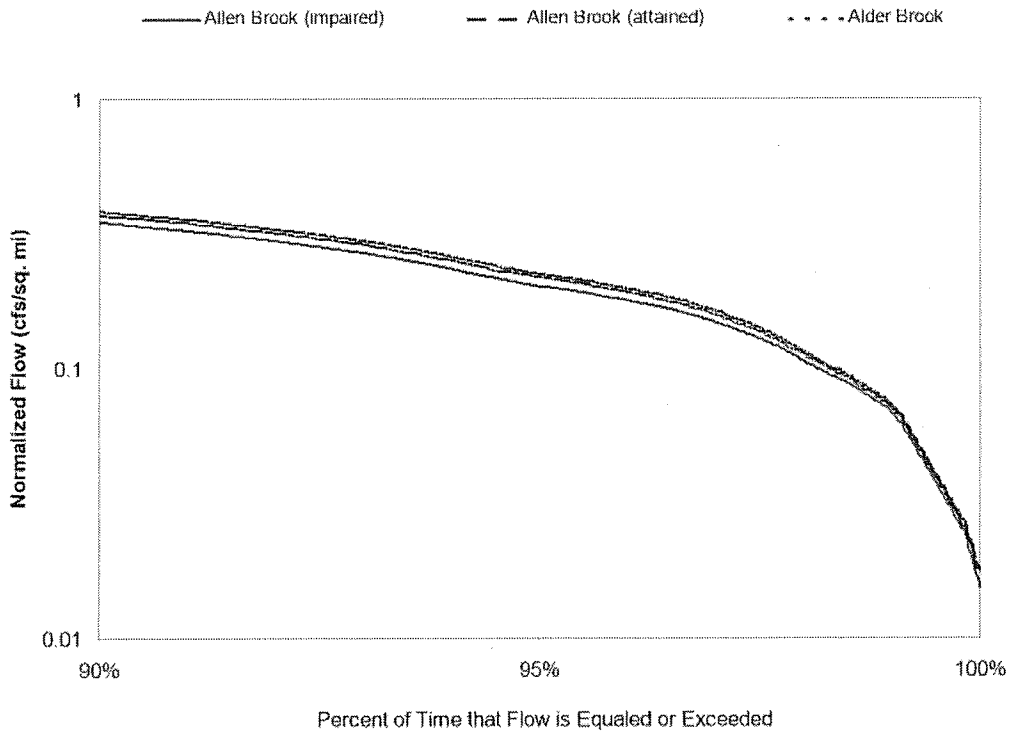


Figure 6. Low flow portion of the flow duration curves for Allen Brook and attainment streams.



The actual TMDL target flows for Allen Brook are the percentage differences between the Allen Brook flows and the mean of the attainment streams at both Q0.3% and Q95% (Table 3). This accounts for any lack of accuracy in the FDCs developed with the P8-UCM. Considering the relative simplicity of the model, there may be some inaccuracy with the final modeled flow values compared to actual flows. However, since similar data sources and calibrated model were used across all watersheds, both impaired and attained, inaccuracies are expected to be relative across all watersheds. Therefore, the relative difference between impaired and target flows are best described as a percentage rather than actual flow rates.

Table 3. Watershed flow targets for Allen Brook given as percentage increase/decrease from current conditions.

Target decrease in flow at Q 0.3%	Target increase in flow at Q 95%
4 %	9 %

Margin of Safety

The Clean Water Act and implementing regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between the TMDL allocations and water quality. EPA guidance explains that the MOS may be either implicit (i.e. incorporated into the TMDL through conservative

assumptions in the analysis) or explicit (i.e. expressed as a separate allocation). The MOS in this TMDL is implicit and is incorporated through conservative assumptions in the target setting approach.

As described above, the mean flow of the attainment streams was selected as the target flow condition in the Allen Brook TMDL to provide an intrinsic margin of safety that the selected targets would provide for the attainment of the VTWQS. Due to the rigorous application of the attainment stream selection approach in the Allen Brook TMDL, the targets are believed to be particularly accurate thus reducing the need for an overly conservative or arbitrary margin of safety.

The use of the attainment stream approach is a particularly good approach to identify flow targets because it relates appropriate flow conditions in streams that comply with the VTWQS (attainment streams) back to Allen Brook. However, haphazard matching of attainment streams, and thus flow targets, to Allen Brook could lead to targets with a high degree of uncertainty as to whether standards would be met. To provide a more rigorous target setting approach, attainment streams for Allen Brook were selected using an analysis described in "Statistical Analysis of Watershed Variables" (Foley, J. and Bowden, 2005). VTDEC believes that by utilizing this approach, Allen Brook was paired with the "most similar" attainment streams available in the Lake Champlain Basin. By identifying the "most similar" attainment streams through standard statistical approaches, a significant amount of uncertainty is eliminated regarding what are the best target values.

According to the attainment stream approach, by definition, the flows for the attainment streams (Alder Brook and Allen Brook-attain) represent flows under which the biologic criteria are currently being met. This can be thought of as a range of flows in streams most similar to Allen Brook that are capable of sustaining appropriate aquatic life standards as defined by the VTWQS. It is reasonable to assume that attainment of flows at the high end of this range would allow Allen Brook to comply with the VTWQS, however, by lowering the target to the attainment stream mean, an added margin of safety is incorporated.

Additionally, it is likely that the flows represented by the attainment stream are not at the "threshold" of attainment. That is, the modeled flows in the streams currently meeting standards likely represent flows somewhat below that which impairment would occur, thus adding an additional level of safety.

VTDEC affirms the attainment stream approach outlined in the Docket report and has taken steps to reduce a significant level of target setting uncertainty by incorporating a solid statistical approach. The fact that the stormwater runoff volume target approach has not routinely been utilized in the development of TMDLs should not detract from its firm basis in sound science and logical experimental design.

Further, the Docket strongly urges the concept of adaptive management when implementing controls in the stormwater-impaired streams and VTDEC is firmly

committed to this idea. Various types of watershed monitoring, many of which have already been initiated, will provide the necessary data to either adjust the targets or implementation measures to ensure ultimate compliance with VTWQS in Allen Brook. While VTDEC believes there is an adequately conservative margin of safety associated with these targets, post-implementation adaptive management provides yet another layer of "safety" that the VTWQS will be met.

Seasonal Variation

The Clean Water Act and implementing regulations require that a TMDL be established with consideration of seasonable variations. The FDCs, and subsequent hydrologic targets, developed for this TMDL are very useful for incorporating any seasonal variation in the stream system because they describe the full spectrum of flow conditions (very low to very high) that occur. By using a 10 year simulation period utilizing actual precipitation data to develop the FDCs, any flow variability due to seasonal variations has been incorporated into the hydrologic targets and the required flow decreases/increases in Allen Brook to meet those targets.

Allocations

In addition to the overall watershed target, TMDLs must also provide for an allocation of that target between point sources and nonpoint sources, or, the Wasteload Allocation (WLA) and the Load Allocation (LA) respectively. USEPA guidance allows for a gross allocation between these two stormwater source types rather than accounting for every discrete stormwater conveyance and the areas draining to them (USEPA 2002). The USEPA guidance also allows for dividing the allocation by using a land use analysis to simplify the process. By making the assumption that more developed areas typically convey stormwater via discrete means such as pipes or swales and lesser developed areas mostly convey stormwater via surface sheetflow, the allocation process can be developed with land use analysis whereby developed areas fall into the WLA and the lesser developed areas into the LA.

This TMDL uses the land use based allocation approach to distribute the overall percentage targets for the watershed. To do this, the Allen Brook watershed was divided into three broad categories including Urban/Developed, Agriculture/Open, and Forest/Wetland. Table 4 below illustrates how the land use categories were divided into these three broader categories and the associated land areas within the Allen Brook watershed.

Table 4. Categorization of Land Uses into broader classes.

Major Land Use Categories	Land Use Name
Urban/Developed	Residential
	Commercial
	Industrial
	Transportation
	Other Urban
Agriculture/Open	Agriculture/Mixed Open
	Row Crops
	Hay/Pasture
	Barren Land
Forest/Wetland	Deciduous Forest
	Coniferous Forest
	Mixed Forest
	Brush/Transitional
	Wetland
	Water

The overall percent reduction/increase in flows was then distributed among these three categories to meet watershed targets. It was determined that there would be a zero allocation, or no expected change in flow levels emanating from the Forest/Wetland category since the runoff characteristics from these areas are likely optimal with regard to overall watershed hydrology. This left the allocation to be distributed between the Urban/Developed (WLA) and Agriculture/Open (LA) categories. The next step was to determine the relative amount of influence each category had on runoff characteristics, and thus the FDC, and divide the allocation accordingly. To accomplish this, the concept of a runoff coefficient was utilized.

A runoff coefficient (R_v) is an expression of the percentage of precipitation that appears as runoff. The value of the coefficient is determined on the basis of climatic conditions and physiographic characteristics of the drainage area and is expressed as a constant between zero and one. By determining the relative contribution to stormwater runoff from each land use category using the R_v, the allocation between WLA and LA can be made accordingly.

The primary influence on R_v is the degree of watershed imperviousness. This is shown through data collected from numerous watersheds during the National Urban Runoff Program Study from which an equation was developed to define the R_v, as shown below (Schueler 1987):

$$R_v = 0.05 + 0.9(I_a)$$

Where: I_a = Impervious fraction

Percent imperviousness was estimated using a previously developed relationship (CWP et al., 1999) for the Vermont Center for Geographic Information (VCGI) land use data layer. Table 5 presents the estimated values for various land use categories.

Table 5. Relationship between VCGI Land Use and percent imperviousness.

VCGI Land Use Code	Land Use Name	Percent Impervious Cover
3	Brush/Transitional	0%
5	Water	0%
7	Barren Land	0%
11	Residential	14%
12	Commercial	80%
13	Industrial	60%
14	Transportation	41%
17	Other Urban	60%
24	Agriculture/Mixed Open	2%
41	Deciduous Forest	0%
42	Coniferous Forest	0%
43	Mixed Forest	0%
61,62	Wetland	0%
211	Row Crops	2%
212	Hay/Pasture	2%

By calculating the R_v for each broad land use group, and then weighting that coefficient's influence on runoff based on the amount of land area within each group, the relative influence of each group on runoff (and conversely groundwater recharge) can be used to allocate the watershed targets across the entire watershed. The results for Allen Brook are given below in Table 6.

Table 6. The relative influence of each land use category on stormwater runoff in Allen Brook based on the calculation of the R_v.

	R_v	Area (acres)	Weighted influence on runoff
Urban/Developed	0.30	1,725	78%
Agriculture/Open	0.07	2,190	22%

USEPA interprets 40 CFR 130.2 to require that allocations for NPDES-regulated discharges of stormwater runoff be included within the wasteload allocation component of the TMDL (USEPA, 2002). USEPA also states that in instances where there is insufficient data to calculate loads on an outfall by outfall basis, the stormwater wasteload may be expressed as an aggregate or categorical allocation. USEPA acknowledges that in cases where it is difficult to separate NPDES-regulated from non NPDES-regulated stormwater discharges, it is acceptable to include both NPDES-regulated stormwater discharges and non NPDES-regulated discharges (which would typically be included in the load allocation portion of the TMDL) in this aggregated wasteload category.

Because of data limitations and the wide variability of stormwater discharges, it is not possible to separate the stormwater discharges subject to the NPDES program (e.g. stormwater discharges from construction activity, MS4 discharges and multi-sector industries) from stormwater discharges that are not subject to NPDES permitting (e.g. stormwater discharges from impervious surfaces regulated under Vermont's stormwater program). Therefore, all stormwater discharges from the urban/developed land category are included in the wasteload allocation portion of this TMDL. This category includes

the NPDES-regulated stormwater discharges as well as other sources of stormwater runoff not regulated as NPDES discharges.

In other words, the weighted proportion of runoff from the more developed areas, where the vast majority of the NPDES regulated and non-NPDES regulated stormwater was generated, established the limit of the WLA. Therefore, the "regulated" areas, including all the NPDES regulated and non-NPDES regulated sources in the WLA, are responsible for reducing and maintaining a 78% decrease in the high flow target. The same is true for the LA whereby the "nonregulated" areas are responsible for reducing and maintaining a 22% decrease in the high flow target.

By aggregating NPDES-regulated and non NPDES-regulated stormwater discharges in the wasteload allocation, the public is provided with a clearer understanding of how Vermont proposes to achieve water quality standards and meet the cleanup target established in the TMDL. However, the inclusion of stormwater discharges outside the scope of the NPDES permit program in the wasteload allocation does not mean that these discharges are legally required to obtain a NPDES stormwater permit currently or that they will be legally required to obtain a NPDES permit to implement the TMDL.

Future Growth

The Agency has applied a two step analysis in allocating for future growth in this TMDL. First, as to "jurisdictional" new growth that is subject to the VTDEC's permit program for impervious surfaces under 10 V.S.A. Section 1264 (i.e. new impervious surfaces greater than one acre), the Agency assumes that the channel protection requirements in the Vermont Stormwater Management Manual requiring 12-hour detention of the 1-year storm, or 24-hour detention if discharging to a warm-water fishery, are sufficient to protect against future stream degradation. The manual requires sites to meet channel protection (CPv) as well as groundwater recharge treatment standards. The premise of the channel protection standard is that runoff would be stored and released in such a gradual manner that critical erosive velocities would seldom be exceeded in downstream channels. MacRae (1991) found that the traditionally used 2-year control approach failed to protect channels worn into more sensitive boundary materials and actually aggravated erosion hazard in very sensitive channels. Therefore, MacRae (1991) developed the distributed runoff control (DRC) as a method to vary the degree of control from the 2-year control to the 80% over control based on the strength of boundary material. A study done in Maryland (Cappuccitti, 2000) showed that "the CPv and DRC methods provide a comparable level of management." Additionally, the Center for Watershed Protection (CWP) recommends the use of the channel protection criteria stating that "the criterion balances the need to use a scientifically valid approach with a methodology that is relatively easy to implement in the context of a statewide program." (CWP, 2000) VTDEC believes that if future growth complies with the channel protection standard as well as the groundwater recharge treatment standard, Allen Brook will be able to meet both the high and low flow targets of the TMDL.

For "jurisdictional" new growth relative to the low flow targets, the Vermont Stormwater Management Manual groundwater recharge treatment standard requires that predevelopment recharge volumes be maintained, thus providing adequate protection.

As to "non-jurisdiction" new growth (i.e. new impervious surfaces less than one acre), runoff from which could contribute to stream degradation, the Agency has allocated additional stream flow reductions from current conditions to account for these potential impacts. This allocation is based on future growth estimates of "non-jurisdiction" impervious surfaces developed in cooperation with the Town of Williston. Initial Estimates developed in conjunction with the Town suggested that approximately 35 acres of "non-jurisdictional" impervious surfaces could be created, at a maximum, over the next ten years since most of the planned development in the community normally falls into the "jurisdictional" category.

By requiring reductions from currently developed areas that are equal to the future impacts of the additional 35 acres this type of future development should have no effect on the overall watershed stream flow targets. The same approach has been applied to the low flow targets.

Based on a subsequent P8-UCM model run, the projected 35 acres of impervious surfaces increased the flow at the 0.3% high flow point on the FDC from 11.7358 to 11.7647 cfs/mi^2. The flow at the 95% low flow point on the FDC remained unchanged at 0.2015 cfs/mi^2.

This unchanged low flow response appears to be coupled to the capabilities of the P8 model groundwater component and the relatively low discernible change the additional future growth has on the overall percent imperviousness of the Allen Brook watershed. The 35 acres of additional non-jurisdictional impervious acreage attributed to future growth contributes a relatively minor overall increase to impervious cover – approximately 0.5%. As a result, the groundwater component of the P8 model does not discern a significant change in the groundwater recharge component of the overall flow.

Overall Allocation

In the broadest sense, the primary function of a TMDL is to determine and allocate among sources the maximum pollutant loading a waterbody can receive to maintain compliance with the appropriate water quality standard. For the Allen Brook TMDL, it's the stormwater runoff volume that is being limited overall and allocated among sources. This approach works well within the TMDL framework for the high flow target whereby an overall reduction of stormwater runoff is required. However, this approach does not fit particularly well for the low flow target where an increase in non-stormwater instream flow is necessary and loading of stormwater runoff volume is not directly being allocated. The restoration of low flows in Allen Brook is actually a secondary result of controlling stormwater runoff (high flows) to increase groundwater recharge. As stormwater runoff volumes are controlled (high flow reductions), the water that eventually reaches the stream (low flow increases) is no longer considered stormwater runoff because it is

generally routed through the groundwater and does not reach the stream for a significant amount of time following the precipitation event.

Also, the benefit of decreased pollutant loading (sediment, nutrients, etc.) due to reduced stormwater runoff at high flows provides a good fit, although indirectly, within the TMDL framework. The same cannot be said of the low flow targets. The low flow targets represent conditions where pollutants are already substantially removed from water the stream receives from groundwater and thus there are no problematic "pollutants" to allocate.

For these reasons, EPA does not consider the low flow targets applicable to an allocation scenario and thus they will not be presented as such in this TMDL. Therefore, Table 7 gives the overall Allen Brook TMDL allocation for the high flows and Table 8 presents the overall Allen Brook targets for the low flow condition.

It should be emphasized here that even though the low flow targets are not part of the formal TMDL allocation, VTDEC remains committed to including these low flow targets within the remediation plan for the watershed.

Table 7. Allen Brook TMDL high flow allocation at Q0.3%.

Wasteload Allocation	Stormwater reduction from current Urban/Developed areas	3.1%	3.3%
	Additional stormwater flow reduction from Urban/Developed areas to account for future growth	0.2%	
Load Allocation	Stormwater reduction from Agriculture/Open areas		0.9%
Total Allen Brook watershed stormwater flow reduction allocation at Q0.3%			4.2%

Table 8. Allen Brook low flow targets at Q95%.

Wasteload Allocation	Base flow increase from current Urban/Developed areas	7.4%	7.4%
	Additional base flow increase from Urban/Developed areas to account for future growth	0.0%	
Load Allocation	Base flow increase from Agriculture/Open areas		2.1%
Total Allen Brook watershed base flow increase target at Q95%			9.5%

Reasonable Assurances

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the wasteload allocation is based on an assumption that nonpoint source load reductions will occur, EPA's TMDL guidance provides that a TMDL must provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. In order to allocate loads among both nonpoint

and point sources, there must be reasonable assurances that nonpoint source reduction will in fact be achieved. Where there are not reasonable assurances, under the Clean Water Act, the entire load reduction must be assigned to point sources.

As discussed earlier, this TMDL has been structured with an aggregate wasteload allocation category that includes both NPDES-regulated stormwater discharges and non NPDES-regulated stormwater discharges. Under the Clean Water Act, the only federally enforceable controls are those for point sources through the NPDES permitting process. However, VTDEC implements both a federally-authorized NPDES permit program for stormwater discharges from construction activities, industrial activities and municipal discharges under the MS4 program and a state-authorized permitting program for stormwater discharges from impervious surfaces equal to or greater than one acre. VTDEC is, therefore, well positioned to require implementation of stormwater treatment and control measures through NPDES permit conditions and state stormwater permit conditions for discharges in the urban/developed land category. This wasteload allocation category constitutes a 78% weighted influence on stormwater runoff.

The load allocation is comprised of the agriculture/open land use category that constitutes a 22% weighted influence on stormwater runoff. VTDEC believes that nonpoint source control measures that will be implemented through Vermont's Clean and Clear Action Plan and other stormwater related nonpoint source controls will achieve the minimal load reductions set forth in this TMDL. Although the Clean and Clear Action Plan is primarily a phosphorus reduction plan, action items in that Plan will also benefit the stormwater-impaired streams in the Champlain Basin. These action items include:

- Expand the Conservation Reserve Enhancement Program statewide to create conservation easements on farms along streams for buffer implementation.
- Provide technical assistance by Agricultural Resource Specialists to help farmers statewide with best management practices, riparian buffer conservation, nutrient management, compliance with Accepted Agricultural Practices, basin planning, and other technical needs.
- Support agricultural participation in the basin planning process.
- Hire Watershed Coordinators for Lake Champlain Basin watersheds to help develop and implement river basin plans.
- Expand the Department's River Management Program to promote stream stability and reduce phosphorus loading from stream bank and stream channel erosion in the Lake Champlain Basin through a comprehensive program of assessment, protection, management, restoration, and education, with additional federal funding being sought from the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and other agencies.
- Enhance the Vermont Better Backroads Program throughout the Lake Champlain Basin with staffing for technical assistance and increased funding for erosion control grants to towns.

- Offer technical assistance to towns in the Lake Champlain Basin seeking to provide better water quality protection through local ordinances and other municipal actions.
- Protect and/or restore riparian wetlands.

The nonpoint source phosphorus reduction activities listed in the Lake Champlain Phosphorus TMDL implementation plan will be actively pursued, contingent on the availability of state and federal funding and the provision of other necessary authority to the Department to carry out these implementation activities. Vermont Governor Douglas announced his "Clean and Clear Action Plan" on September 30, 2003. A major focus of this plan is implementation of the Lake Champlain Phosphorus TMDL.

A total of $5.2 million in state funds was approved by the Vermont General Assembly for state fiscal year 2008 for the Clean and Clear Action Plan. This follows the $8.1 million and $9.5 million state appropriation in FY2006 and FY2007 respectively. These funds are being used to support the above mentioned activities, and others, by the Agency of Natural Resources, the Agency of Agriculture Food and Markets, and many partners.

Additionally, several activities have been undertaken within the Allen Brook watershed incorporating stormwater control measures, primarily through the efforts of the Winooski Natural Resources Conservation District. The types of stormwater remediation projects in part include remediation of gulley erosion, rain garden installation and education, and stream channel reconfiguration.

Implementation Plan

EPA is not required to and does not approve TMDL implementation plans. Moreover, TMDLs are not legally required to include implementation plans. Despite this, the Agency has provided below a brief description of the general framework that it anticipates using to implement this TMDL. The Agency is providing this general description to aid the public in understanding the myriad of tools that the Agency possesses to effectively implement this TMDL. This framework may change over time based on new information gathered by VTDEC and as necessary to meet the requirements of this TMDL.

As a starting point, the Agency has been undertaking various projects to collect information to aid in the development of the implementation plan and in monitoring to assess the success of the plan as it is implemented and make necessary adjustments to the implementation plan. These projects include stream geomorphic assessment, subwatershed mapping, flow gaging and precipitation monitoring, impervious surface mapping and engineering feasibility assessment

Stream Geomorphic Assessment

In order to support the monitoring phase of stream remediation efforts, ANR has contracted with UVM and various consultants to develop a consistent baseline of stream geomorphic assessments (SGAs) for the stormwater-impaired streams, including Allen

Brook. These SGAs can be used as a point of comparison for future assessments to document improvements or degradation of these streams on a set of reaches from stormwater-impaired streams.

Subwatershed Mapping

The objective of this project is to identify discharge points within the stormwater-impaired watersheds and delineate the associated watersheds for those discharge points. The previously available subwatershed data is of varying quality. In some cases, there was data on stormwater collection systems and discharge points. However, all of the watersheds took a substantial amount of work to get an accurate subwatershed delineation. The delineation of these sub-watersheds will help to focus stormwater treatment and control measures on higher risk areas within each stormwater-impaired watershed.

Flow Gaging and Precipitation Monitoring

Altered hydrology within the stormwater-impaired watersheds is the dominant factor in causing the impairments. To support the monitoring phase of stream remediation, ANR, through a contract, established and operates stream flow and precipitation recording stations within each of the stormwater-impaired waters. This data will form an essential part of the adaptive management approach (discussed below) as stream flow is anticipated to reflect the initial response of Allen Brook to stormwater treatment and control measures that are implemented in accordance with this TMDL.

Impervious Surface Mapping

ANR is mapping the impervious surface area of each stormwater-impaired watershed using QuickBird satellite data. The QuickBird satellite acquires high-quality satellite imagery for map creation, detection of change over time, and image analysis. This project is being undertaken in conjunction with the School of Natural Resources at the University of Vermont.

ANR has performed the digital analysis of the data for the Allen Brook watershed. UVM will apply advanced object oriented eCognition classification techniques to potentially improve the mapping accuracy for the previously analyzed data using the QuickBird satellite data. This data will be used in developing the implementation plan for this TMDL.

Engineering Feasibility Assessment

To help develop the implementation plan for this TMDL, ANR is currently collecting technical data for all significant stormwater treatment practices (including ponds, infiltration basins, constructed wetlands, etc.) in the Allen Brook watershed. Technical information including pond volume, drainage area and detention time is being collected through permit review and site modeling using HydroCAD software. Once information is collected, site visits are conducted to ensure the accuracy of data. In addition to data collection, ANR is also conducting a limited engineering feasibility analysis at each site

to determine what can reasonably be achieved at each site with regard to stormwater detention and infiltration.

Vermont BMP Decision Support System

In order to implement appropriate restoration efforts, it is important to identify and size the appropriate best management practices (BMP) to achieve the watershed target. Because there are a plethora of BMP type, size, and location combinations, this type of analysis is typically extremely time-consuming. It may require numerous computer model iterations and a significant data pre- and post-processing effort. The urban nature of the stormwater impaired Vermont watersheds and their inherent spatial limitations make them particularly difficult and time-consuming to evaluate. Restoration may require implementing a large number of small-scale BMPs. To increase the efficiency in evaluating these watersheds, a BMP modeling tool that considers type, sizing, and placement and produces results that can be compared to the TMDL targets is being developed. This modeling tool is the Vermont BMP Decision Support System (VT BMP DSS). The VT BMP DSS will help to evaluate where the implementation of stormwater treatment and control will result in the greatest improvements on the flow regime, and ultimately the water quality in the watershed.

Watershed-Wide General Permits and NPDES Permits

As discussed above, Vermont is authorized to implement both a federally-authorized NPDES permit program for stormwater discharges from construction activities, industrial activities and municipal discharges under the MS4 program and a state-authorized permitting program for stormwater discharges from impervious surfaces equal to or greater than one acre. This dual permitting authority provides Vermont with powerful tools for requiring stormwater treatment and control practices and monitoring necessary to implement this TMDL.

The Agency currently anticipates that TMDL implementation will be phased and that the Agency will utilize an iterative, adaptive management approach to implementation The first phase of implementation may involve the issuance of a watershed-wide general permit pursuant to state law and may involve requiring controls through Vermont's federally-authorized NDPES stormwater permit program for municipal discharges, discharges associated with industrial activities and construction discharges. Stormwater treatment and control measures required in the first-round watershed-wide general permit may include the construction and/or upgrade of stormwater treatment and control systems by specifically identified dischargers of stormwater runoff.

The first-phase permit(s) will include a coordinated and cost-effective monitoring program to gather necessary information on progress toward the TMDL target and water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include BMP evaluation, ambient monitoring, receiving water assessment, or a combination of monitoring procedures designed to gather the necessary information. Based on this information, the permit(s) would be amended, as appropriate, to require implementation of more widespread and/or more stringent treatment and controls or other best management practices as necessary to

meet the TMDL targets. This adaptive management approach is a cyclical process in which a permit(s) is periodically assessed and adjustments to the permit(s) are made as necessary.

Monitoring Plan

USEPA recommends a monitoring plan to track the effectiveness of a TMDL. The Framework supports the concept of adaptive management which necessitates a substantial monitoring plan at several levels. The Framework identifies three levels of monitoring that are necessary for an adaptive management process to proceed most effectively. These include monitoring: 1) BMP implementation, 2) the primary stressors in the watershed, and 3) the instream habitat and biological condition. VTDEC intends to institute a comprehensive monitoring plan that addresses all the aspects identified in the Framework. At this point, certain parts of the monitoring plan have already been initiated while it is premature for others to begin. Several of the initiated monitoring programs have been summarized in the previous "Implementation Plan" section.

Since the watershed general permit that will require the implementation of stormwater treatment and control measures necessary to meet the TMDL target for Allen Brook has yet to be developed, there is currently no specific monitoring plan for Allen Brook. However, VTDEC will include requirements for the monitoring components listed in the Framework which might include tracking BMPs implemented, percentage of stormwater treated, percent of land area treated, etc. in the general permit. This should be accomplished relatively easily through database tracking of permits.

Monitoring of the primary stressors in Allen Brook is necessary to reveal if the implementation measures are having the desired impact. To date, some background monitoring has occurred to provide baseline information against which to measure future change. Continuous streamflow monitoring has been initiated in Allen Brook. Also, VTDEC has developed the in-house capability to accurately measure imperviousness within the watershed based on satellite imagery.

Monitoring of habitat condition and biological condition in Allen Brook has also been initiated. A stream geomorphic assessment has been completed which includes an assessment of aquatic life habitat. This data will provide a baseline against which to compare future assessments. Recent biological monitoring has also been conducted to verify the stormwater impairment listing of Allen Brook. Similarly, this will be used as background data to track future improvements and ultimate meeting of the VTWQS.

Public Participation

A public comment period was established upon the release of the draft Allen Brook TMDL from April 16, 2008 through May 16, 2008. In conjunction with the release of the draft TMDL, two informational public meetings were conducted, one in Shelburne and another in Williston on May 6, 2008 to present the TMDL and to answer any questions. Additionally, notification of the public informational meeting was posted to the Vermont Department of Libraries website.

At the close of the public comment period, VTDEC had received comments from one party. Responses to those comments is given in the below section.

Responses to Public Comments on the Draft Allen, Indian, Sunderland, and Munroe Brook TMDLs

Comments received

Submitted by:	Signed by:
Village of Essex Junction	James L. Jutras Water Quality Superintendent

1. Page; 25 Watershed-wide General Permits and NPDES Permits

   As stated within the TMDL, there are multiple permitting tools available. At the implementation phase, any general watershed permit considered should not delegate all work to a municipality via these noted permitting processes.

   Not all sites in a municipality or within an MS4 are under direct municipal control or municipal jurisdiction. Included in this type of parcel are state permitted facilities and facilities with expired stormwater permits. Expired permits remain an outstanding matter that requires resolution. Address of this permit group has the potential for substantial positive effect on the TMDL implementation.

   Response:
   DEC recently reconvened the Stormwater Advisory Group (SWAG) to discuss the full range of implementation issues associated with its stormwater TMDLs. One topic of discussion will be the role of municipalities in the implementation phase. DEC is cognizant of the legal limits on jurisdiction over municipal discharges both under the MS4 permit program and under state stormwater law. DEC hopes to cooperatively work with affected municipalities to best implement these TMDLs and currently anticipates that a combination of municipal and private efforts will be needed to fully implement the TMDLs. Expired permits will also be a focus of SWAG discussions. DEC anticipates that positive effects to these impaired streams will occur if stormwater systems with expired permits are maintained and/or upgraded.

2. The TMDL was not clear what occurs when attainment of water quality standards are achieved. It is assumed that the jurisdictional and non jurisdictional controls are to be continued for maintenance of water quality. The TMDL does not specifically address how those controls may be integrated through ongoing watershed wide or other permit mechanisms.

   Response:
   The role of the stormwater TMDLs is to set the hydrologic target for each watershed upon which the implementation plan will be based. A TMDL is not required to include an implementation plan or the specific control actions required to meet water quality

standards and the long-term maintenance requirements for these control actions. Each watershed-specific implementation plan and related permit(s) will spell out the required stormwater control requirements and the long-term maintenance of those controls.

3. Indian Brook. Page 5: Biomonitoring: It was my understanding that there would be additional bioassessment prior to TMDL development. In streams near attainment where offset work has been completed after the most current assessment described, there might be improvement to bioassessment data. With work completed, this assessment will unfortunately occur during TMDL implementation.

   Response:
   VTDEC agrees that follow-up biomonitoring is an important aspect to tracking BMP effectiveness, especially in watersheds with relatively attainable TMDL targets and where significant BMPs have been installed. However, no monitoring schedule has been devised for the stormwater impaired watersheds beyond the statewide five year rotating watershed assessment schedule. This important aspect of stormwater implementation planning will be part of the Stormwater Advisory Group (SWAG) discussions. Key to this discussion will be consideration of appropriate biomonitoring schedules and resources available to fund this labor intensive and expensive monitoring.

4. Page 1. Waterbody: Sunderland Brook also lies within the Village of Essex Junction, upstream from Susie Wilson Road.

   Response
   This change will be made to the Sunderland Brook TMDL.

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Town of Williston

Stormwater Management Program 2013

Appendix 4

VERMONT
ENVIRONMENTAL CONSERVATION

Allen Brook

Watershed Description

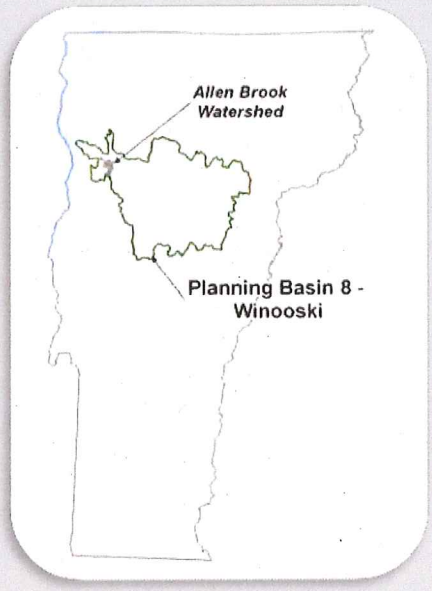
This bacteria TMDL summary applies to 4.6-mile segment of Allen Brook, an approximately 10-mile long stream located entirely in the Town of Williston in Chittenden County (Figure 1). The headwaters of the stream flow in a northerly direction through sparsely developed and forested land until it intersects Interstate Route 89. North of the Interstate, the stream flows in a westerly and then a northerly direction through areas of significant residential, commercial and industrial land uses (VTDEC, 2008a). Allen Brook flows into Muddy Brook just before it enters the Winooski River, which flows to Lake Champlain (Barg et al., 2003).

Allen Brook is a low to moderate gradient stream (VTDEC, 2008a), with an average gradient of 1% (Barg et al., 2003). Topographic relief in the watershed is low with the highest point at 908 feet above sea level and the lowest point at 210 feet. The stream's eight tributaries are mostly ephemeral, with drainage areas generally less than one square mile (Barg et al., 2003). A notable stream feature is the Allen Brook Cascades which are 200 feet long and drop a total of 20 feet (VTANR, 2008).

The watershed drains an increasingly developed landscape on formerly agricultural lands. The Town of Williston has experienced rapid growth with a 57% increase in population between 1990 – 2000, making it the fast growing community in Vermont (Barg et al., 2003). Increases in impervious cover and man-made drainage infrastructure, and loss of wetlands in the Allen Brook watershed have impacted the stream's hydrologic regime in the lower and middle reaches of the watershed (Fitzgerald, 2008). Increased development results in increased impervious areas, leading to increased stormwater runoff which picks up pollutants such as sediments, nutrients, heavy metals and bacteria.

Waterbody Facts (VT08-02)

- **Town:** Williston
- **Impaired Segment Location:** From River Cove Rd. upstream to Route 2
- **Impaired Segment Length:** 4.6 miles
- **Classification:** Class B
- **Watershed Area:** ~ 11 square miles
- **Planning Basin:** 8-Winooski River



The Allen Brook watershed contains a mixture of land uses (Figure 2) including significant amounts of agricultural land (mostly in the upper watershed), and large, contiguous areas of forest land in the southern portions of the watershed south of Interstate 89. Overall, land use in the watershed is 41% forested, 38% agricultural, 14% developed, and 4% wetland and water (Based on 2006 Land Cover Analysis by NOAA-CSC). The developed land is largely attributed to residential development and transportation related uses (Fitzgerald, 2008). Impervious cover in the watershed is considered low to moderate at 7.4% (Fitzgerald, 2007).

Biological monitoring data (macroinvertebrate and fish) indicate that the principal aquatic life and habitat impairment in Allen Brook stems from excess sediment, nutrient enrichment, high temperatures, habitat alterations from stormwater runoff from developed areas, erosion, and lack of streambank vegetation (VTANR, 2008). The bacteria impaired segment extends from the mouth of Allen Brook, upstream to Route 2 and is believed to be the result of *E. coli* numbers above state standards due to stormwater runoff, occasional malfunctioning septic systems and beaver (VTANR, 2008). There are eleven sampling stations in Allen Brook (Figure 1) including three within the impaired segment (Figure 3).

Previous efforts to restore the water quality in Allen Brook have focused on identifying the sources of these impairments. Major components of these studies include a geomorphic assessment (Fitzgerald, 2006) and stressor analysis (Fitzgerald, 2008) which led to the identification of 21 unique restoration projects. The assessment found that in the absence of pervasive beaver impacts, current day stressors like urbanization appear to dominate in the lower portion of Allen Brook in addition to historic impacts from flood plain encroachment, road crossings, and agricultural impacts in the lower watershed (VTANR, 2008).

Example of a restoration project to replace bridges at River Cover Rd. (Source: Fitzgerald, 2008)

A hydrologically-based Total Maximum Daily Load (TMDL) was developed in 2008 to address the biological impairments in the stream (VTDEC, 2008a). The major focus of the TMDL is to address stormwater runoff, the report describes how mitigation of this runoff will help reduce the impacts of other pollutants of concern in the watershed, including sediments, nutrients, heavy metals, and fecal bacteria.

Despite these studies, little information is available to characterize the extent of the *E. coli* bacteria monitoring data in the stream.

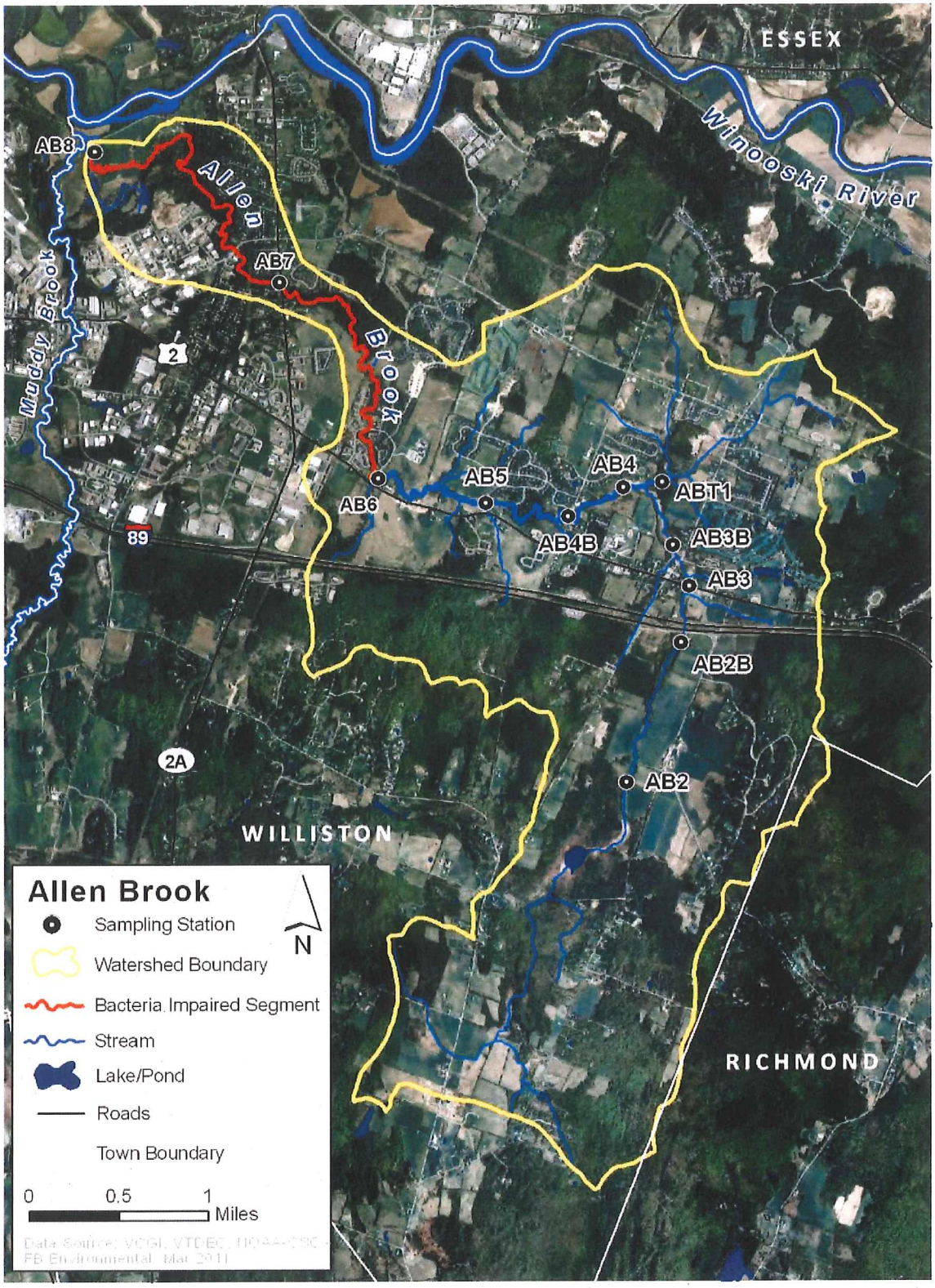


Figure 1: ***Map of the Allen Brook watershed with impaired segment and sampling stations indicated.***

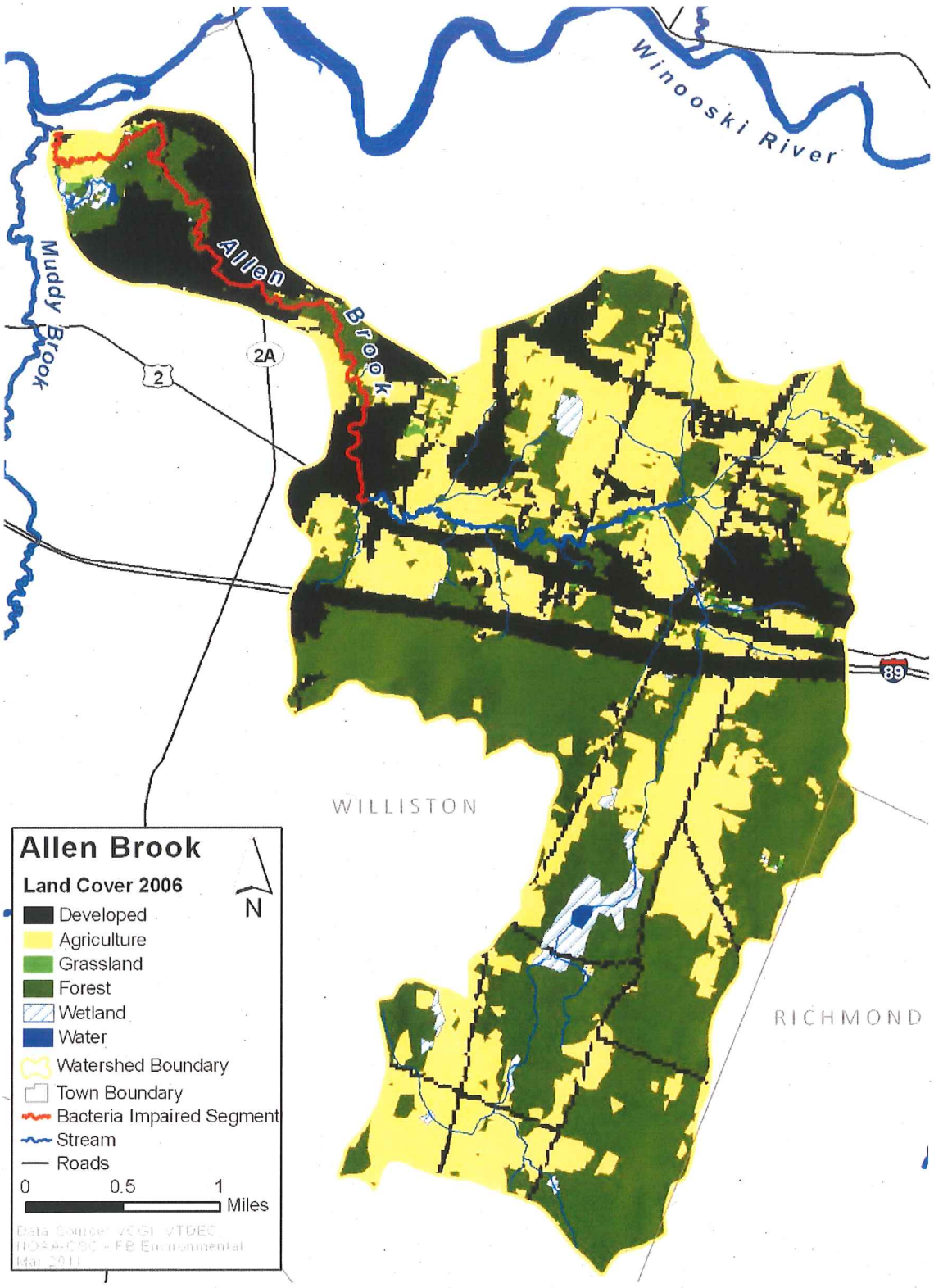


Figure 2: ***Map of the Allen Brook watershed with impaired segment and land cover indicated.***

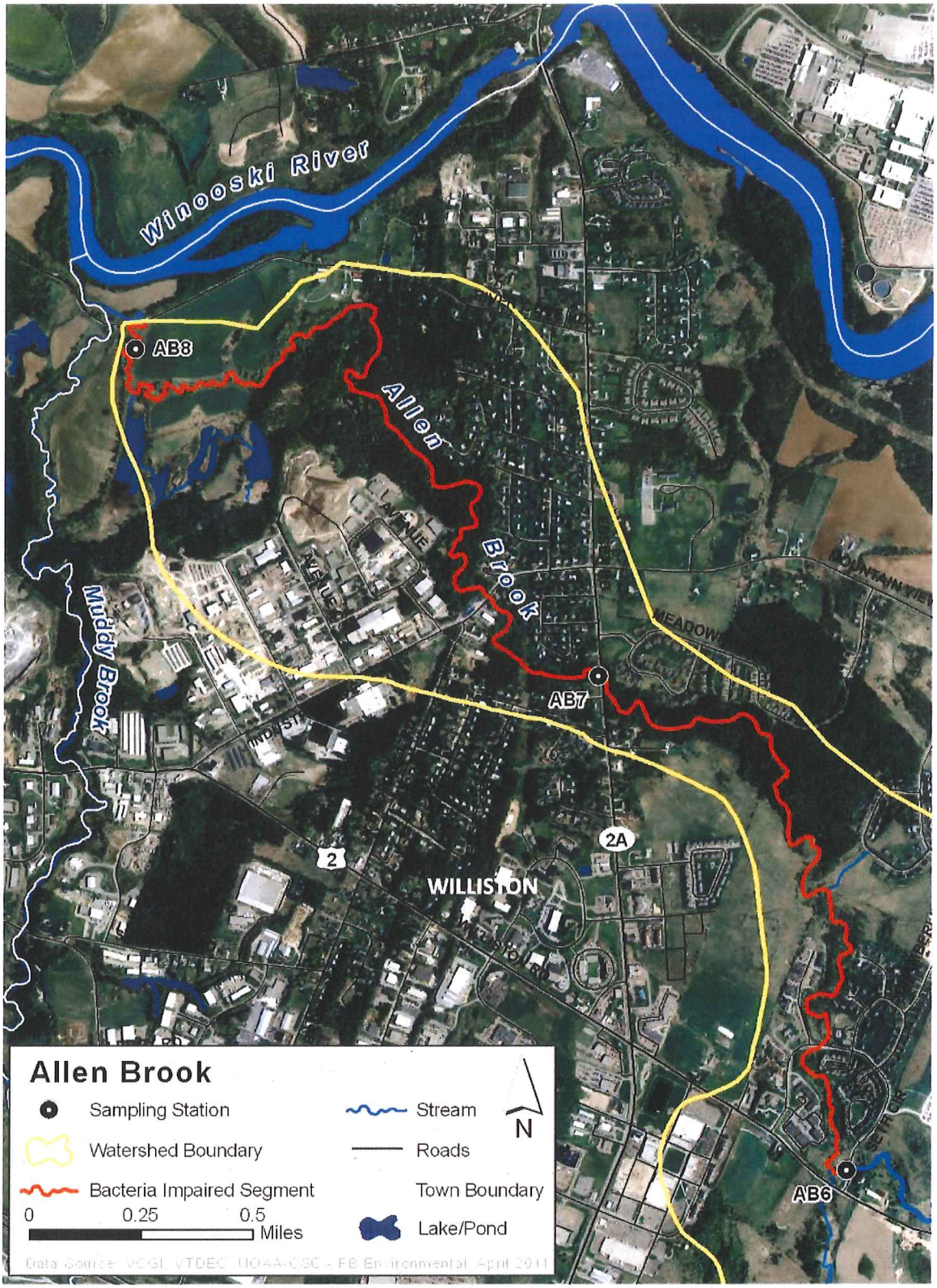


Figure 3: ***Map of the downstream reach of Allen Brook with impaired segment and sampling locations indicated.***

Why is a TMDL needed?

Allen Brook is a Class B, cold water fishery with designated uses including swimming, fishing and boating (VTDEC, 2008b). In the summer of 2007, 2008 and 2010, the Williston Conservation Commission partnered with the LaRosa Environmental Laboratory to collect and analyze water samples on Allen Brook. Bacteria data from the downstream sampling locations (AB6, AB7 and AB8) were used to determine percent reductions needed for the impaired segment. These sites consistently exceed Vermont's water quality criteria for *E.coli* bacteria. Tables 1-3 (below) provide bacteria data collected at these downstream sampling locations in 2007 and 2008, as well as the water quality criteria for *E. coli* bacteria and the individual sampling event bacteria results and geometric mean concentration statistics for each sampling season at each station. Station AB6, at the Route 2 road crossing exceeded bacteria standards in all but two sampling events in 2007, and all but one event in 2008 (Table 1). AB7 exhibited high levels of bacteria and numerous exceedances throughout the sampling period, but had the lowest incidences of exceedances of the three stations and did not exceed the geometric mean standard in 2007 (Table 2). Station AB8 at the River Cove Rd. exceeded standards in all sampling events in 2007, and all but one sampling event in 2008, and exceeded the geometric mean standard in both years (Table 3).

Both historic and recent beaver activity has been recorded in Allen Brook (Photo: Fitzgerald, 2006)

Due to the elevated bacteria measurements presented in Tables 1-3 (below), Allen Brook, from upstream of the River Cove Rd. crossing, upstream 4.6 miles to the Route 2 crossing did not meet Vermont's water quality standards, and was identified as impaired and placed on the 303(d) list (VTDEC, 2008c). The 303(d) listing states that use of Allen Brook for contact recreation (i.e., swimming) is impaired. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

Potential Bacteria Sources

Bacterial contamination in streams of urbanizing watersheds can be the result of a variety of sources. These sources include: illicit sewer connections; sewer line leaks; septic systems; urban stormwater runoff; and animal waste including wildlife, agriculture and pets.

As of November 2007, there were 135 stormwater discharges to Allen Brook and its tributaries (VTANR, 2008). Urban stormwater runoff is typically considered a significant source of bacteria during wet weather, as is contamination from wildlife and domesticated animals (including pet waste). Bacteria

loading problems during dry weather can be linked to illicit sewer connections and sewer-line breaks, or wildlife, since the loadings are independent of runoff from storm events.

Despite major losses of agricultural land to rural residential and suburban development in the Allen Brook watershed, five important farms in the Town of Williston are still operational (Williston, 2006). The close proximity of agricultural land to Allen Brook and its tributaries make management of agricultural land important in order to limit bacteria contributions to the stream. The land use analysis for Allen Brook estimates that 38% of the watershed area (4 sq. miles or 2,573 acres) is used for agriculture. The watershed study for Allen Brook (Fitzgerald, 2007) recommends fencing along the stream to exclude grazing animals from the stream channel and riparian buffer plantings to stabilize stream banks in several stream reaches including approximately 1500 linear feet for channel near the intersection of South Rd. and East Hill Road. Manure management and manure spreading, livestock exclusions including fencing, and adequate bridge and culvert crossings for livestock are examples of management practices that can be used to limit the impacts from agriculture in the watershed.

Wildlife, including beaver, which have been documented throughout the stream (Fitzgerald, 2006) are a potential source of bacterial contamination in Allen Brook.

Recommended Next Steps

As described above, the recently developed TMDL (VTDEC, 2008a) to address biological impairments in Allen Brook focuses on reducing the effects of urban stormwater runoff in the watershed. Implementation of stormwater controls within the Allen Brook watershed should result in quantifiable improvements in bacterial loading. The Town of Williston has been proactive in developing a Stormwater Management Plan to address stormwater discharges, developing a regional stormwater education and community outreach program, and a water quality monitoring program. The town also has a stream buffer program which has resulted in revegetation of buffers along the Allen Brook stream corridor. Despite these efforts a separate and specific investigation as to the specific sources of high bacteria levels in Allen Brook is required in order to fully assess these impacts.

Additional bacteria data collection will be beneficial to support identification of sources of potentially harmful bacteria in the Allen Brook watershed, and to determine if improved management practices, or changes in ownership changes of contributing farmland has improved conditions in the stream. Sampling upstream and downstream of known stormwater discharges and agricultural sources (a practice known as "bracket sampling") may be beneficial for identifying and quantifying sources. Ongoing sampling focused on capturing bacteria data under different weather conditions (e.g., wet and dry) will also be beneficial in support of source identification. Microbial source tracking (MST) studies can be conducted to differentiate sources of bacteria among wildlife types. Wildlife sources do not require mitigation because they are "natural sources", however, many best management practices (BMPs) designed to disconnect stormwater runoff from Allen Brook will also reduce wildlife source contributions (FBE, 2010).

Illicit Discharge Detection & Elimination (IDDE) Investigations are useful for removing bacteria sources from stormdrain networks and identifying illicit (i.e., unlawful) sewage sources. An IDDE investigation requires starting at an outfall where presence of bacteria is known to exist, and working up gradient to identify and isolate source(s) of bacteria. Several different investigative tools can be used for these surveys including: stormdrain network reconnaissance, inventory and mapping; bracket sampling; optical brightener surveys, and television surveys.

Previous investigations (Barg et al., 2003; Fitzgerald 2006, 2007, 2008; VTANR 2008; VTDEC 2008a) have recommended actions to support water quality goals in Allen Brook with a focus on reducing stormwater runoff and sediment. Below are a few of the major objectives:

- Reduce overall pollutant loading (emphasis on sediment) from urban/developed land by installing stormwater controls, issuance of a watershed-wide general permit, upgrade of existing stormwater treatments, development of a stormwater utility, routine street sweeping and catch basin cleaning, improved stormwater ordinances.
- Reduce runoff from agricultural land by expanding the CRP program to create easements on farms along the streams for buffer implementation, provide technical assistance to farmers with BMPs including nutrient management, and livestock exclusion.
- Improve riparian buffers by increasing land in conservation easements, expanding buffers beyond 150' to include all tributaries, ephemeral, intermittent and perennial, and through riparian revegetation projects.

Several of the steps outlined above are ongoing and should be continued and enhanced to focus on the goals of bacteria TMDL implementation. If implemented, these actions will help provide a strong basis toward the goal of mitigating bacteria sources and meeting water quality standards in Allen Brook.

Bacteria Data

Vermont's current criteria for bacteria are more conservative than those recommended by EPA. For Class B waters, VTDEC currently utilizes an E. coli single sample criterion of 77 organisms/100ml. Although, Vermont is in the process of revising their bacteria WQS to better align with the National Recommended Water Quality Criteria (NRWQC) of a geometric mean of 126 organisms/100ml, and a single sample of 235 organisms/100ml. Therefore, in Table 1 below, bacteria data were compared to both the current VTWQS and the NRWQC for informational purposes.

Allen Brook, from River Cove Rd. upstream 4.6 miles to Route 2

WB ID: VT08-02

Characteristics: Class B

Impairment: *E. coli* (organisms/100mL)

Current Water Quality Criteria for E. coli:

Single sample: 77 organisms/100 mL

NRWQC for E. coli::

Single sample: 235 organisms/100 mL

Geometric mean: 126 organisms/100 mL

Percent Reduction to meet TMDL (Current):

Single Sample: **97%**

Percent Reduction to meet NRWQC

Single sample: **90%**

Geometric mean: **59%**

Data: 2007-2008, Williston Conservation Commission, VTDEC

Table 1: *E.coli* (organisms/100 mL) Data for Allen Brook (2007-2008) and Geometric Mean (organisms/100mL) for Station AB6 based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
AB6	Talcott Road East	9/29/2008	50	
AB6	Talcott Road East	9/22/2008	96	
AB6	Talcott Road East	9/15/2008	248	
AB6	Talcott Road East	9/8/2008	127	
AB6	Talcott Road East	8/25/2008	131	
AB6	Talcott Road East	8/18/2008	236	
AB6	Talcott Road East	8/11/2008	122	
AB6	Talcott Road East	8/4/2008	457	269
AB6	Talcott Road East	7/28/2008	132	
AB6	Talcott Road East	7/21/2008	816	
AB6	Talcott Road East	7/14/2008	2420	
AB6	Talcott Road East	7/7/2008	299	
AB6	Talcott Road East	6/30/2008	365	
AB6	Talcott Road East	6/23/2008	2420	
AB6	Talcott Road East	6/16/2008	313	
AB6	Talcott Road East	6/9/2008	137	

**Shaded cells indicate geometric mean and single sample values used to determine percent reduction.*
***Geometric mean used to calculate % reduction has no fewer than 5 data points.*

Table 1 cont.: *E.coli* (organisms/100 mL) Data for Allen Brook (2007-2008) and Geometric Mean (organisms/100mL) for Station AB6 based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
AB6	new Fire Station	9/25/2007	649	
AB6	new Fire Station	9/18/2007	1050	
AB6	new Fire Station	9/11/2007	299	
AB6	new Fire Station	8/28/2007	60	
AB6	new Fire Station	8/21/2007	21	
AB6	new Fire Station	8/14/2007	79	
AB6	new Fire Station	8/7/2007	2420	
AB6	new Fire Station	7/31/2007	326	305
AB6	new Fire Station	7/24/2007	151	
AB6	new Fire Station	7/17/2007	248	
AB6	new Fire Station	7/10/2007	2420	
AB6	new Fire Station	7/2/2007	99	
AB6	new Fire Station	6/26/2007	249	
AB6	new Fire Station	6/19/2007	308	
AB6	new Fire Station	6/12/2007	579	
AB6	new Fire Station	6/5/2007	866	

**Shaded cells indicate geometric mean and single sample values used to determine percent reduction.*
***Geometric mean used to calculate % reduction has no fewer than 5 data points.*

Table 2: *E.coli* (organisms/100 mL) Data for Allen Brook (2007-2008) and Geometric Mean (organisms/100mL) for Station AB7 based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
AB7	Route 2A	9/29/2008	276	
AB7	Route 2A	9/22/2008	34	
AB7	Route 2A	9/15/2008	172	
AB7	Route 2A	9/8/2008	55	
AB7	Route 2A	8/25/2008	72	
AB7	Route 2A	8/18/2008	86	
AB7	Route 2A	8/11/2008	206	
AB7	Route 2A	8/4/2008	411	207
AB7	Route 2A	7/28/2008	347	
AB7	Route 2A	7/21/2008	866	
AB7	Route 2A	7/14/2008	2420	
AB7	Route 2A	7/7/2008	27	
AB7	Route 2A	6/30/2008	144	
AB7	Route 2A	6/23/2008	2420	
AB7	Route 2A	6/16/2008	236	
AB7	Route 2A	6/9/2008	150	
AB7	Route 2A	9/25/2007	2	
AB7	Route 2A	9/18/2007	11	
AB7	Route 2A	9/11/2007	21	
AB7	Route 2A	9/4/2007	39	
AB7	Route 2A	8/28/2007	24	
AB7	Route 2A	8/21/2007	32	
AB7	Route 2A	8/14/2007	102	
AB7	Route 2A	8/7/2007	1550	
AB7	Route 2A	7/31/2007	65	70
AB7	Route 2A	7/24/2007	125	
AB7	Route 2A	7/17/2007	186	
AB7	Route 2A	7/10/2007	2420	
AB7	Route 2A	7/2/2007	25	
AB7	Route 2A	6/26/2007	35	
AB7	Route 2A	6/19/2007	131	
AB7	Route 2A	6/12/2007	32	
AB7	Route 2A	6/5/2007	866	

**Shaded cells indicate geometric mean and single sample values used to determine percent reduction.*
***Geometric mean used to calculate % reduction has no fewer than 5 data points.*

Table 3: *E.coli* (organisms/100 mL) Data for Allen Brook (2007-2008) and Geometric Mean (organisms/100mL) for Station AB8 based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
AB8	River Cove Rd	9/29/2008	144	
AB8	River Cove Rd	9/22/2008	86	
AB8	River Cove Rd	9/15/2008	461	
AB8	River Cove Rd	9/8/2008	135	
AB8	River Cove Rd	8/25/2008	147	
AB8	River Cove Rd	8/18/2008	117	
AB8	River Cove Rd	8/11/2008	62	
AB8	River Cove Rd	8/4/2008	411	244
AB8	River Cove Rd	7/28/2008	137	
AB8	River Cove Rd	7/21/2008	1733	
AB8	River Cove Rd	7/14/2008	2420	
AB8	River Cove Rd	7/7/2008	79	
AB8	River Cove Rd	6/30/2008	122	
AB8	River Cove Rd	6/23/2008	2420	
AB8	River Cove Rd	6/16/2008	260	
AB8	River Cove Rd	6/9/2008	131	
AB8	River Cove Rd	9/25/2007	150	
AB8	River Cove Rd	9/18/2007	113	
AB8	River Cove Rd	9/11/2007	172	
AB8	River Cove Rd	9/4/2007	91	
AB8	River Cove Rd	8/28/2007	131	
AB8	River Cove Rd	8/21/2007	84	
AB8	River Cove Rd	8/14/2007	186	
AB8	River Cove Rd	8/7/2007	1300	198
AB8	River Cove Rd	7/31/2007	91	
AB8	River Cove Rd	7/24/2007	114	
AB8	River Cove Rd	7/17/2007	93	
AB8	River Cove Rd	7/10/2007	2420	
AB8	River Cove Rd	6/26/2007	147	
AB8	River Cove Rd	6/19/2007	119	
AB8	River Cove Rd	6/12/2007	248	
AB8	River Cove Rd	6/5/2007	770	

**Shaded cells indicate geometric mean and single sample values used to determine percent reduction.*
***Geometric mean used to calculate % reduction has no fewer than 5 data points.*

References

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Town of Williston

Stormwater Management Program 2013

Appendix 5

STATE OF VERMONT

2012

LIST OF PRIORITY SURFACE WATERS OUTSIDE THE SCOPE OF CLEAN WATER ACT SECTION 303(d)

includes:

PART B. IMPAIRED SURFACE WATERS - NO TOTAL MAXIMUM DAILY LOAD DETERMINATION REQUIRED

PART C. SURFACE WATERS IN NEED OF FURTHER ASSESSMENT

PART D. SURFACE WATERS WITH COMPLETED AND APPROVED TMDLs

PART E. SURFACE WATERS ALTERED BY INVASIVE AQUATIC SPECIES

PART F. SURFACE WATERS ALTERED BY FLOW REGULATION

PART G. SURFACE WATERS ALTERED BY CHANNEL ALTERATION

Vermont Department of Environmental Conservation
Watershed Management Division
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

(802) 828-1535
(802) 828-1544 FAX

Overview

The following six-part list of waters has been prepared by the Vermont Department of Environmental Conservation (VT DEC) in accordance with the Vermont Surface Water Assessment and Listing Methodology. Each part is considered to be outside the scope of Clean Water Act Section 303(d).

All waters listed in **Part B** are assessed as "impaired" and do not require development of a TMDL as described in 40 CFR 130.7. Section 303d of the Federal Clean Water Act does not govern these waters. Impaired waters that do not need a TMDL are those where other pollution control requirements (such as best management practices) required by local, state or federal authority are expected to address all water-pollutant combinations and the Water Quality Standards are expected to be attained in a reasonable period of time. These waters correspond to Category 4b of EPA's Consolidated Assessment Listing Methodology.

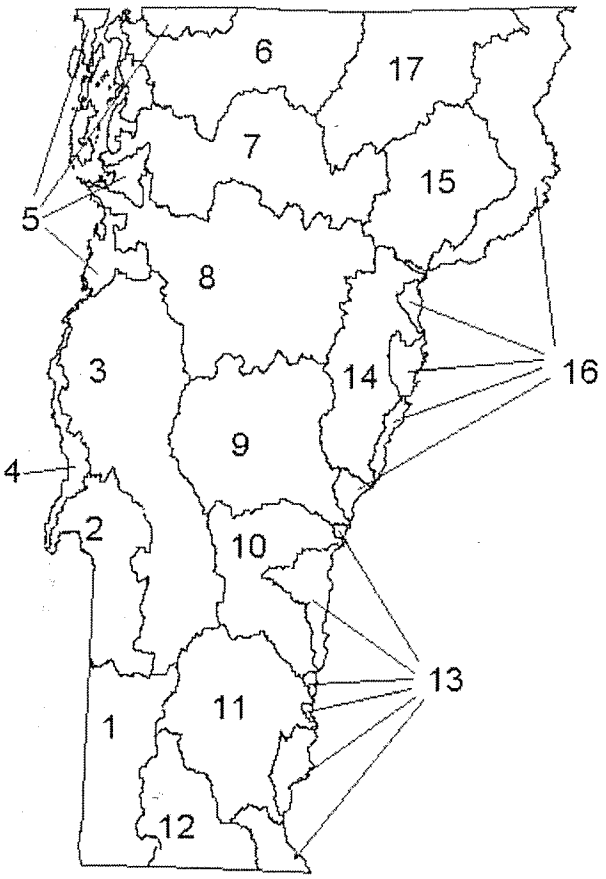
All waters appearing in **Part C** are assessed as "stressed" and have been identified as needing further assessment to confirm the presence of a violation of one or more criteria of the Vermont Water Quality Standards. A violation has not been documented by sufficient data (i.e. there is an insufficient weight of evidence). Part C waters are considered high priority waters for assessment and monitoring.

All waters identified on **Part D** have appeared on a previous version of the Part A-303d List and also have completed and approved TMDLs in place. If future assessments show the impairment has been eliminated, the waters will remain on Part D as a means of TMDL tracking. These waters correspond to Category 4a of EPA's Consolidated Assessment Listing Methodology.

Waters appearing in **Part E** are assessed as "altered." They represent situations to be given priority for management where aquatic habitat and/or other designated uses have been altered to the extent that one or more designated uses are not supported due to the presence of invasive aquatic species. This list currently includes waters altered by the proliferation of Eurasian watermilfoil, water chestnut, zebra mussels or the presence of alewives. These waters correspond to Category 4c of EPA's Consolidated Assessment Listing Methodology.

Waters appearing in **Part F** of the Vermont Priority Waters List are assessed as "altered." They represent priority management situations where aquatic habitat and/or other designated uses have been altered by flow regulation to the extent that one or more designated uses are not supported. Alterations arise from flow fluctuation, obstructions, or other manipulations of water levels that originate from hydroelectric facilities or other dam operations or from water withdrawals for industrial or municipal water supply or snowmaking purposes. These waters correspond to Category 4c of EPA's Consolidated Assessment Listing Methodology.

Waters appearing in **Part G** have been assessed as "altered." These waters include stream or river reaches with significant impacts due to physical channel alterations, documented channel degradation or a change in stream type that have resulted from human activities such as gravel mining, dredging, channelization, improper bridge or culvert placement, or floodplain encroachments. In these situations, the aquatic habitat is altered from the stable ecological state due to changes in bedload movement and habitat feature loss so that one or more designated uses are not supported. In these altered reaches, the changes in bedload and habitat features result from an instability of the system itself as streams naturally realign themselves into a new natural equilibrium. These waters correspond to Category 4c of EPA's Consolidated Assessment Listing Methodology.



Major Vermont River Basins

1. Battenkill
2. Poultney-Mettawee
3. Otter Creek
4. Lower Lake Champlain
5. Upper Lake Champlain
6. Missisquoi
7. Lamoille
8. Winooski
9. White
10. Ottauquechee
11. West
12. Deerfield
13. Lower Connecticut
14. Wells, Waits, Ompompanoosic
15. Passumpsic
16. Upper Connecticut
17. Lake Memphremagog

List of Acronyms and Terms

AAFM	VT Agency of Agriculture, Food and Markets
As	arsenic
BMP	best management practice
Cfu	colony forming unit
CRJC	CT River Joint Commissions
CSO	combined sewer overflow
Cu	copper
DEC-AP	VT DEC, Air Pollution Division
DEC-ENF	VT DEC, Enforcement Division
DEC-FE	VT DEC, Facilities Engineering Division
DEC-HM	VT DEC, Hazardous Materials Section (of DEC-WM)
DEC-SW	VT DEC, Solid Waste Section (of DEC-WM)
DEC-WM	VT DEC, Waste Management Division
DEC-WQ	VT DEC, Water Quality Division
DEC-WS	VT DEC, Water Supply Division
DEC-WWM	VT DEC, Wastewater Management Division
DF&W	VT Department of Fish & Wildlife
DFP&R	VT Department of Forests, Parks & Recreation
D.O.	dissolved oxygen
DOH	VT Department of Health
E.COLI	Escherichia coli (an indicator bacterium)
EPT	Ephemeroptera/Plecoptera/Tricoptera
FERC	Federal Energy Regulatory Commission
Fe	iron
F/S	feasibility study
Hg	mercury
-HUA	Hydrologic Unit Area (a USDA cost share program)
LCBP	Lake Champlain Basin Program
MG/L	milligrams per liter (same as parts per million)
MOU	memorandum of understanding
MT/YR	metric tons per year
Ni	nickel
NOx	nitrogen oxide
NPL	National Priority Listing
NPS	nonpoint source
P	phosphorus
Pb	lead
PCB	poly-chlorinated biphenol
pH	hydrogen ion concentration (measurement of)
RCWP	Rural Clean Water Program
RI/FS	Remedial Investigation/Feasibility Study
RM	river mile
SCS	Soil Conservation Service (same as USDA-NRCS)
SECT 319	Section 319 [of federal Clean Water Act]
SHG	Small High Gradient
SO2	sulfur dioxide
SRF	State Revolving Fund
UG/L	micrograms per liter (same as parts per billion)
USACOE	US Army Corps of Engineers
USBOM	US Bureau of Mines
USDA	US Department of Agriculture
USDA-ACP	- Agriculture Conservation Program
USDA-HUA	- Hydrologic Unit Area
USDA-SpP	- Special Project
USDA-WQIP	- Water Quality Incentive Program
USDA-NRCS	- Natural Resource Conservation Service
USEPA	US Environmental Protection Agency
USF&WS	US Fish & Wildlife Service
UVM	University of Vermont
UVM-SNR	- School of Natural Resources
VSA	VT Statutes Annotated
VTDEC	Vermont Department of Environmental Conservation
WQ	water quality
WQS	Water Quality Standards
WWTF	wastewater treatment facility
Zn	zinc
1272	Section 1272 of 10 VSA Chapter 47
1272 Order	An order issued by the ANR Secretary to properly manage or eliminate an existing discharge to waters that may cause a violation of the Water Quality Standards.
1277	Section 1277 of 10 VSA Chapter 47
1277 Order	An order issued by the ANR Secretary to a municipality that is discharging untreated or improperly treated sewage that causes a reduction in water quality to construct a sewage collection and treatment system to correct or abate the discharge.
PL83-566 (a USDA cost share program)	

STATE OF VERMONT

2012

303(d) LIST OF WATERS

PART A - IMPAIRED SURFACE WATERS IN NEED OF TMDL

JUNE 2012

(Approved by USEPA Region 1 – June 13, 2012)

Prepared by:

Vermont Department of Environmental Conservation
Watershed Management Division
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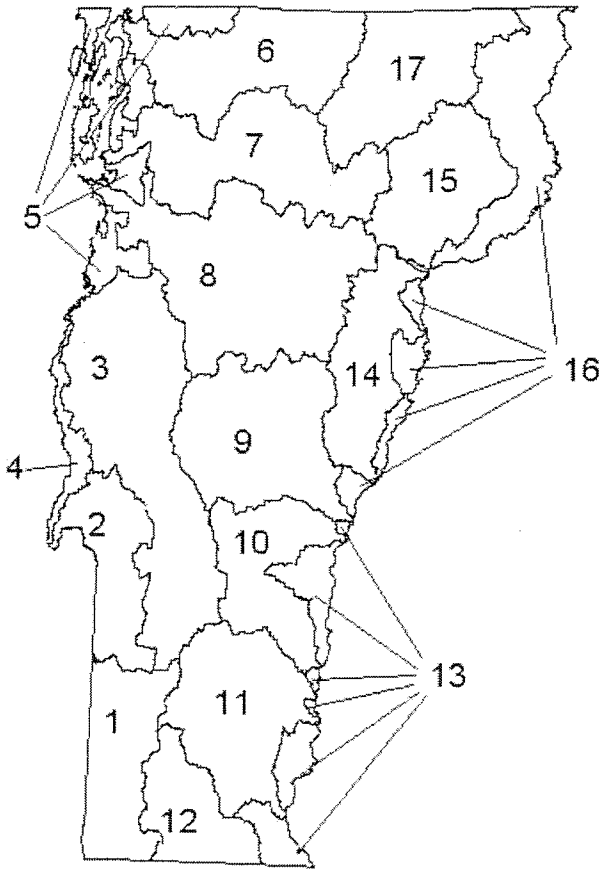

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17. Lake Memphremagog

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DOH	VT Department of Health
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USDA-SpP	- Special Project
USDA-WQIP	- Water Quality Incentive Program
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1277 Order	An order issued by the ANR Secretary to a municipality that is discharging untreated or improperly treated sewage that causes a reduction in water quality to construct a sewage collection and treatment system to correct or abate the discharge.
566	PL83-566 (a USDA cost share program)

PART A - IMPAIRED SURFACE WATERS IN NEED OF TMDL

Part A of the 2012 List of Waters identifies impaired surface waters that are scheduled for total maximum daily load (TMDL) development. Part A of the List has been prepared in accordance with the Vermont Surface Water Assessment and Listing Methodology, current EPA Guidance and the Environmental Protection Regulations 40 CFR 130.7 ("Total maximum daily loads (TMDL) and individual water quality-based effluent limitations"). A TMDL is deemed necessary for these waters (unless remediation will be completed prior to the scheduled TMDL) in order to establish the maximum amount of a pollutant that may be introduced into the water after the application of required pollution controls and to ensure the Water Quality Standards are attained and maintained.

Explanation of Column Headings for Part A

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, located in Vermont river basin #01. River basin #01 includes the Batten Kill, Hoosic and Walloomsac rivers; there are 17 river basins for planning purposes identified in Vermont. A statewide map illustrating designated lake and river waterbodies can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

Segment Name/Description - The name of the river/stream segment or lake/pond. Entries denoted by "**" indicate newly discovered impairments since the 2010 list.

Pollutant(s) - The pollutant or pollutants that cause a violation of the Vermont Water Quality Standards (VWQS).

Use(s) Impaired - An indication of which designated or existing uses (as defined in the VWQS) are impaired. The following conventions are used to represent a specific use:

AES – aesthetics
ALS - aquatic life support
AWS - agricultural water supply
2CR - secondary contact recreation (fishing, boating)
FC - fish consumption
DWS - drinking water supply
CR - contact recreation (i.e. swimming)

Surface Water Quality Problem - A brief description of the problem found in the particular segment.

TMDL Completion Priority - An indication of priority as to when TMDLs will be completed (H=high 1-3 years, M=medium 4-8 years, L=low 8+ years).

	Lakes and Ponds	Streams and Rivers	Total
Total number of impairment entries listed in Part A:	15	71 (1)	86

Number in parentheses ( ) represents new Part A listings since the 2010 listing cycle. The total number of Part A listings has decreased from 107 in 2010 to 86 in 2012.

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT01-02	01	HOOSIC RIVER, ENTIRE 7 MILE LENGTH IN VERMONT	PCBs	FC	ELEVATED LEVELS OF TOXIC CONTAMINANT IN BROWN TROUT	L
	02	LADD BROOK, MOUTH TO RM 0.4	SEDIMENT	ALS	INDICATION OF SEDIMENT STRESS; POTENTIAL IMPACTS FROM ERODING DIRT ROADS	M
VT01-03	01	BARNEY BROOK, MOUTH TO RM 1.5	SEDIMENT, IRON	ALS	DOWNSTREAM OF LANDFILL, HAZ SITE, AND CONSTRUCTED WETLANDS; SILT AND IRON PRECIPITATE CAUSING FISH/INVERT IMPACTS	M
VT01-05	01	LYE BROOK, RM 2.5 TO HEADWATERS (4.5 MILES)	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
VT01-06	01	BRANCH POND BROOK (POND TO ROARING BRANCH)	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
	02	FAYVILLE BRANCH, RM 3.7 TO HEADWATERS	ACID	ALS	ACIDIFICATION, ACID DEPOSITION	M
VT02-02	01	UNNAMED TRIB TO HUBBARDTON RIVER, BELOW WWTF DISCHARGE	E. COLI, NUTRIENTS, TEMPERATURE	ALS, CR, 2CR	BENSON WWTF, AG RUNOFF POSSIBLE SOURCES; MONITORING & ASSESSMENT REQUIRED	M
VT02-03	01	CASTLETON RIVER, FAIR HAVEN	E. COLI	CR	WWTF PUMP STATION OVERFLOWS	L
VT02-05	02	UNNAMED TRIB TO METTAWEE RIVER	METALS (IRON, ZINC)	ALS	PAWLET LANDFILL LEACHATE	M
VT03-01	02	LOWER OTTER CREEK, BELOW VERGENNES WWTF (APPROX 7 MILES)	E. COLI	CR	PERIODIC & RECURRING OVERFLOWS AT PUMP STATIONS WITHIN THE COLLECTION SYSTEM	L
VT03-05	01	OTTER CREEK, VICINITY OF RUTLAND CITY WWTF	E. COLI	CR	RUTLAND CITY WWTF COLLECTION SYSTEM PASSES CSOs	L
VT03-07	02	LITTLE OTTER CREEK, RM 15.4 TO RM 16.4	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF	H
VT03-12	02	**HALNON BROOK, TRIBUTARY #1	NUTRIENTS	ALS	ELEVATED NUTRIENTS AFFECT AQUATIC BIOTA	M

Certain local, state and federal regulatory programs refer to impaired segments (or waters draining to those segments) listed on the 303d List of Impaired Waters as part of program operations. Contact the respective regulatory program for details regarding regulated activities in these waters and their watersheds.

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT03-14	01	EAST CREEK, MOUTH TO 0.2 MI (BELOW CSO DISCHARGE PTS #2 AND #9)	E. COLI	CR	RUTLAND CITY COLLECTION SYSTEM CSO	L
VT04-01L01	01, 02, 03, 04	OTTER CREEK SECTION - LAKE CHAMPLAIN (Ferrisburg)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT04-01L02	01, 02, 03	PORT HENRY SECTION - LAKE CHAMPLAIN (Ferrisburg)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT04-02L01	01, 02	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-01	01	ROCK RIVER - MOUTH TO VT/QUE BORDER (3.6 MILES)	NUTRIENTS, SEDIMENT	AES	ALGAL GROWTH; AGRICULTURAL RUNOFF; FISH KILLS	H
	02	ROCK RIVER, UPSTREAM FROM QUE/VT BORDER (APPROX 13 MILES)	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF; NUTRIENT ENRICHMENT	H
	03	SAXE BROOK (TRIB TO ROCK RIVER) FROM MOUTH UPSTREAM 1 MILE	NUTRIENTS	ALS	AGRICULTURAL RUNOFF	H
VT05-04L01	01, 02, 03	NORTHEAST ARM - LAKE CHAMPLAIN (Swanton)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-04L02	01, 02	ISLE LAMOTTE - LAKE CHAMPLAIN (Alburg)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-07	01	RUGG BROOK, FROM MOUTH TO APPROX 3.1 MILES UPSTREAM	NUTRIENTS, SEDIMENT, E. COLI	ALS, CR	AGRICULTURAL RUNOFF	H
	03	JEWETT BROOK (3.5 MILES)	NUTRIENTS, SEDIMENT, E. COLI	ALS, CR	AGRICULTURAL RUNOFF	H
	04	MILL RIVER, FROM ST. ALBANS BAY TO 1.8 MILES UPSTREAM	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF; STREAMBANK EROSION	H

Certain local, state and federal regulatory programs refer to impaired segments (or waters draining to those segment(s) listed on the 303d List of Impaired Waters as part of program operations. Contact the respective regulatory program for details regarding regulated activities in these waters and their watersheds.

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT05-07	05	STEVENS BROOK, MOUTH UPSTREAM 6.8 MILES	NUTRIENTS, SEDIMENT, E. COLI	ALS, CR	AGRICULTURAL RUNOFF; MORPHOLOGICAL INSTABILITY	H
	06	STEVENS BROOK, APPROX. 1 MILE BELOW CTRL VT RAIL YARD UPSTREAM TO YARD	SEDIMENT, OIL, GREASE, HYDROCARBONS	AES, ALS, CR	SEDIMENT, SOIL & WATER CONTAMINATION FROM FUEL SPILLS & MANAGEMENT	L
VT05-07L01	01, 02	ST. ALBANS BAY - LAKE CHAMPLAIN (St. Albans)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-09L01	01, 02, 03	MALLETTS BAY - LAKE CHAMPLAIN (Colchester)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-10L01	01, 02, 03	BURLINGTON BAY - LAKE CHAMPLAIN (Burlington)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-10L02	01, 02	MAIN SECTION - LAKE CHAMPLAIN (South Hero)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT05-11L01	01, 02, 03	SHELBURNE BAY - LAKE CHAMPLAIN (Shelburne)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT06-04	01	BERRY BK, MOUTH UP TO AND INCLUDING NO TRIB (APPROX. 1 MI)	SEDIMENT, NUTRIENTS	ALS	AGRICULTURAL RUNOFF, AQUATIC HABITAT IMPACTS	H
	02	GODIN BROOK	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF, AQUATIC HABITAT IMPACTS	H
	03	SAMSONVILLE BROOK	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF, AQUATIC HABITAT IMPACTS	H
	04	TROUT BROOK, UPSTREAM FROM MOUTH FOR 2.3 MILES	NUTRIENTS	ALS	AGRICULTURAL RUNOFF	H
VT06-05	01	CHESTER BROOK	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF	H

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Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT06-05	02	WANZER BROOK (MOUTH TO RM 4.0)	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF	H
VT06-08	03	MUD CREEK, FROM VT/QUE BORDER UP TO RM 6.5	NUTRIENTS, SEDIMENT	ALS	AGRICULTURAL RUNOFF; NUTRIENT ENRICHMENT	H
	04	COBURN BROOK (MOUTH TO RM 0.2)	NUTRIENTS	ALS	AGRICULTURAL ACTIVITY AND RUNOFF	H
	05	BURGESS BROOK, RM 4.9 TO 5.4	SEDIMENT	ALS	ASBESTOS MINE TAILINGS EROSION; ASBESTOS FIBERS	L
	06	BURGESS BROOK TRIBUTARY# 11, MOUTH TO RM 0.5	SEDIMENT	ALS	ASBESTOS MINE TAILINGS EROSION; ASBESTOS FIBERS	L
VT07-03	01	DEER BROOK, MOUTH TO 2.5 MILES UPSTREAM	SEDIMENT	ALS	EROSION FROM STORMWATER DISCHARGES; CORRODING ROAD CULVERTS; BMPs IMPLEMENTED	M
VT07-08	01	RODMAN BROOK, MOUTH TO RM 0.6	IRON	ALS	IMPACTS FROM LANDFILL LEACHATE	M
VT07-13	01	TRIB TO BREWSTER RIVER (1 MILE)	METALS (IRON)	AES, ALS	IRON SEEPS ON STREAMBANK; BMPs IN PLACE	L
VT07-15	01	HUTCHINS BROOK, RM 2.0 TO 3.0	SEDIMENT	ALS	ASBESTOS MINE TAILINGS EROSION; ASBESTOS FIBERS	L
	02	HUTCHINS BROOK TRIBUTARY #4, MOUTH TO RM 0.3	SEDIMENT	ALS	ASBESTOS MINE TAILINGS EROSION; ASBESTOS FIBERS	L
VT08-02	02	MUDDY BROOK, MOUTH TO 7 MILES UPSTREAM	NUTRIENTS, TEMPERATURE	ALS	LACK OF BUFFER, LAND DEVELOPMENT; EROSION	M
	03	TRIBUTARY TO TRIB #4, MUDDY BROOK, 0.5MI	TOXICS (TCE, VINYL CHLORIDE)	ALS	SURFACE WATER IMPACT FROM PAST DISPOSAL ACTIVITIES	L
VT08-02L01		SHELBURNE POND (Shelburne)	PHOSPHORUS	ALS	EXCESSIVE ALGAE AND NATIVE PLANT GROWTH CAUSES PERIODIC LOW D.O./FISH KILLS	L

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Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT08-05	01	WINOOSKI RIVER ABOVE MONTPELIER WWTF DISCHARGE	E. COLI	CR	MONTPELIER WWTF COLLECTION SYSTEM PASSES COMBINED SEWER OVERFLOWS	L
VT08-11L02	02	WATERBURY RESERVOIR (Waterbury)	SEDIMENT	ALS, AES	SEDIMENTATION, TURBIDITY	L
VT08-12	01	INN BROOK, RM 0.3 TO 0.6	IRON	ALS	IRON SEEPS ORIGINATING FROM DISTURBED SOILS	L
VT08-13	01	LOWER NORTH BRANCH, WINOOSKI RIVER (APPROX 1 MILE)	E. COLI	CR	MONTPELIER WWTF COLLECTION SYSTEM PASSES COMBINED SEWER OVERFLOWS	L
VT08-16	01	GUNNER BROOK, BELOW FARWELL ST. DUMP (APPROX 0.5 MILE)	METALS (Cu, Fe), NUTRIENTS, SEDIMENT	AES, ALS	FARWELL ST. LANDFILL LEACHATE, SURFACE RUNOFF FROM DEVELOPED AREA	M
VT08-20	01	CLAY BROOK, RM 1.8 TO RM 2.3	STORMWATER, IRON	ALS	STORMWATER RUNOFF, EROSION FROM CONSTRUCTION ACTIVITIES & GRAVEL PARKING LOT; INCREASED PEAK STORMWATER FLOWS	L
VT09-06	01	SMITH BROOK (MOUTH TO RM 0.3)	IRON	ALS, AES	APPARENT LEACHATE FROM ADJACENT OLD DUMP	M
VT10-04	01	WETLAND DRAINING TO SMALL STREAM TO OTTAUQUECHEE RIVER (BRIDGEWATER)	METALS (Fe)	ALS	BRIDGEWATER LANDFILL, LEACHATE ENTERING SURFACE WATER VIA WETLAND	M
VT10-06	01	ROARING BROOK, RM 3.5 TO RM 4.2	STORMWATER	AES, ALS	STORMWATER RUNOFF, LAND DEVELOPMENT; EROSION	L
	02	E. BRANCH ROARING BROOK, RM 0.1 TO RM 0.6	STORMWATER, IRON	AES, ALS	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	L
VT10-11	01	BLACK RIVER; FROM MOUTH TO 2.5 MI UPSTRM (SPRINGFIELD)	E. COLI	CR	COMBINED SEWER OVERFLOWS	L
VT11-10	01	WEST RIVER, BELOW BALL MOUNTAIN DAM TO TOWNSHEND DAM (9 MILES)	TEMPERATURE	2CR	ELEVATED TEMPERATURES AFFECT FISHERY	L

Certain local, state and federal regulatory programs refer to impaired segments (or waters draining to those segments) listed on the 303d List of Impaired Waters as part of program operations. Contact the respective regulatory program for details regarding regulated activities in these waters and their watersheds.

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT11-15	03	BALL MOUNTAIN BROOK, ABOVE NORTH BRANCH CONFLUENCE	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
	04	BEAR CREEK BROOK, RM 0.7 TO HEADWATERS	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
	05	KIDDER BROOK, CONFLUENCE OF SUN BOWL BROOK TO HEADWATERS	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
VT11-16	01	MILL BROOK TRIBUTARY #6, RM 1.9 TO 2.6	STORMWATER	ALS	SEDIMENT IMPACTS ON HABITAT/INVERTS; STREAM HYDROLOGIC IMPACTS FROM IMPERVIOUS SURFACES	L
VT11-18L03		LILY POND (Londonderry)	ACID	ALS	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	H
VT12-03	01	EAST BRANCH DEERFIELD RIVER, BELOW SOMERSET DAM	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
VT12-04	01	UPPER DEERFIELD RIVER, BELOW SEARSBURG DAM	ACID	ALS	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	M
VT12-05	01	NO. BRANCH DEERFIELD RIVER, TANNERY BRK RD TO 0.2 MI ABOVE SNOW LAKE	STORMWATER	AES, ALS	STORMWATER RUNOFF, LAND DEVELOPMENT & CONSTRUCTION RELATED EROSION	L
	03	IRON STREAM, TRIB TO TANNERY BROOK (0.3 MILE)	IRON	ALS	LAND DEVELOPMENT, SOURCE(S) NEED FURTHER ASSESSMENT	M
VT13-10	01	COMMISSARY BROOK TRIB, MOUTH TO RM 0.2	SEDIMENT	AES, ALS	BANK FAILURE AND EROSION DUE TO PAST CLAY MINING	L
VT13-13	01	CROSBY BROOK, MOUTH TO RM 0.7	SEDIMENT	ALS	HABITAT ALTERATIONS DUE TO SEDIMENTATION, CHANNELIZATION AND BUFFER LOSS	M
VT13-16	01	NEWTON BROOK, MOUTH TO RM 2.0	SEDIMENT	ALS	AGRICULTURAL ACTIVITY	H

Certain local, state and federal regulatory programs refer to impaired segments (or waters draining to those segments) listed on the 303d List of Impaired Waters as part of program operations. Contact the respective regulatory program for details regarding regulated activities in these waters and their watersheds.

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Priority
VT13-16L01		LILY POND (Vernon)	ACID	ALS	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	H
VT14-02	01	WEST BRANCH OF OMPOMPANOOSUC RIVER (3.8 MILES)	METALS, ACID	AES, ALS	HIGH METALS IN DRAINAGE FROM ABANDONED ELIZABETH MINE & FROM TAILINGS	M
	02	COPPERAS BROOK (1 MILE)	METALS, ACID	AES, ALS	HIGH METALS IN DRAINAGE FROM ABANDONED ELIZABETH MINE & FROM TAILINGS PILES	M
	03	LORDS BROOK (RM 0.5 TO RM 3.3)	METALS, ACID	ALS	ABANDONED MINE DRAINAGE, BELOW "SOUTH CUT"	M
VT14-03	03	SCHOOLHOUSE BROOK AND TRIBUTARY	METALS, ACID	AES, ALS	HIGH METALS IN DRAINAGE FROM ABANDONED ELY MINE	M
VT14-05	01	PIKE HILL BROOK, FROM MOUTH TO 4 MILES UPSTREAM	METALS	AES, ALS	HIGH METALS IN DRAINAGE FROM ABANDONED PIKE HILL MINE & TAILINGS	M
	02	TABOR BRANCH TRIBUTARY #6, MOUTH TO RM 0.1	UNDEFINED	ALS	AGRICULTURAL RUNOFF	H
VT14-06	01	COOKVILLE TRIB #4, RM 1.0 TO 1.7	METALS	ALS	ACID MINE DRAINAGE ASSOCIATED WITH PIKE HILL MINE	L
VT15-01	01	PASSUMPSIC RIVER FROM PIERCE MILLS DAM TO 5 MILES BELOW PASSUMPSIC DAM	E. COLI	CR	ST. JOHNSBURY WWTF COLLECTION SYSTEM PASSES COMBINED SEWER OVERFLOWS	L
VT15-04	01	LOWER SLEEPERS RIVER IN ST. JOHNSBURY	E. COLI	CR	ST. JOHNSBURY WWTF COLLECTION SYSTEM PASSES COMBINED SEWER OVERFLOWS	L
VT17-01L01	01, 02	LAKE MEMPHREMAGOG (Newport)	PHOSPHORUS	AES, CR	EXCESSIVE ALGAE GROWTH, NUTRIENT ENRICHMENT	H
VT17-02	01	STEARNS BROOK TRIBUTARY (HOLLAND)	NUTRIENTS	ALS	AGRICULTURAL RUNOFF	H

Certain local, state and federal regulatory programs refer to impaired segments (or waters draining to those segments) listed on the 303d List of Impaired Waters as part of program operations. Contact the respective regulatory program for details regarding regulated activities in these waters and their watersheds.

PART B - IMPAIRED SURFACE WATERS NOT NEEDING A TOTAL MAXIMUM DAILY LOAD DETERMINATION

EXPLANATION OF COLUMN HEADINGS

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, which are located in Vermont river basin #01. River basin #01 includes the Batten Kill, Hoosic and Walloomsac rivers; there are 17 river basins for planning purposes identified in Vermont. A statewide map has been included on the preceding page that names these 17 river basins and identifies their approximate boundaries.

A statewide map illustrating designated river and stream waterbodies and designated waterbodies of Lake Champlain, Lake Memphremagog and South Bay can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

ADB Code(s) – Assessment Database segment code used for EPA tracking purposes. If blank, Waterbody ID represents entire ADB code.

Segment Name/Description - The name of the river/stream segment or lake/pond.

Pollutant(s) - The measured pollutant or pollutants that cause a violation of the Vermont Water Quality Standards (VWQS).

Use(s) Impaired - An indication of which designated or existing uses (as defined in the VWQS) are impaired. The following conventions are used to represent a specific use:

AES - aesthetics
ALS or AH - aquatic life (biota and/or habitat) support
AWS - agricultural water supply
2CR - secondary contact recreation (fishing, boating)
FC - fish consumption
DWS - drinking water supply
CR - contact recreation (i.e. swimming)

Surface Water Quality Problem(s) - A brief description of the problem found in the particular segment.

Rationale - A summary narrative explaining why a TMDL determination is not needed to correct the specific impairment

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT05-10L01	04	BURLINGTON BAY - LAKE CHAMPLAIN - PINE STREET BARGE CANAL (Burlington)	PRIORITY & NONPRIORITY ORGANICS, METALS, OIL, GREASE, PCBs	ALS, CR, 2CR	CONTAM'N FROM COAL TAR IN SEDIMENTS OF PINE ST BARGE CANAL (SITE #770042)

No TMDL is necessary for this impairment as authority and legal means are available and in place to address the source of impairment. The authority and legal means that are available to DEC and the US EPA are considered sufficient to attain Water Quality Standards in the future. DEC authority is under 10 VSA 6603 and 6610a. US EPA authority is CERCLA (42 USC section 9601 - 9675).

The Pine Street Barge Canal Coordinating Council (PSBC Council) is overseeing implementation of the May 1998 Cleanup Plan. Cleanup Plan was reviewed and approved by EPA. Personnel from DEC's Hazardous Materials Division participate with and serve on the Council.

This is an EPA Superfund site designated under CERCLA. There are legal requirements in place that apply to the source of the pollutants contributing to the impairment. The performance standards identified in the Statement of Work are sufficient to remediate the problem and are consistent with VT Water Quality Standards when implementation of the remediation/clean-up plan is complete.

An extensive water quality monitoring plan is in-place to track effectiveness of pollution controls implemented and compliance with VT Water Quality Standards.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT06-08	01	JAY BRANCH, RM 8.3 UPSTREAM 1.9 MILES	SEDIMENT	ALS	EROSION FROM LAND DEVELOPMENT ACTIVITIES

No TMDL is necessary as DEC has the authority and legal means available to eliminate the sources causing this impairment. The authority and legal means that are available to DEC are sufficient to attain WQS and enable DEC to utilize enforcement authority as it exists under 10 VSA 1272.

The impairment of this stream reach is the result of failure to comply with applicable Vermont construction and erosion control permits and operational stormwater permits. 1272 orders have been issued and an enforcement case has been initiated by ANR. Ultimately, the remediation measures associated with the enforcement action and future permit compliance enforcement is expected to allow the stream reach to return to compliance with the WQS.

Jay Peak Resort (JPR) submitted a Water Quality Remediation Plan (WQRP) to the Water Quality Division (WQD) in 2006 that was updated in 2009. The WQRP was required per the requirements of a Section 1272 Order issued by DEC concerning the sediment impairment of the Jay Branch and to Jay Branch-Tributary #9. The WQD continues to work with JPR to refine the remediation actions and monitoring requirements of the WQRP. Upon completion of the remediation projects, additional requirements may be required and will be dependent upon biomonitoring results and the progress towards meeting VT Water Quality Standards for the impaired reaches in a reasonable timeframe.

Remediation projects have included stormwater treatment and revegetation of disturbed soils. A corridor management plan has been instituted including stream setbacks, crossing and vegetation management. Ongoing and future projects include channel restoration, road maintenance and culvert replacement.

The impaired reach of Jay Branch has in the past extended from RM 9.1 to RM 8.3. In 2010, the biomonitoring data show four of five reaches are meeting biocriteria expectations for a Class B stream. The uppermost location at RM 10.1 ("local reference") has consistently been in excellent to very good (vg) condition, documenting a very high quality stream. The next reach down, RM 9.1, showed considerable improvement from fair in 2009 to vg-good in 2010 meeting Class B expectations. The next reach RM 8.6 decreased in biological condition in 2010 from good to fair and failed to meet Class B expectation due to very low abundance and richness. The percent of the community represented by sediment tolerant Oligochaeta was highest at this location in 2010. The next reach, RM 8.3, has been vg-good in both 2009 and 2010 and seems to be maintaining its improved biological integrity. Based on these assessments of both Jay Branch and Tributary 9, biomonitoring of these stream reaches will need to continue through at least 2013, in order to show positive recovery on all reaches of Jay Branch and Tributary 9 to allow for an impaired waters delisting to occur.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT06-08	02	JAY BRANCH-TRIBUTARY #9	SEDIMENT	ALS	EROSION FROM LAND DEVELOPMENT ACTIVITIES

No TMDL is necessary as DEC has the authority and legal means available to eliminate the sources causing this impairment. The authority and legal means that are available to DEC are sufficient to attain WQS and enable DEC to utilize enforcement authority as it exists under 10 VSA 1272.

The impairment of this stream reach is the result of failure to comply with applicable Vermont construction and erosion control permits and operational stormwater permits. 1272 orders have been issued and an enforcement case has been initiated by ANR. Ultimately, the remediation measures associated with the enforcement action and future permit compliance enforcement is expected to allow the stream reach to return to compliance with the WQS.

Jay Peak Resort (JPR) submitted a Water Quality Remediation Plan (WQRP) to the Water Quality Division (WQD) in 2006 that was updated in 2009. The WQRP was required per the requirements of a Section 1272 Order issued by DEC concerning the sediment impairment of the Jay Branch and to Jay Branch-Tributary #9. The WQD continues to work with JPR to refine the remediation actions and monitoring requirements of the WQRP. Upon completion of the remediation projects, additional requirements may be required and will be dependent upon biomonitoring results and the progress towards meeting VT Water Quality Standards for the impaired reaches in a reasonable timeframe.

Remediation projects have included stormwater treatment and revegetation of disturbed soils. A corridor management plan has been instituted including stream setbacks, crossing and vegetation management. Ongoing and future projects include channel restoration, road maintenance and culvert replacement.

Based on the latest (2010) annual report, Tributary 9 decreased in biological condition for the second year in a row. It had shown a positive response to mitigation efforts in 2007 and 2008, however it has declined for the last two years, and is now in a fair-poor condition similar to that of 2004-2006. A considerable amount of in-stream restoration work was mandated in tributary 9 in 2010, which may be responsible for the decline in condition. Based on these assessments of both Jay Branch and Tributary 9, biomonitoring of these stream reaches will need to continue through at least 2013, in order to show positive recovery on all reaches of Jay Branch and Tributary 9 to allow for an impaired waters delisting to occur.

VT07-01	01	LOWER LAMOILLE RIVER FROM CLARKS FALLS DAM TO ROUTE 2 BRIDGE (6 MILES)	LOW D.O.	ALS	3 DAMS (CLARKS, MILTON, PETERSON) CREATE D.O. PROBLEMS DOWNSTREAM

No TMDL is necessary for this impaired segment as DEC has the authority and legal means available to address the dissolved oxygen (D.O.) problem found below the Clarks Falls hydroelectric facility. The authority and legal means that are available to DEC are sufficient to attain Water Quality Standards in the near future.

A new federal license for the Lamoille River Hydroelectric Project was issued in June 2005. Articles 407 and 408 address post-licensing water quality monitoring and D.O. enhancement, respectively. The new license provides for conservation flows that may improve the D.O. regime sufficiently to obviate the need for specific mechanical enhancements, such as turbine aspiration. FERC approved the licensee's water quality monitoring and dissolved oxygen enhancement plan on December 5, 2006, although the licensee elected to initiate sampling in Summer 2006. Because of higher than normal flows in 2006, sampling continued in 2007. Conditions were again somewhat atypical in 2007 because the Milton Station was off line, resulting in highly reoxygenated flows entering Peterson impoundment. Consequently, the Department has asked CVPS to continue sampling in summer 2008 before it determines whether there is sufficient data to conclude that the post-licensing operational changes have achieved compliance with the Water Quality Standards. If the data indicates that standards are not being met, the licensee must propose and implement enhancement measures.

Currently, sufficient data has not been collected to make a final WQS determination; however, the operational changes have occurred to address the potential low dissolved oxygen condition downstream.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT08-02	07	UNNAMED TRIB TO WINOOSKI RIVER	METALS (Fe, As)	ALS	SO. BURLINGTON LANDFILL LEACHATE ENTERING SURFACE WATER

No TMDL is necessary for this impairment as DEC has the authority and legal means available to address the source causing this particular impairment. The authority and legal means that are available to DEC are sufficient to attain Water Quality Standards.

This is a small stream that is pumped around the South Burlington Landfill. Leachate-contaminated seeps at the base of the landfill have in the past drained into a wetland area connected to the stream. Currently, curtain drains are in place and leachate is pumped, collected and transported to a permitted wastewater treatment facility. The landfill facility was ordered by DEC to be closed with capping. Capping occurred in 1992. The facility has a post-closure court order requiring water quality monitoring and maintenance of the site. Water quality sampling is conducted semi annually to determine effectiveness of treatment. Water quality improvement is expected over time as water quality treatment and site management continues. During the latest sampling period, October 2011, surface water quality sampling locations indicate that iron and arsenic concentrations remain above the VTWQS for the protection of aquatic biota.

VT08-08	01	MUDDY BROOK (0.1 MILE)	METALS (Fe)	AES	CV LANDFILL: LEACHATE ENTERING SURFACE WATER

No TMDL is necessary for this impairment as DEC has the authority and legal means available to address the source causing this particular impairment. The authority and legal means available to DEC are sufficient to attain Water Quality Standards and have been implemented.

This is a small stream that flows around the Central Vermont Landfill. Until summer 2001, leachate had entered the stream from seeps located along the side slopes of the landfill. The Landfill was ordered by DEC to be closed and capped in 1993. Due to the slumping of the capping soils in 2001, the original clay cap was removed, the landfill was re-graded and a synthetic cap was installed along with a new toe drain and gas collection system. The landfill facility has a post-closure court order requiring water quality monitoring and maintenance of the site. Currently the amount of water collected in the drains is significantly less than previously reported. Through May 2011, monitoring data shows sporadic but inconsistent compliance with the VTWQS, however, monitoring is scheduled to continue.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT08-12	03	BIG SPRUCE BROOK, RM 0.3 TO 0.6	SEDIMENT, IRON	ALS	SEDIMENT IMPACTS, IRON SEEPS

No TMDL is necessary for this impairment as DEC has the authority and legal means available to address the source causing this particular impairment. The authority and legal means that are available to DEC are sufficient to attain Water Quality Standards.

Big Spruce Brook, located in the town of Stowe Vermont, is a small, cold water, Class B stream and is a tributary to the West Branch of the Little River. The lower watershed and stream reaches of Big Spruce Brook are located on property owned by the Stowe Mountain Resort (SMR).

The Agency placed Big Spruce Brook on Part C of the 2008 Vermont List of Priority Waters, thereby identifying it as in need of further assessment to determine compliance with the Vermont Water Quality Standards. Based on SMR biomonitoring data since the 2008 listing cycle, the Agency has determined that Big Spruce Brook upstream of site 0.3 is not in compliance with the Vermont Water Quality Standards for aquatic life support due to sediment and iron stresses.

Initially, Big Spruce Brook was slated for 303(d) listing in 2010 due to iron and sediment discharges resulting in the continued non-compliance at RM 0.3. During the draft list comment period, Stowe Mountain Resort (SMR) representatives and their environmental consultants presented to VTDEC staff site specific information regarding the sources of the impairment. The information presented was compelling that the primary sources of the impairment had been identified. VTDEC staff concurred that the sources presented were consistent with on-site observations. Namely, a localized groundwater seep associated with the practice green was contributing significant iron discharges to the stream and were having a dramatic impact on the macroinvertebrate community. Additionally, intermittent sediment discharges associated with an upstream stormwater sedimentation basin were occurring and placing additional stress on the macroinvertebrate community. It was determined that remediation of these two sources would allow the stream to come back into compliance with the Vermont Water Quality Standards within a reasonable period of time.

On May 6, 2010, DEC issued an order pursuant to 10 V.S.A. §1272 ordering SMR to, no later than 45 days following the Order, develop remediation strategies for the two identified pollutant sources and submit them to the Department for approval. These plans must identify the remediation methods that will be employed, a description of preventative measures to be taken to avoid additional discharges and a monitoring plan design suitable to assess progress towards mitigation. Upon approval of the plans, SMR will have 90 days to implement remediation measures.

As of November 2010, SMR had completed all remediation measures pursuant to the 1272 Order to the satisfaction of VTDEC staff. Specifically, the iron seep remediation project was installed and stabilized and stormwater management improvements were completed to reduce sediment impacts. Visual assessment has occurred at both sites and all appears to be functioning as planned. Water chemistry and bioassessment work for the 2011 monitoring season has not been reported as of this writing.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT08-12	04	WEST BRANCH LITTLE RIVER, RM 7.5 TO 8.0	UNDEFINED	ALS	IMPACTS TO MACROINVERT. COMMUNITY; POTENTIAL SOURCES INCLUDE HYDROLOGIC MODIFICATION, SEDIMENT, LOW pH

No TMDL is necessary for this impairment as VTDEC has the authority and legal means available to address the source causing this particular impairment. The authority and legal means that are available to DEC are sufficient to attain Water Quality Standards.

The mid-upper reaches of the West Branch Little River, located in the town of Stowe, Vermont, is a small, cold water, Class B stream and drains the eastern reaches of Mt Mansfield. Much of the mid-upper reaches of the stream receive, either directly or through tributaries, runoff from the developed areas of the Stowe Mountain Resort (SMR).

The Agency placed the reach between rivermile (RM) 7.5 and 8.0 of West Branch Little River on Part C of the 2002 Vermont List of Priority Waters, thereby identifying it as in need of further assessment to determine compliance with the VTWQS. The site has been re-evaluated with each subsequent biennial listing cycle, with consistently marginal attainment. However, based on biomonitoring data collected since 2008, the Agency has determined that the West Branch Little River from RM7.5 to RM8.0 is no longer in compliance with the VTWQS for aquatic life support due to undefined stresses.

Through comments submitted during the draft 303(d) List comment period, SMR proposed it take a series of steps to: 1) investigate potential sources contributing to the impairment, 2) develop and prioritize actions to remediate the problematic areas, and 3) implement the necessary actions to remediate the water quality impairment. Development of this water quality remediation plan would be conducted in conjunction with Agency review, approval and oversight.

On May 3, 2012, DEC issued an order pursuant to 10 V.S.A. §1272 ordering SMR to: 1) by May 30, 2012, conduct a field investigation, develop or improve existing hydrologic models and submit recommendations to eliminate the identified impairment, and 2) by September 30, 2012, complete approved remediation measures and submit proposed monitoring plan for approval.

VT08-16	02	TRIB (#23) TO STEVENS BR, BELOW WILLIAMSTOWN WWTF OUTFALL (0.5 MI)	NUTRIENTS	ALS	TREATED EFFLUENT DISCHARGE TO SMALL RECVING WATER

No TMDL is necessary as DEC has the authority and legal means available to address the municipal source causing this impairment. The authority and legal means that are available to DEC are sufficient to attain WQS. DEC has NPDES discharge permitting authority under the delegation agreement with EPA. Delegation of NPDES permitting authority means that DEC has adequate authority and legal mechanisms to execute enforcement. Authority to order correction resides within 10 VSA 1272.

Recent biological monitoring downstream of the discharge in 2002 and 2005 indicates considerably improved invertebrate and fish communities, at times exceeding minimum criteria. Sampling in 2010 showed a slight decline in macroinvertebrate community composition as compared to immediately upstream. However, as a result of a VTDEC wastewater facility inspection in 2009, a project to remove sludge in the lagoon and completely replace the aerations systems was scheduled. The project work was completed after the 2010 biomonitoring. Future biomonitoring will indicate the effectiveness of the lagoon upgrade work.

Part B. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to USEPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID	ADB Code(s)	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)
VT11-15	03	NO. BRANCH, BALL MTN BROOK, STRATTON LAKE TO KIDDER BROOK	MANGANESE	AES	CONTRIBUTIONS/RELEASES OF REDUCED Mn FROM RESERVOIR SEDIMENT COATING STREAM SUBSTRATE ("BLACK ROCKS")

Conditions created by the installed diversion around the pond have resulted in an elimination of the problematic Mn discharge. Staining of the substrate is no longer occurring. Historical staining from previous Mn discharge remains. Ongoing sampling results will be monitored to ensure Mn levels remain below levels necessary to prevent further impairment.

Part C - Waters in Need of Further Assessment

EXPLANATION OF COLUMN HEADINGS

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, which is located in Vermont river basin #01. River basin #01 includes the Batten Kill, Hoosic and Walloomsac rivers; there are 17 river basins for planning purposes identified in Vermont. A statewide map has been included that names these 17 river basins and identifies their approximate boundaries.

A statewide map further illustrating designated river and stream waterbodies and waterbody designations for Lake Champlain, Lake Memphremagog and South Bay can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

Segment Name/Description - The name of the river/stream segment or lake/pond.

Possible Pollutant(s) - The potential pollutant or pollutants that MAY cause a violation of the Vermont Water Quality Standards (VWQS).

Possible Use(s) Impaired - An indication of which designated or existing uses (as defined in the VWQS) are possibly impaired. The following conventions are used to represent a specific use:

AES - aesthetics
ALS or AH - aquatic life (biota and/or habitat) support
AWS - agricultural water supply
2CR - secondary contact recreation (fishing, boating)
FC - fish consumption
DWS - drinking water supply
CR - contact recreation (i.e. swimming)

Possible Surface Water Quality Problem Needing Assessment - A brief description of the alleged problem found in the particular segment.

Part C. Waters appearing below are in need of further assessment. If future assessment results indicate impairment, the waterbody will be included in the next 303(d) list (Part A).

Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT01-02	TUBBS BROOK	SEDIMENT	ALS	FAIR BIO DATA 2008; LIKELY DUE TO SEDIMENT STRESS
VT01-03	JEWITT BROOK	TEMPERATURE	ALS	FAIR BIO DATA 2008
VT01-05	MUNSON BROOK	SEDIMENT	ALS	HIGH EMBEDDEDNESS
VT02-04	POULTNEY RIVER, FROM BUXTON HOLLOW TO D&H RAIL TRAIL	E. COLI	CR	SOURCE(S) NEED FURTHER ASSESSMENT
VT02-05	INDIAN RIVER BELOW WEST PAWLET WWTF	LOW D.O.	ALS	D.O. LEVELS OF DISCHARGE & DOWNSTREAM
VT03-05	OTTER CREEK, FURNACE BROOK CONFL UPSTREAM TO MILL RIVER CONFLUENCE	SEDIMENT, ORG ENRICHMENT, TOXICS, METALS	AES, ALS, CR, DWS	NEEDS FURTHER ASSESSMENT & MONITORING ESP. SOURCE(S)
VT03-07	MUD CREEK, MOUTH UPSTREAM 4 MILES	E. COLI	CR	AGRICULTURAL RUNOFF
VT03-10	LEMON FAIR RIVER, MOUTH TO RM 18	E. COLI	CR	ELEVATED E. COLI; SOURCES UNKNOWN; POTENTIAL LARGE WILDLIFE CONTRIBUTION
	LEMON FAIR RIVER, RICHVILLE POND TO JOHNSON POND	E. COLI	CR	ELEVATED E. COLI; SOURCES UNKNOWN; POTENTIAL LARGE WILDLIFE CONTRIBUTION
VT03-14	TRIBUTARY TO EAST CREEK	IRON	ALS	HEAVY IRON PRECIPITATE, SOURCES UNKNOWN
VT03-15	CLARENDON RIVER	SEDIMENT, NUTRIENTS, E. COLI, STORMWATER	AES, ALS, CR	AGRICULTURAL RUNOFF, INDUSTRIAL AND URBAN RUNOFF
VT04-03	EAST CREEK-NORTH FORK	NUTRIENTS	ALS	AGRICULTURE OR NATURAL; INVERTS "FAIR" FISH "POOR" 2004
VT05-01	YOUNGMAN BROOK (1.8 MI ABOVE MOUTH TO HEADWATERS)	UNDEFINED-TYPICAL (SEDIMENT, NUTRIENTS)	ALS	AGRICULTURAL RUNOFF
VT05-07	MILL RIVER, 3.5 MILES IN UPPER REACHES	SEDIMENT, NUTRIENT & ORG ENRICHMENT, E. COLI	AES, ALS, CR	AGRICULTURAL & URBAN RUNOFF, STREAMBANK EROSION
VT05-07L02	ST. ALBANS RESERVOIR, NORTH (Fairfax)	UNKNOWN	ALS	MACROINVERTEBRATE ASSESSMENT INDICATES POTENTIAL BIOLOGICAL ALTERATION. COPPER IN SEDIMENTS ABOVE NOAA THRESHOLD EFFECTS VALUE.
VT05-09	INDIAN BROOK FROM LAKE UPSTREAM 10 MILES TO BUTLERS CORNERS (RT 15)	E. COLI	CR	POSSIBLE FAILED SEPTIC SYSTEMS
	INDIAN BROOK, RM 3.1 TO RM 5.8	SEDIMENT, TOXICS, METALS	ALS	POTENTIAL IMPACTS FROM LANDFILL LEACHATE, DEVELOPED AREAS

Part C. Waters appearing below are in need of further assessment. If future assessment results indicate impairment, the waterbody will be included in the next 303(d) list (Part A).

Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT05-09	MALLETTS CREEK, MOUTH UPSTREAM 3.5 MILES	SEDIMENT, NUTRIENT & ORG ENRICHMENT, METALS, E. COLI	AES, ALS, CR	LAND DEVELOPMENT, EROSION/SEDIMENTATION, URBAN RUNOFF
VT06-05	BLACK CREEK, MOUTH TO EAST FAIRFIELD (12 MILES)	SEDIMENT, NUTRIENTS, E. COLI	AES, AH, CR	AGRICULTURAL RUNOFF
VT06-06	TYLER BRANCH	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS, CR	AGRICULTURAL RUNOFF; MORPHOLOGICAL INSTABILITY (WEST ENOSBURG TO COLD HOLLOW BROOK)
VT06-08	JAY BRANCH, RM 8.3 TO RM 5.6	SEDIMENT, STORMWATER	ALS, AES	POTENTIAL IMPACTS FROM CONSTRUCTION EROSION, WATERSHED HYDROLOGY
VT07-02	LOWER MIDDLE LAMOILLE FROM FAIRFAX FALLS DAM TO ARROWHEAD MT LAKE	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE
VT07-12	SEYMOUR RIVER (LOWEST 3.5 MILES)	SEDIMENT, NUTRIENTS	AH, AES	BANK EROSION, AGRICULTURAL ENCROACHMENTS, CHANNEL INSTABILITY
VT07-13	BREWSTER RIVER FROM SKI AREA TO MOUTH	SEDIMENT	ALS, AES	CONSTRUCTION EROSION; INCREASED PEAK STORMWATER DISCHARGE; ROAD & PARKING LOT RUNOFF
VT07-14	NORTH BRANCH IN WATERVILLE VILLAGE	TOXICS	ALS, DWS, AES	SEEP WITH MTBE, XYLENE, TMB ABOVE VGES. SEEP AT WATERFALL ON NORTH BRANCH
	NORTH BRANCH LAMOILLE (RT 109 TO MOUTH)	SEDIMENT	AH	BANK EROSON, CHANNEL INSTABILITY
VT07-15	DARK BRANCH, RM 3.3	ASBESTOS, SEDIMENT	ALS	GOOD-FAIR BIO DATA 2007; POSSIBLE IMPACTS FROM ASBESTOS MINE
	GIHON RIVER (EDEN & JOHNSON)	ORGANICS	ALS, CR, DWS	LEAK FROM UNDERGROUND STORAGE TANK (EDEN), OIL SPILLS (JOHNSON) BOTH IN CLOSE PROXIMITY TO SURFACE WATER; NO SURFACE WQ DATA
VT07-16	MUD BROOK	IRON	ALS, AES	IRON PRECIPATE DEGRADING HABITAT-BUGS FAIR IN 2002
VT07-19	WILD BRANCH, MOUTH TO HEADWATERS	SEDIMENT	ALS, AES, 3CR	POST RE-LOCATION OF CHANNEL; FLOOD DAMAGE AND REPAIR; LOSS OF FLOODPLAIN, ENCROACHMENTS, BANK EROSION
VT07-22	STANNARD BROOK	SEDIMENT	ALS	FLOODS AND POST FLOOD WORK (1973, 95, 97); BANK EROSION-BUGS FAIR IN 2002
VT08-02	SUNNYSIDE BROOK (TRIB #8 TO SUNDERLAND BROOK)	UNDEFINED	ALS	POTENTIAL IMPACTS FROM LAND DEVELOPMENT AND RUNOFF
		ORG ENRICHMENT, TOXICS, SEDIMENT	ALS	POTENTIAL IMPACT SURFACE WATER BY PAST DUMPING (CHAMPLAIN CABLE & HAMPDEN); LAND DEVELOPMENT

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Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT08-06	GRAVES BROOK (MOUTH UPSTREAM TO RM 0.3)	SEDIMENT	ALS	RESIDENTIAL WATERSHED, SOME AGRICULTURE, RIPARIAN ENCROACHMENTS
	THATCHER BROOK (WATERBURY TO WATERBURY CTR)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY
VT08-07	BRYANT BROOK	SEDIMENT, NUTRIENTS	ALS, AES, AH	NEEDS SAMPLING AND STRESSOR ID
	WINOOSKI RIVER (10 MILES), BELOW MARSHFIELD #6 HYDROFACILITY	LOW D.O.	ALS	POSSIBLE DISSOLVED OXYGEN PROBLEMS FROM HYPOLIMNETIC WITHDRAWAL OF UNLICENSED HYDRO DAM
VT08-12	EAST BRANCH, LITTLE RIVER	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS, CR	LAND DEVELOPMENT, AGRICULTURAL RUNOFF; MORPHOLOGICAL INSTABILITY (MOSCOW/STOWE TO STERLING BROOK)
	LITTLE RIVER, WEST BRANCH (RM 7.0 TO RM 7.5)	SEDIMENT	ALS	IMPACTS MAY BE RELATED TO PAST CONSTRUCTION EROSION
	LONG TRAIL TRIBUTARY (LOWEST 0.1 MILES)	SEDIMENT, ACID	ALS	SEDIMENT SOURCE(S) NEED FURTHER ASSESSMENT; pH SHOCK IN SPRINGTIME
	WEST BRANCH LITTLE RIVER (RM 8.5 UP TO HEADWATERS)	SEDIMENT, ACID	ALS	SEDIMENT SOURCE(S) NEED FURTHER ASSESSMENT; pH SHOCK IN SPRINGTIME
VT08-13	HANCOCK BROOK	ACID	ALS	LOW pH SHOCK IN SPRINGTIME
	MINISTER BROOK	ACID	ALS	LOW SPRINGTIME pH, GRAVEL ROAD RUNOFF
VT08-15	JAIL BRANCH, BARRE CITY AND BELOW (1.5 MILES)	SEDIMENT, NUTRIENTS, E. COLI	ALS	LAND DEVELOPMENT; EROSION/SEDIMENTATION; URBAN RUNOFF
	JAIL BRANCH, WASHNGTON/ORANGE AREA	E. COLI	CR	ELEVATED BACTERIA LEVELS; SOURCE(S) UNKNOWN
VT08-16	STEVENS BRANCH, FROM BARRE CITY LIMITS TO MOUTH, 5.8 MILES	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS	URBAN RUNOFF INCLUDING SUSPECTED FLOOR DRAINS FROM COMMERCIAL BUILDINGS ON RIVER
VT08-17	DOG RIVER, 3 AREAS (ROXBURY, RIVERTON, NORTHFIELD FALLS)	E. COLI	CR	RESIDENTIAL STRAIGHT PIPES &/OR FAILED SEPTIC SYSTEMS
VT08-18	MAD RIVER (WARREN DAM UP TO RT 100)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY; CONTRIBUTIONS FROM NEARBY GRAVEL/SAND PIT
VT08-20	FREEMAN BROOK	E. COLI	CR	FAILED/FAILING SEPTIC SYSTEMS
	MILL BROOK	SEDIMENT, IRON	ALS, 2CR	LAND DEVELOPMENT, ROAD RUNOFF, CHANNEL ALTERATIONS

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Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT09-01	WHITE RIVER (MOUTH TO BETHEL)	E. COLI	CR	ELEVATED BACTERIA LEVELS EARLY 1990's AND 2001-2003. SOURCES UNKNOWN
	WHITE RIVER, WEST HARTFORD	METALS (Ni, Cr)	ALS	ELEVATED LEVELS OF Cr & Ni IN SEDIMENT
VT09-04	FIRST BRANCH WHITE RIVER	E. COLI	CR	ELEVATED LEVELS OF E.COLI BACTERIA. SOURCES UNKNOWN
	FIRST BRANCH, WHITE RIVER, CHELSEA TO MOUTH	SEDIMENT, TEMPERATURE	ALS, 2CR	SOIL & STREAMBANK EROSION, LOSS OF RIPARIAN VEGETATION
VT09-05	KINGSBURY BROOK	TEMPERATURE, NUTRIENTS	ALS	AG RUNOFF, LOSS OF RIPARIAN VEGETATION
	SECOND BRANCH WHITE RIVER, EASTBRKFLD TO 1 MI ABOVE WHITE (17 MI)	SEDIMENT, NUTRIENTS, E COLI	AES, ALS, CR	AGRICULTURAL RUNOFF, STREAMBANK EROSION
VT09-06	3RD BRANCH (WHITE RIVER), AYERS BRK TO BETHEL (11 MILES)	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS	STORMWATER & AGRICULTURAL RUNOFF, LIVESTOCK ACCESS, LOSS RIPARIAN VEGETATION, BANK EROSION
	AYERS BROOK	METALS (Ni, Cr)	ALS	ELEVATED LEVELS OF Cr & Ni IN SEDIMENT
	AYERS BROOK (MOUTH UP TO BROOKFIELD GULF)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY
	COLD BROOK	SEDIMENT, NUTRIENTS, E. COLI, ORG ENRICHMENT	AES, ALS, CR	AGRICULTURAL RUNOFF, STREAMBANK EROSION; BUGS FAIR-POOR 2001
	THIRD BRANCH WHITE RIVER	E. COLI	CR	ELEVATED BACTERIA LEVELS. SOURCES UNKNOWN
VT09-07	HANCOCK BRANCH	ACID, SEDIMENT	ALS	ACID PRECIPITATION, STREAMBANK EROSION
VT10-01	OTTAUQUECHEE RIVER, TAFTSVILLE DAM TO HARTLAND RESERVOIR	E. COLI, NUTRIENTS	CR, ALS	FAILED/FAILING SEPTIC SYSTEMS; FERTILIZED TURF
VT10-06	FALLS BROOK (3 MILES)	SEDIMENT	ALS	LAND DEVELOPMENT; EROSION; STREAMBANK DESTABILIZATION
	WEST BRANCH OF ROARING BROOK & UPPER ROARING BROOK (APPROX 3 MILES)	SEDIMENT	AES, ALS	LAND DEVELOPMENT;EROSION; ROAD RUNOFF
VT10-07	KEDRON BROOK - WOODSTOCK	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS, CR	HORSE RECREATION ACTIVITY; PASTURE; ROAD RUNOFF; LOSS OF RIPARIAN VEGETATION; GOLF COURSE
VT10-10	BARNARD BROOK	SEDIMENT, TEMPERATURE	ALS	SOURCE(S) NEED FURTHER ASSESSMENT
	GULF STREAM BROOK	SEDIMENT	2CR	GRAVEL ROAD MAINTENANCE

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Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT10-11	BLACK RIVER, 2.5 TO 7.5 MILES ABOVE MOUTH	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS, CR	CONTRIBUTIONS FROM URBAN RUNOFF, LAND DEVELOPMENT
VT10-16	NO. BRANCH BLACK RIVER ABOVE STOUGHTON POND	SEDIMENT, NUTRIENTS, E. COLI	AES, ALS, CR	SOURCE(S) NEED FURTHER ASSESSMENT; NOTABLE EROSION
VT11-01	LOWER WILLIAMS RIVER (MOUTH UPSTREAM TO MIDDLE BRANCH CONFLUENCE)	SEDIMENT, NUTRIENTS, TEMPERATURE	AES, ALS, CR	ENCORACHMENTS & RUNOFF FROM AGRICULTURE & DEVELOPMENT, POOR RIPARIAN CONDITION
VT11-05	LOWER SAXTONS RIVER	SEDIMENT, TEMPERATURE	AES, ALS	POOR RIPARIAN CONDITION, CHANNEL MODIFICATION, NEED FISH COMMUNITY DATA
VT11-14	WARDSBORO BROOK, FROM WEST WARDSBORO TO MOUTH (7 MILES)	SEDIMENT; TEMPERATURE	ALS	STREAMBANK EROSION; LAND DEVELOPMENT; ROAD RUNOFF; CHANNEL WIDENING; LOSS RIPARIAN VEGETATION
VT11-16	WINHALL RIVER (J.P. CO. BRIDGE TO MOUTH)	SEDIMENT, TEMPERATURE	AES, ALS	CHANNEL HABITAT CHANGE, ROAD RUNOFF, LOSS RIPARIAN VEGETATION; EROSION/SEDIMENTATION
VT11-18	FLOOD BROOK, TO 0.1 MI BELOW DAM	TEMPERATURE	ALS	FAIR BIO DATA. USFS TO MONITOR TEMP AND D.O.
VT12-05	ELLIS BROOK	UNDEFINED	ALS	MACROINVERTEBRATE RATING DROPPED FROM EXCELLENT TO GOOD; FISH RATING FAIR
VT13-05	CT RIVER, BELOW VERNON DAM	TRITIUM	DWS	TRITIUM LEAK TO GROUNDWATER FROM VERMONT YANKEE
VT13-06	NEALS BROOK	TOXICS	ALS	BELOW LANDFILL FAIR BIO RATING 2008
VT13-07	LULLS BROOK	SEDIMENT	AES, ALS	SEDIMENTATION FROM GRAVEL ROAD RUNOFF & OTHER SOURCES; NEEDS ADDITIONAL ASSESSMENT
VT13-08	MILL BROOK, FROM READING THRU BROWNSVILLE TO MILL POND (APPROX 8 MI)	E. COLI, TEMPERATURE, SEDIMENT	AES, ALS, CR	NEEDS FURTHER ASSESSMENT
VT14-03	OMPOMPANOOSUC RIVER BELOW SCHOOLHOUSE BROOK	METALS	ALS	POTENTIAL IMPACTS FROM ELY MINE
VT14-04	WAITS RIVER, BELOW SOUTH BRANCH CONFLUENCE	SEDIMENT, TEMPERATURE	ALS, 2CR	HABITAT ALTERATION, CHANNEL WIDENING, EROSION, LAND RUNOFF
VT14-07	WELLS RIVER	METALS (Fe)	AES	NEWBURY LANDFILL LEACHATE ENTERING SURFACE WATER VIA GROUNDWATER
VT14-09	STEVENS RIVER (US RT 5 UP TO I-91)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY

Part C. Waters appearing below are in need of further assessment. If future assessment results indicate impairment, the waterbody will be included in the next 303(d) list (Part A).

Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT15-01	PASSUMPSIC RIVER, EAST-WEST BR CONFL TO VAIL STATION (5.6 MILES)	SEDIMENT, E. COLI	AES, ALS, CR	URBAN RUNOFF
	PASSUMPSIC RIVER, GREAT FALLS DAM TO PIERCE MILLS DAM (1.5 MILES)	SEDIMENT, E. COLI	AES, ALS, CR	URBAN RUNOFF
VT15-03	SIMPSON BROOK	UNDEFINED	ALS	IMPACTS TO FISH COMMUNITY, UNDETERMINED SOURCES
VT15-04	SLEEPERS RIVER	METALS (Ni)	ALS	ELEVATED LEVELS OF Ni IN SEDIMENT
		OIL	AES, CR, 2CR	FAIRBANKS-MORSE FOUNDRY SITE: OIL SPILLS, OTHER POSSIBLE CONTAMINANTS
VT15-05	UNNAMED OUTLET STREAM OF LILY POND IN LYNDON	PRIORITY ORG (TCE), METALS (IN SEDIMENT)	DWS	PARKER LANDFILL RECEIVED HAZARDOUS WASTE; CONTAMINATED GROUNDWATER & POTENTIALLY CONTAM'D SURFACE WATER (THREAT)
VT15-08	DISH MILL BROOK, MOUTH TO RM 1.3	SEDIMENT, HYDROLOGIC ALTERATIONS	ALS	SCOUR EVENTS FROM INCREASED PEAK FLOWS; PERIODIC SEDIMENTATION ISSUES
	TRIB TO DISH MILL BROOK	SEDIMENT	ALS	HIGH EMBEDDEDNESS, EROSION FROM PARKING AREAS
VT15-09	CHESTERFIELD VALLEY/ MOOSE RIVER	E. COLI	CR	ELEVATED E. COLI; AG BMP INSTALLED IN 2008 WITH IMPROVEMENT NOTED
VT16-06	CT RIVER, McINDOES RESERVOIR	MERCURY	FC	ELEVATED LEVELS OF MERCURY IN ALL FISH
	CT RIVER, WELLS RIVER CONFLUENCE UPSTRM TO DODGE FALLS (APPROX 5 MI)	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE
VT16-07	CT RIVER, WELLS RIVER CONFLUENCE DOWNSTRM TO WILDER DAM (47.3 MILES)	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE
VT16-08	CLOUGH BROOK	ACID	ALS	MEDIUM TO LOW BUFFERING, LOW pH
	LEACH CREEK (VT 102 UP TO WALLACE POND)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY
VT16-09	WILLARD STREAM (MOUTH UP TO VT 102)	SEDIMENT	AES, ALS	MORPHOLOGICAL INSTABILITY
VT16-10	EAST BRANCH, NULHEGAN RIVER	SEDIMENT	AES, ALS	SEDIMENTATION, SILVICULTURAL EROSION
VT16-11	MURPHY BROOK	SEDIMENT	ALS	LOGGING ROADS
VT16-16	FIRST BROOK	SEDIMENT	ALS	LAND DEVELOPMENT, AGRICULTURAL RUNOFF
VT17-01L01	LAKE MEMPHREMAGOG (Newport)	MERCURY	FC	ELEVATED LEVELS OF MERCURY IN WALLEYE

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Waterbody ID	Segment Name/ Description	Possible Pollutant(s)	Possible Use(s) Impaired	Possible Surface Water Quality Problem Needing Assessment
VT17-01L02	SOUTH BAY (Newport)	MERCURY	FC	ELEVATED LEVELS OF MERCURY IN WALLEYE
VT17-04	CLYDE RIVER, MOUTH TO NEWPORT 1,2,3 HYDRO DAM	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE
	CLYDE RIVER, WEST CHARLESTON DOWN TO LAKE SALEM	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE
	TRIB TO CLYDE RIVER	UNDEFINED	ALS, DWS	UNNAMED TRIB. IN NEWPORT HAD 28K GAL SOLVENT DUMPED IN PIT (FILLED) AS THREAT
VT17-04L04	LAKE SALEM (Derby)	E. COLI	CR	UNKNOWN SOURCE OF BACTERIA CONTAMINATION IN INLET STREAMS AND LAKE
VT17-04L06	CLYDE POND (Derby)	MERCURY	FC	ELEVATED LEVELS OF MERCURY IN WALLEYE
VT17-08	BARTON RIVER, BELOW ETHAN ALLEN WETLANDS	TOXICS	ALS	NEED FISH COMMUNITY AND SEDIMENT MONITORING
VT17-09	BLACK RIVER, MOUTH UPSTREAM TO COVENTRY FALLS (6 MILES)	MERCURY	FC	ELEVATED LEVELS OF Hg IN WALLEYE

Part D - Waters with Completed and Approved TMDLs

EXPLANATION OF COLUMN HEADINGS

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, that is located in Vermont river basin #01. River basin #01 includes the Batten Kill, Hoosic and Walloomsac rivers; there are 17 river basins for planning purposes identified in Vermont. A statewide map has been included that names these 17 river basins and identifies their approximate boundaries.

A statewide map further illustrating designated river and stream waterbodies and waterbody designations for Lake Champlain, Lake Memphremagog and South Bay can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

Name - The name of the river/stream segment or lake/pond.

ADB Code(s) – Assessment Database segment code used for EPA tracking purposes. If blank, Waterbody ID represents entire ADB code.

Pollutant - The pollutant for which the TMDL was completed.

Previously Identified Problem - A brief description of the water quality problem associated with the particular segment.

Status – Gives the TMDL information and the date of EPA approval.

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT01-05L01		BOURN POND (Sunderland)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT01-05L10		LITTLE MUD (Winhall)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004
VT01-05L11		LYE BROOK - N (Sunderland)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT01-05L12		LYE BROOK - S (Sunderland)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT01-06L01		BRANCH POND (Sunderland)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT01-06L02		BEEBE POND (Sunderland)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT02-01	01	POULTNEY RIVER, MOUTH UPSTRM TO CARVERS FALLS (10.4 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT02-05	03	FLOWER BROOK, MOUTH TO RM 0.5	E. COLI	ELEVATED E. COLI MONITORING RESULTS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-01	01	OTTER CREEK, MOUTH OF MIDDLEBURY RIVER TO PULP MILL BRIDGE (4.0 MI)	E. COLI	AGRICULTURAL RUNOFF, POSSIBLE FAILED SEPTIC SYSTEMS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-01	02	LOWER OTTER CREEK, MOUTH UPSTREAM TO VERGENNES DAM (APPROX 7.6 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT03-06	01	MOON BROOK, MOUTH TO RM 2.9	STORMWATER	STORMWATER RUNOFF; EROSION	EPA APPROVED TMDL FEBRUARY 19, 2009
VT03-07	01	LITTLE OTTER CREEK, MOUTH UPSTRM TO FALLS/LEDGE WEST RT 7 (CIRCA 1 MI)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE; FISH PRESENT ONLY SEASONALLY; EXTREMELY LOW #s	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT03-07	01	LITTLE OTTER CREEK, MOUTH TO RM 7.8	E. COLI	ELEVATED E. COLI MONITORING RESULTS	EPA APPROVED TMDL SEPTEMBER 30, 2011

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT03-07	02	LITTLE OTTER CREEK, RM 15.4 TO RM 16.4	E. COLI	AGRICULTURAL RUNOFF	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-08	01	LEWIS CREEK, FROM LOWER COV'D BRIDGE UPSTRM TO FOOTBRIDGE (12.3 MI)	E. COLI	AGRICULTURAL RUNOFF	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-08	02	POND BROOK, FROM LEWIS CREEK CONFLUENCE UPSTREAM (1.5 MILES)	E. COLI	AGRICULTURAL RUNOFF	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-09	01	LOWER DEAD CREEK, FROM MOUTH UPSTREAM (APPROX 3 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT03-11L01		NORTH POND (Bristol)	ACID	ATMOSPHERIC DEPOSITION; CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT03-11L02		GILMORE POND (Bristol)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT03-12	01	MIDDLEBURY RIVER, FROM MOUTH UPSTREAM 2 MILES	E. COLI	AGRICULTURAL RUNOFF, LIVESTOCK, POSSIBLE FAILED SEPTIC SYSTEMS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT03-14L03		CHITTENDEN RESERVOIR (Chittenden)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT03-18L02		GRIFFITH LAKE (Peru)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT03-18L03		BIG MUD POND (Mt. Tabor)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT03-18L06		LONG HOLE (Mt. Tabor)	ACID	ATMOSPHERIC DEPOSITION; CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT03-18L07		LITTLE MUD (Mt. Tabor)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT04-01L01	01, 02, 03, 04	OTTER CREEK SECTION - LAKE CHAMPLAIN (Ferrisburg)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT04-01L01	01, 02, 03, 04	OTTER CREEK SECTION - LAKE CHAMPLAIN (Ferrisburg)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT04-01L02	01, 02, 03	PORT HENRY SECTION - LAKE CHAMPLAIN (Ferrisburg)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT04-01L02	01, 02, 03	PORT HENRY SECTION - LAKE CHAMPLAIN (Ferrisburg)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT04-02L01	01, 02	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT04-02L01	01, 02	SOUTHERN SECTION (B) - LAKE CHAMPLAIN (Bridport)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT04-02L01	01, 02	SOUTHERN SECTION (A) - LAKE CHAMPLAIN (Bridport)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT05-01L01	01, 02	MISSISQUOI BAY - LAKE CHAMPLAIN (Alburg)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT05-01L01	01, 02	MISSISQUOI BAY - LAKE CHAMPLAIN (Alburg)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-02L01	01, 02, 03, 04	LAKE CARMI (Franklin)	PHOSPHORUS	ALGAE BLOOMS	EPA APPROVED TMDL APRIL 13, 2009
VT05-04L01	01, 02, 03	NORTHEAST ARM - LAKE CHAMPLAIN (Swanton)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT05-04L01	01, 02, 03	NORTHEAST ARM - LAKE CHAMPLAIN (Swanton)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-04L02	01, 02	ISLE LAMOTTE - LAKE CHAMPLAIN (Alburg)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-07	02	RUGG BROOK, RM 3.1 UPSTREAM 1.6 MILES	STORMWATER	STORMWATER RUNOFF	EPA APPROVED TMDL FEBRUARY 19, 2009

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT05-07	07	STEVENS BROOK, RM 6.8 (PEARL ST) TO RM 9.3	STORMWATER	STORMWATER RUNOFF, EROSION/SEDIMENTATION, MORPHOLOGICAL INSTABILITY	EPA APPROVED TMDL FEBRUARY 19, 2009
VT05-07L01	01, 02	ST. ALBANS BAY - LAKE CHAMPLAIN (St. Albans)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT05-07L01	01, 02	ST. ALBANS BAY - LAKE CHAMPLAIN (St. Albans)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-09	01	INDIAN BROOK, RM 5.8 (SUZIE WILSON RD) TO RM 9.8	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL AUGUST 21, 2008
VT05-09	02	DIRECT SMALLER DRAINAGES TO INNER MALLETTS BAY	E. COLI	URBAN RUNOFF, POTENTIAL FAILED/FAILING SEPTIC SYSTEMS. INCLUDES SMITH HOLLOW BROOK & CROOKED CREEK	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT05-09L01	01, 02, 03	MALLETTS BAY - LAKE CHAMPLAIN (Colchester)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-10	01	ENGLESBY BROOK, MOUTH TO RM 1.3	STORMWATER	STORMWATER RUNOFF, BLANCHARD BEACH CLOSURE	EPA APPROVED TMDL SEPTEMBER 30, 2007

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT05-10	01	ENGLESBY BROOK	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT05-10L01	01, 02, 03	BURLINGTON BAY - LAKE CHAMPLAIN (Burlington)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-10L03	01, 02	MAIN SECTION - LAKE CHAMPLAIN (South Hero)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT05-10L02	01, 02	MAIN SECTION - LAKE CHAMPLAIN (South Hero)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-11	01	MUNROE BROOK, MOUTH TO RM 2.8	STORMWATER	STORMWATER RUNOFF, EROSION, LAND DEVELOPMENT	EPA APPROVED TMDL AUGUST 21, 2008
VT05-11	02	BARTLETT BROOK, MOUTH TO RM 0.7	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL SEPTEMBER 30, 2007
VT05-11	03	POTASH BROOK, MOUTH TO RM 5.2	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL DECEMBER 19, 2006
VT05-11	03	POTASH BROOK	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT05-11	04	LAPLATTE RIVER FROM HINESBURG TO MOUTH (10.5 MILES)	E. COLI	AGRICULTURAL RUNOFF	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT05-11	04	LAPLATTE RIVER, AT MOUTH	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT05-11	05	MUD HOLLOW BROOK, FROM MOUTH TO 3 MILES UPSTREAM	E. COLI	AGRICULTURAL RUNOFF, STREAMBANK EROSION	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT05-11L01	01, 02, 03	SHELBURNE BAY - LAKE CHAMPLAIN (Shelburne)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002. EPA DISSAPPROVED IN 2011. EPA DEVELOPING NEW TMDL EXPECTED 2013
VT05-11L01	01, 02, 03	SHELBURNE BAY - LAKE CHAMPLAIN (Shelburne)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT06-01	01	MISSISQUOI RIVER, MOUTH UPSTRM TO SWANTON DAM (APPROX 8 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT06-04	01	BERRY BROOK, MOUTH UP TO AND INCLUDING N. TRIB (APPROX. 1 MILE)	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT06-04	02	GODIN BROOK	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT06-04	03	SAMSONVILLE BROOK	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT06-06L01		KINGS HILL POND (Bakersfield)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT07-01	01, 02	LAMOILLE RIVER, MOUTH TO CLARKS FALLS DAM (8.5 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT07-03L03	01, 02	ARROWHEAD MOUNTAIN LAKE (Milton)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT07-13L02		LAKE-OF-THE-CLOUDS (Cambridge)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT08-01	01	WINOOSKI RIVER, MOUTH TO WINOOSKI DAM	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT08-02	01	ALLEN BROOK	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT08-02	01	ALLEN BROOK, RM 2.4 TO RM 5.0 (Talcott Rd)	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL AUGUST 21, 2008
VT08-02	04	SUNDERLAND BROOK, RM 3.5 (RT. 7) TO RM 5.3	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL AUGUST 21, 2008
VT08-02	05	CENTENNIAL BROOK, MOUTH TO RM 1.2	STORMWATER	STORMWATER RUNOFF, LAND DEVELOPMENT, EROSION	EPA APPROVED TMDL SEPTEMBER 30, 2007
VT08-02	06	MOREHOUSE BROOK, MOUTH TO RM 0.6	STORMWATER	STORMWATER RUNOFF, EROSION	EPA APPROVED TMDL SEPTEMBER 30, 2007
VT08-09		WINOOSKI RIVER - CABOT VILLAGE	E. COLI	RESIDENTIAL DIRECT DISCHARGES &/OR FAILED SEPTIC SYSTEMS	EPA APPROVED TMDL MARCH 8, 2001
VT08-10	01	HUNTINGTON RIVER, VICINITY OF BRIDGE STREET IN HUNTINGTON	E. COLI	ELEVATED E. COLI LEVELS DETECTED AT SEVERAL SAMPLING STATIONS	EPA APPROVED TMDL SEPTEMBER 30, 2011

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT08-13L01		HARDWOOD POND (Elmore)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT08-18	01	MAD RIVER, MOUTH TO MORETOWN (6.2 MILES)	E. COLI	POSIBLE FAILING SEPTIC SYSTEMS AND OTHER UNKNOWN SOURCES; ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT09-07L01		SKYLIGHT POND (Ripton)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004
VT10-14		BLACK RIVER, BELOW LUDLOW WWTF FOR APPROX. 0.5 MILES	PHOSPHORUS	NUTRIENT ENRICHMENT FROM WWTF	EPA APPROVED TMDL MAY 1, 2001
VT11-08L01		SUNSET LAKE (Marlboro)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT11-15	01	TRIB #1, NO. BRANCH, BALL MTN BROOK, ABOVE GOLF COURSE POND	SEDIMENT	URBAN RUNOFF, LAND DEVELOPMENT IN STEEP AREA, EROSION	EPA APPROVED TMDL JUNE21, 2002

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT11-15	02	STYLES BROOK (2 MILES)	SEDIMENT	LAND DEVELOPMENT; HYDROLOGIC MODIFICATION	EPA APPROVED TMDL JUNE21, 2002
VT11-15L01		FORESTER POND (Jamaica)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT11-15L02		LITTLE POND (Winhall)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2004
VT11-16L01		STRATTON POND (Stratton)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT11-17	01	WEST RIVER, APPROX 1 MILE BELOW TO 0.5 MILE ABOVE SOUTH LONDONDERRY	E. COLI	POSSIBLE SEPTIC SYSTEM DISCHARGES	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT11-18L06		MOSES (Weston)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT12-01L01		HARRIMAN RESERVOIR (Whitingham)	MERCURY	ELEVATED LEVEL OF MERCURY IN ALL FISH EXCEPT BROWN BULLHEAD	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-01L01		HARRIMAN RESERVOIR (Whitingham)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004
VT12-01L04		SHERMAN RESERVOIR (Whitingham)	MERCURY	ELEVATED LEVEL OF MERCURY IN ALL FISH EXCEPT BROWN BULLHEAD	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-02L02		HOWE POND (Readsboro)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-02L03		STAMFORD POND (Stamford)	ACID	ATMOSPHERIC DEPOSITION; EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-03	01	EAST BRANCH DEERFIELD RIVER, BELOW SOMERSET DAM	MERCURY	ELEVATED LEVELS OF Hg IN ALL FISH	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT12-03L01		GROUT POND (Stratton)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-03L01		GROUT POND (Stratton)	MERCURY	ELEVATED LEVEL OF MERCURY IN ALL FISH EXCEPT BROWN BULLHEAD	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-03L02		SOMERSET RESERVOIR (Somerset)	MERCURY	ELEVATED LEVEL OF MERCURY IN ALL FISH EXCEPT BROWN BULLHEAD	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-03L02		SOMERSET RESERVOIR (Somerset)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-04	01	UPPER DEERFIELD RIVER, BELOW SEARSBURG DAM	MERCURY	ELEVATED LEVELS OF Hg IN ALL FISH	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-04L01		ADAMS RESERVOIR (Woodford)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT12-04L02		LOST POND (Glastenbury)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004
VT12-04L04		LITTLE POND (Woodford)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-04L05		SEARSBURG RESERVOIR (Searsburg)	MERCURY	ELEVATED LEVEL OF MERCURY IN ALL FISH EXCEPT BROWN BULLHEAD	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT12-05	02	NO. BRANCH, DEERFIELD RIVER, VICINITY OF WEST DOVER	E. COLI	HIGH E.COLI LEVELS; CAUSE(S) & SOURCE(S) UNKNOWN; NEEDS ASSESSMENT	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT12-05L01		HAYSTACK POND (Wilmington)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT12-07L01		SOUTH POND (Marlboro)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT13-14	01	WHETSTONE BROOK - BRATTLEBORO	E. COLI	SOURCES UNKNOWN, POTENTIALLY FAULTY SEWER LINE/SEPTIC SYSTEM	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT14-03	01	OMPOMPANOOSUC RIVER, USACOE BEACH AREA TO BRIMSTONE CORNER (9 8 MI)	E. COLI	ELEVATED E. COLI LEVELS	EPA APPROVED TMDL SEPTEMBER 30, 2011
VT14-07L01		LEVI POND (Groton)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 20, 2004
VT14-07L02		TICKLENAKED POND (Ryegate)	PHOSPHORUS	ALGAE BLOOMS, HIGH pH, LOW D.O.; MANURE RUNOFF	EPA APPROVED TMDL NOVEMBER 30, 2009
VT16-04L01		MOORE RESERVOIR (Waterford)	MERCURY	ELEVATED LEVELS OF MERCURY IN ALL FISH.	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT16-05L01		COMERFORD RESERVOIR (Barnet)	MERCURY	ELEVATED LEVELS OF MERCURY IN ALL FISH	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007

Part D. Waters in this section have completed and EPA-approved TMDLs.

Waterbody ID	ADB Code(s)	Name	Pollutant	Previously Identified Problem	Status
VT16-11L01		UNKNOWN POND (Averys Gore)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT17-02L02		TURTLE POND (Holland)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT17-02L03		ROUND POND (Holland)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT17-02L06		DUCK POND (Holland)	ACID	ATMOSPHERIC DEPOSITION: EXTREMELY SENSITIVE TO ACIDIFICATION; EPISODIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT17-03L03		HALFWAY POND (Norton)	ACID	ATMOSPHERIC DEPOSITION: CRITICALLY ACIDIFIED; CHRONIC ACIDIFICATION	EPA APPROVED TMDL SEPTEMBER 30, 2003
VT17-04L04	01, 02, 03	LAKE SALEM (Derby)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007

Part E - Waters Altered by Invasive Aquatic Species

EXPLANATION OF COLUMN HEADINGS

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, which are located in Vermont river basin #01. There are 17 river basins for planning purposes identified in Vermont. A statewide map that names and identifies the boundary of each river basin has been referenced earlier.

A statewide map further illustrating designated river and stream waterbodies and waterbody designations for Lake Champlain, Lake Memphremagog and South Bay can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

Segment Name/Description - The name of the river/stream segment or lake/pond.

Use(s) Impacted - An indication of which designated or existing uses (as defined in the VWQS) are impacted by invasive aquatic species. The following conventions are used to represent a specific use:

AES - aesthetics
ALS or AH - aquatic life (biota and/or habitat) support
AWS - agricultural water supply
2CR - secondary contact recreation (fishing, boating)
FC - fish consumption
DWS - drinking water supply
CR - contact recreation (i.e. swimming)

Surface Water Quality Problem - A brief description of the type of invasive aquatic species affecting the segment.

Current Status/Management or Control Activity - An indication of the current status of the problem and/or any recent or on-going management or control efforts.

Part E. Waters appearing below are altered by aquatic invasive species. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT01-03L05	LAKE PARAN (Bennington)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	WEEVIL PRESENT; NOTED NATURAL MILFOIL DECLINE IN 1991
VT02-01	DISCRETE AREAS OF LOWER POULTNEY RIVER	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING SINCE 1998 BY TNC
VT02-01L01	COGGMAN POND (West Haven)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1998; VTDEC/TNC HANDPULLING ONGOING SINCE 1999
		AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	CONFIRMED POPULATION IN 1998; VTDEC/TNC HANDPULLING ONGOING SINCE 1999
VT02-02L06	BLACK POND (Hubbardton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1987; WEEVIL PRESENT: WEEVIL AUGMENTATION (1997-2000)
VT02-02L07	MILL POND (PARSONS MILL POND) (Benson)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT WATER CHESTNUT GROWTH	POPULATION CONFIRMED IN 1987; VTDEC/TNC HANDPULLING ONGOING
VT02-03	CASTLETON RIVER	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	NO CONTROL
VT02-03L05	LAKE BOMOSEEN (Castleton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1982; WEEVIL PRESENT; WEEVIL AUGMENTATION (93, 94, 97); 1997 AND 2001 MILFOIL DECLINES OF UNKNOWN CAUSE
		ALS, CR	ZEBRA MUSSEL INFESTATION	ZM POPULATION DISCOVERED IN 1999; FIRST WATER INTAKE LINE CLOGGED IN LATE 2001; ADULTS COMMON THRUOUT MOST OF LAKE IN 2005
VT02-03L06	GLEN LAKE (Castleton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1983; WEEVIL PRESENT. NOTED NATURAL MILFOIL DECLINE IN 1992; WQD WEEVIL HARVEST IN 1999-2009; MIDDLEBURY COLLEGE WEEVIL HARVEST IN 2005 AND 2006
VT02-05L03	LAKE ST. CATHERINE (Wells)	AES, ALS	ALEWIVES	ALEWIVES CONFIRMED IN 1997, NOW ABUNDANT THRUOUT LAKE. VT DEPT OF FISH AND WILDLIFE CONTROL ALTERNATIVES REPORT (2004):
VT03-04	LEICESTER RIVER	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	LIMITED HAND PULLING
VT03-06L01	BEAVER POND (PROCTR)	AES, ALS, CR, 2CR	DENSE EURASIAN WATERMILFOIL GROWTH IN MOST SHORELINE AREAS	POPULATION CONFIRMED IN 2000, NO CONTROL ACTIVITIES

Part E. Waters appearing below are altered by aquatic invasive species. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT03-07L01	VERGENNES WATERSHED (Bristol)	AES, ALS, CR, 2CR	DENSE EURASIAN WATERMILFOIL GROWTH IN MOST SHORELINE AREAS	POPULATION CONFIRMED IN 1985; WEEVIL INTRODUCED (93-94); LIMITED EXPERIMENTAL INTRO - POOR RESPONSE; NO FURTHER CONTROL ACTIVITIES
VT03-08L02	CEDAR LAKE (MONKTON POND) (Monkton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1990; WEEVIL PRESENT; WEEVIL AUGMENTN (97-98); NOTED NATURAL MILFOIL DECLINE IN 1997, RETURNED TO MODERATE IN 2000
VT03-10L01	RICHVILLE POND (Shoreham)	AES, ALS, CR, 2CR	DENSE EURASIAN WATERMILFOIL GROWTH IN MOST SHORELINE AREAS	POPULATION CONFIRMED IN 1998; NO CONTROL ACTIVITIES
VT03-15L01	CHIPMAN LAKE (TINMOUTH POND) (Tinmouth)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1988; WEEVIL PRESENT; ONGOING LOCAL NON-CHEMICAL CONTROL PROGRAM; SOLARBEE INSTALLED IN 2006 AS EXPERIMENTAL CONTROL FOR EWM
VT03-17L01	STAR LAKE (Mount Holly)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1987; WEEVIL PRESENT; HERBICIDE TREATMENTS 2004 AND 2011 (SONAR), 2007 (RENOVATE)
VT04-01L01	OTTER CREEK SECTION - LAKE CHAMPLAIN (Ferrisburg)	ALS, CR	ZEBRA MUSSEL INFESTATION	CHAMPLAIN II & DIAMOND ISL STONE BOAT WRECKS COVERED; NATIVE MUSSELS MOSTLY EXTIRPATED; NEARLY ALL SUITABLE SUBSTRATE COVERED
		AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
VT04-01L02	PORT HENRY SECTION - LAKE CHAMPLAIN (Ferrisburg)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
		ALS, CR	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
VT04-02	WHITNEY CREEK	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	NO CONTROL
VT04-02L01	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	AES, ALS, CR, 2CR	DENSE WATER CHESTNUT GROWTH	ONGOING HARVESTING WITH SIGNIFICANT CONTROL PROGRAMS; NORTHWARD EXPANSION HALTED IN 1999; 2010 CONTROL EFFORTS HIT "NARROWS OF DRESDEN" - A FIRST IN PROGRAM HISTORY
		ALS, CR	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED

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Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT04-02L01	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
VT04-03	EAST CREEK, ORWELL	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING BY TNC
	SOUTH FORK OF EAST CREEK, ORWELL	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING BY TNC
VT04-04L04	BROOKSIDE POND	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	POPULATION CONFIRMED IN 2008; HANDPULLING BY VTDEC
VT05-01L01	MISSISQUOI BAY - LAKE CHAMPLAIN (Alburg)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
		ALS, CR	ZEBRA MUSSEL INFESTATION	ADULT ZEBRA MUSSELS FOUND AT BRIDGE (1998). ADULTS FOUND N OF BRIDGE,W. OF MISSISQUOI R. (2004-2005). THROUGHOUT BAY IN 2007
	MISSISQUOI BAY-LAKE CHAMPLAIN (Alburg)	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	CONFIRMED 2005; HANDPULLING ONGOING BY VTDEC, MNWR AND OTHERS
VT05-01L03	BULLIS POND	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	POPULATION CONFIRMED IN 2007; HANDPULLING BY VTDEC
VT05-04L01	NORTHEAST ARM - LAKE CHAMPLAIN (Swanton)	ALS, CR, DWS	ZEBRA MUSSEL INFESTATION	ADULT ZEBRA MUSSELS EXPANDING RAPIDLY
		AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN; WEEVILS INTRODUCED INTO PELOTS BAY IN 1999 AND 2000
VT05-04L02	ISLE LAMOTTE - LAKE CHAMPLAIN (Alburg)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION IN SOME NEAR SHORE AREAS	WEEVILS PRESENT IN LAKE CHAMPLAIN

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Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT05-04L02	ISLE LAMOTTE - LAKE CHAMPLAIN (Alburg)	ALS, CR, DWS	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
VT05-07L01	ST. ALBANS BAY - LAKE CHAMPLAIN (St. Albans)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	HARVESTING IN PAST AND AGAIN IN 2005, 2007 HARVESTING PLUS NUISANCE NATIVES; WEEVILS PRESENT IN LAKE CHAMPLAIN
		ALS, CR	ZEBRA MUSSEL INFESTATION	ADULT ZEBRA MUSSELS EXPANDING RAPIDLY
VT05-09L01	MALLETTS BAY - LAKE CHAMPLAIN (Colchester)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
		ALS, CR	ZEBRA MUSSEL INFESTATION	NATIVE MUSSELS IMPACTED IN OUTER MALLETTS BAY
VT05-10L01	BURLINGTON BAY - LAKE CHAMPLAIN (Burlington)	ALS, CR, DWS	ZEBRA MUSSEL INFESTATION	ZEBRA MUSSELS ON GEN. BUTLER WRECK; NEARLY ALL SUITABLE SUBSTRATE IN BAY COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
		AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION IN SOME NEAR SHORE AREAS	WEEVILS PRESENT IN LAKE CHAMPLAIN
VT05-10L02	MAIN SECTION - LAKE CHAMPLAIN (South Hero)	ALS, CR, DWS	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
		AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION IN SOME NEAR SHORE AREAS	WEEVILS PRESENT IN LAKE CHAMPLAIN
VT05-11L01	SHELBURNE BAY - LAKE CHAMPLAIN (Shelburne)	AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
		ALS, CR, DWS	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
VT05-11L02	LAKE IROQUOIS (Hinesburg)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1990, WEEVIL PRESENT; WEEVIL AUGMENTATION (1996-2011)

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Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT06-05L01	METCALF POND (Fletcher)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1984
VT06-05L02	FAIRFIELD SWAMP POND (Swanton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 2008; NO CONTROL
VT06-05L03	FAIRFIELD POND (Fairfield)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1993; WEEVIL PRESENT; WEEVIL AUGMENTATION 2005 AND 2006 (MIDDLEBURY COLLEGE); ONGOING LOCAL NON-CHEMICAL CONTROL PROGRAM
VT07-03L03	ARROWHEAD MOUNTAIN LAKE (Milton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1988; WEEVIL PRESENT; NOTED NATURAL MILFOIL DECLINE IN 1995; WEEVIL AUGMENTATION (98-99)
VT07-08L02	LAKE ELMORE (Elmore)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION DISCOVERED IN 2002, ALREADY MODERATE IN DENSITY; ONGOING LOCAL NON-CHEMICAL CONTROL PROGRAM
VT08-01	LOWER WINOOSKI RIVER	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	NO CONTROL
VT11-07	WEST RIVER - RETREAT MEADOWS AREA	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL GROWTH	HAND PULLING
VT12-01L02	SADAWGA LAKE	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 2006; NO CONTROL
VT13-02	CT RIVER, HOYTS LNDNG, WILDER DAM, TRANSCANADA LAUNCH	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED 1995; NO CONTROL ACTIVITIES
VT13-08L01	MILL POND (KENNEDYS POND) (Windsor)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	LIMITED ONGOING NON-CHEMICAL CONTROLS
VT16-19L03	HALLS LAKE (Newbury)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1991; WEEVIL PRESENT; ONGOING LOCAL NON-CHEMICAL CONTROL PROGRAM
VT17-04L05	LAKE DERBY (Derby)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 2009; ONGOING NON-CHEMICAL CONTROL PROGRAM

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Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT17-07L01	BROWNINGTON POND (Brownington)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1986; WEEVIL PRESENT; NOTED NATURAL DECLINE (1989) - LINKED TO WEEVIL POPULATION; MILFOIL POPULATION VARIES WITH WEEVIL POPULATION
VT17-10L01	LAKE ELLIGO (ELIGO POND) (Craftsbury)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	POPULATION CONFIRMED IN 1997; WEEVIL PRESENT; AGGRESSIVE LOCAL NON-CHEMICAL CONTROL PROGRAM ABANDONED IN 2009; WEEVIL AUGMENTATION 2005 AND 2006

Part F - Waters Altered by Flow Regulation

EXPLANATION OF COLUMN HEADINGS

Waterbody ID - An alphanumeric code used to spatially locate designated surface waterbodies. For example, VT01-02 and VT01-03L05 represent a river and a lake waterbody, respectively, which are located in Vermont river basin #01. There are 17 river basins for planning purposes identified in Vermont. A statewide map that names these 17 river basins and identifies their approximate boundaries has been referenced earlier.

A statewide map further illustrating designated river and stream waterbodies and waterbody designations for Lake Champlain, Lake Memphremagog and South Bay can be obtained upon request from the Water Quality Division, Department of Environmental Conservation in Waterbury, Vermont.

Segment Name/Description - The name of the river/stream segment or lake/pond.

Use(s) Impacted - An indication of which designated or existing uses (as defined in the VWQS) are impacted by flow alteration. The following conventions are used to represent a specific use:

AES - aesthetics
ALS or AH - aquatic life (biota and/or habitat) support
AWS - agricultural water supply
2CR - secondary contact recreation (fishing, boating)
FC - fish consumption
DWS - drinking water supply
CR - contact recreation (i.e. swimming)

Surface Water Quality Problem - A brief description of the type of flow regulation problem affecting the segment. Situations with a threat to water quality are so noted.

Current Status/Management or Control Activity - An indication of current situation and/or recent or on-going management or control efforts.

Projected WQS Compliance Year - For those entries altered by flow regulation and that are associated with hydropower production, the year of facility compliance with the Vermont Water Quality Standards is provided as a projection (estimate). .

Part F. Waters appearing below are altered by flow regulation. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity	Projected WQS Compliance Year
VT01-03	BASIN BROOK	ALS	POSSIBLE LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWAL POINT (THREAT)	WSID #5017 - NORTH BENNINGTON WATER DEPT. SERVES AS BACK UP SUPPLY SOURCE TO GRAVEL WELL FIELD	
	BOLLES BROOK/ROARING BRANCH, INTAKE TO CITY STREAM CONFLUENCE	ALS	POSSIBLE LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWAL POINT (THREAT)	WSID #5016 - BENNINGTON WATER DEPT. ASSESSMENT OF WATER WITHDRAWAL IMPACT DIFFICULT GIVEN LOW PRODUCTIVITY & LOW pH EFFECT	
VT03-04	LEICESTER RIVER, FROM DAM ON LAKE DUNMORE TO 1.0 MILE DOWNSTREAM	ALL USES	ARTIFICIAL FLOW REGULATION & CONDITION BY HYDRO	UNLICENSED FACILITY	2017
	LEICESTER RIVER, FROM SALISBURY DAM TO 5 MILES DOWNSTREAM	ALL USES	ARTIFICIAL FLOW REGULATION & CONDITION BY HYDRO	UNLICENSED FACILITY	2017
		ALS	POSSIBLE DOWNSTREAM FISH PASSAGE PROBLEM AT DAM (THREAT)	UNLICENSED FACILITY	2017
VT03-04L05	LAKE DUNMORE (Salisbury)	ALS	WATER LEVEL MGMT BY HYDRO ALTERS AQUATIC BIOTA	LAKE ASSOC. HAS WATER LEVEL AGREEMENT W/CVPS	2017
VT03-05	OTTER CREEK, 0.1 MILES BELOW PROCTOR DAM	AES	ARTIFICIAL DEWATERING OF LARGE WATERFALL BY HYDRO	FERC LICENSE EXPIRES IN 2012	2012
VT03-06	FURNACE BROOK		LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWL POINT.	BACKUP WATER SUPPLY FOR PROCTOR	
	KILN BROOK	ALS	LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWAL POINT (THREAT)	WSID #5228 - PROCTOR WATER DEPT; MUNICIPALITY STARTED MONITORING STREAMFLOWS IN 2007 IN COOP WITH ANR	
VT03-12	SOUTH BRANCH, MIDDLEBURY RIVER (1.4 MILES)	ALS	ARTIFICIAL FLOW CONDITION, INSUFFICIENT FLOW BELOW SNOW BOWL SNOWMAKING WATER WITHDRAWAL	PARTIAL SUPPORT 1.4 MI (6.0 MI TOTAL LENGTH)	

Part F. Waters appearing below are altered by flow regulation. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity	Projected WQS Compliance Year
VT03-14	EAST CREEK, CHITTENDEN RESERVOIR TO 4 MILES DOWNSTREAM	ALL USES	ARTIFICIAL FLOW REGULATION & CONDITION BY DAM; ONLY LOCAL DRAINAGE BELOW	UNLICENSED FACILITY	2016
	EAST CREEK, FROM GLEN DAM TO 3.0 MILES DOWNSTREAM	ALS	POSSIBLE FISH PASSAGE PROBLEM AT DAM (THREAT)	UNLICENSED FACILITY	2016
		ALL USES	ARTIFICIAL FLOW REGULATION & CONDITION BY HYDRO	UNLICENSED FACILITY	2016
	EAST CREEK, FROM PATCH DAM TO 2.4 MILES DOWNSTREAM	ALS	POSSIBLE FISH PASSAGE PROBLEM AT DAM (THREAT)	UNLICENSED FACILITY	2016
		ALL USES	ARTIFICIAL FLOW REGULATION & CONDITION BY HYDRO	UNLICENSED FACILITY	2016
	MENDON BROOK (3.3 MILES)	ALS	ARTIFICIAL FLOW CONDITION, INSUFFICIENT FLOW BELOW PICO SNOWMAKING WATER WITHDRAWAL	PARTIAL SUPPORT 3.3 MI (6.9 MI TOTAL LENGTH)	
	TRIB TO EAST CREEK, HYDRO FACILITY TO EAST CK CONFLUENCE	ALS	LOW DO DOWNSTREAM OF HYDRO FACILITY	UNLICENSED FACILITY	2016
VT03-14L03	CHITTENDEN RESERVOIR (Chittenden)	ALS	WATER LEVEL FLUCTUATION BY HYDRO ALTERS AQUATIC BIOTA & WETLANDS	UNLICENSED FACILITY	2016
VT03-14L05	PATCH POND (Rutland)	ALS	WATER LEVEL FLUCTUATIONS MAY ALTER AQUATIC BIOTA	UNLICENSED FACILITY	2016
VT03-18	ROARING BROOK	ALS	POSSIBLE LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITDRAWAL POINT (THREAT)	WSID #5242 - WALLINGFORD WATER DISTRICT #1; SOURCE USED ONLY AS AN EMERGENCY SUPPLY	
VT05-02L01	LAKE CARMI (Franklin)	ALS	WATER LEVEL MGMT MAY ALTER AQUATIC HABITAT	NEED TO DETERMINE EXTENT, TIMING, AND IMPACT OF DRAWDOWNS. WATER LEVEL MONITORING IN 2006 AND 2007	

Part F. Waters appearing below are altered by flow regulation. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity	Projected WQS Compliance Year
VT06-02	MISSISQUOI RIVER, BELOW ENOSBURG FALLS DAM (0.1 MILE)	ALS	ARTIFICIAL FLOW REGULTATION & CONDITION BY HYDRO	FERC LICENSE EXPIRES IN 2023	2023
VT06-04	LOVELAND BROOK	ALS	POSSIBLE LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWAL POINT (THREAT)	WSID #5126 - RICHFORD	
VT06-08	JAY BRANCH (4.7 MILES)	ALS	ARTIFICIAL & INSUFFICIENT FLOW BELOW JAY PEAK SNOWMAKING WATER WITHDRAWAL	PARTIAL SUPPORT 4.7 MI (8.7 MI TOTAL LENGTH); JAY PEAK EVALUATING EXPANSION/ALTERNATIVES	
VT07-03	TRIB TO LOWER LAMOILLE	ALS	POSSIBLE LACK OF MINIMUM FLOW BELOW WATER SUPPLY WITHDRAWAL POINT (THREAT)	WSID #2345 (VT WHEY CO. GEORGIA DAIRY IND PARK); NO LONGER UNDER DEC-WS JURISDICTION	
VT07-04	MID-LAMOILLE RIVER, IMMED. BELOW CADYS FALLS DAM (0.3 MILES)	AES	ARTIFICIAL DEWATERING OF FALLS BY HYDRO	CURRENT FERC LICENSE EXPIRES IN 2015; IN FERC RELICENSING PROCESS	2015
		ALS	POSSIBLE FISH PASSAGE PROBLEM AT DAM; LACK OF FLOWS TO SUPPORT AQUATIC HABITAT	FERC LICENSE EXPIRES IN 2015; IN FERC RELICENSING PROCESS	2015
VT07-07	LAMOILLE RIVER - HARDWICK LAKE TO LAKE LAMOILLE IN MOVILLE (15.7 MI)	AES, ALS, 2CR	WOLCOTT DAM: ARTIFICIAL & POOR FLOW REGIME DOWNSTREAM	UNLICENSED FACILITY	2019
		AES, ALS	WOLCOTT DAM: IMPOUNDMENT WATER LEVEL FLUCTUATION BY HYDRO IMPAIRS AQUATIC HABITAT; EROSION	UNLICENSED FACILITY	2019
		ALS	WOLCOTT DAM: POSSIBLE FISH PASSAGE PROBLEM AT DAM (THREAT)	UNLICENSED FACILITY	2019
		ALS	POSSIBLE FISH PASSAGE PROBLEM AT DAMS (THREAT)	FERC LICENSE EXPIRES IN 2015; IN FERC RELICENSING PROCESS	2015
		AES, ALS, 2CR	HARDWICK LAKE DAM: ARTIFICIAL FLOW REGIME DOWNRIVER		2019
		AES, ALS, 2CR	BELOW MORRISVILLE DAM: NO FLOW IN BYPASS IMPAIRS AESTHETICS, RECREATION, HABITAT	FERC LICENSE EXPIRES IN 2015	2015

Town of Williston

Stormwater Management Program 2013

Appendix 6

Nobis

Engineering a Sustainable Future

2011 Data Summary

Commerce Street Plume Superfund Site
Williston, Vermont

Remedial Investigation / Feasibility Study
EPA Task Order No. 0036-RI-FS-019L

REMEDIAL ACTION CONTRACT
No. EP-S1-06-03

FOR

US Environmental Protection Agency
Region 1

BY

Nobis Engineering, Inc.

Nobis Project No. 80036

November 2011

U.S. Environmental Protection Agency
Region 1
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Boston, Massachusetts 02109 3919

Nobis Engineering, Inc.
Lowell, Massachusetts
Concord, New Hampshire

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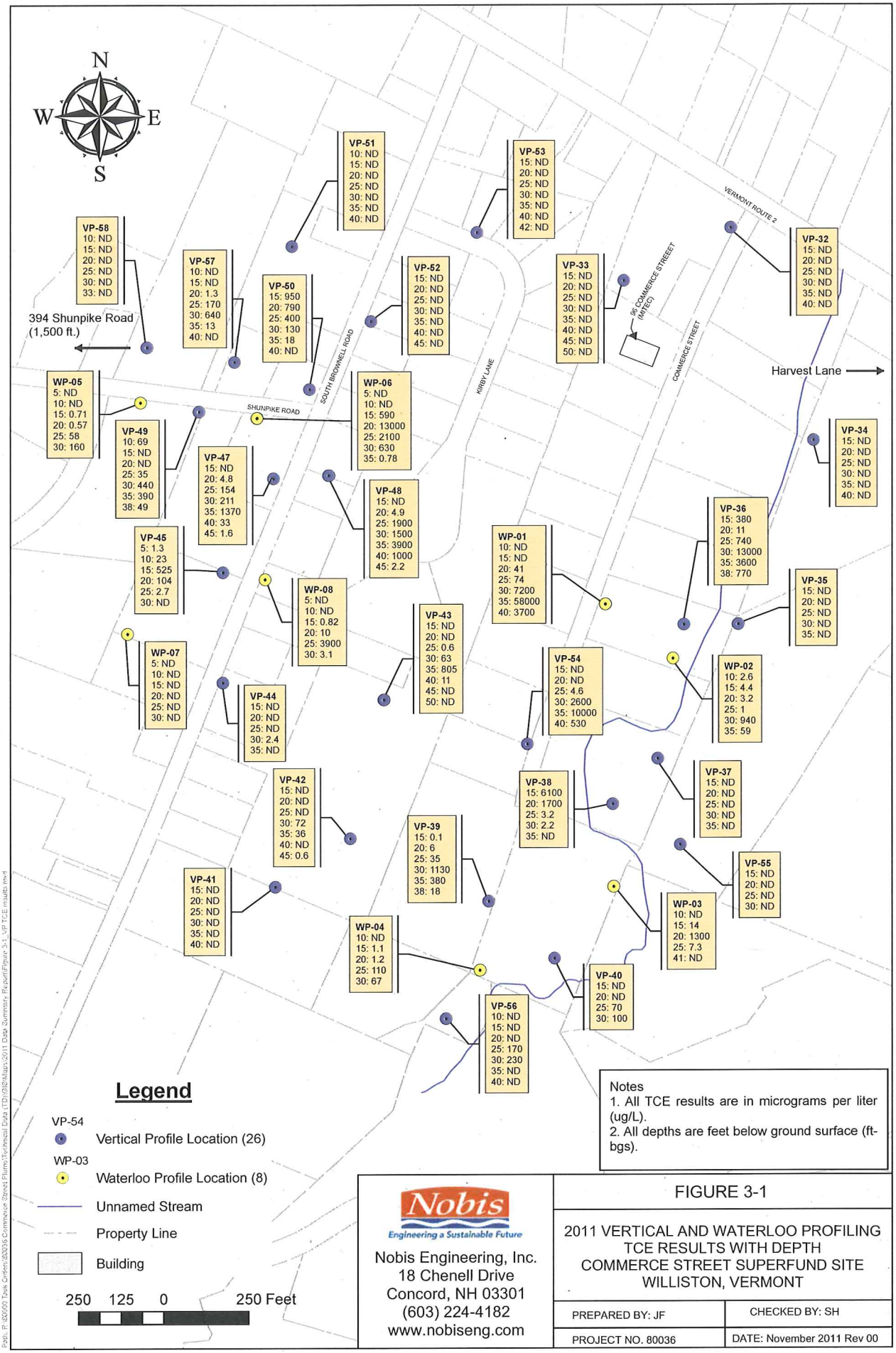

Notes
1. All TCE results are in micrograms per liter (ug/L).
2. All depths are feet below ground surface (ft-bgs).

Nobis
Engineering a Sustainable Future

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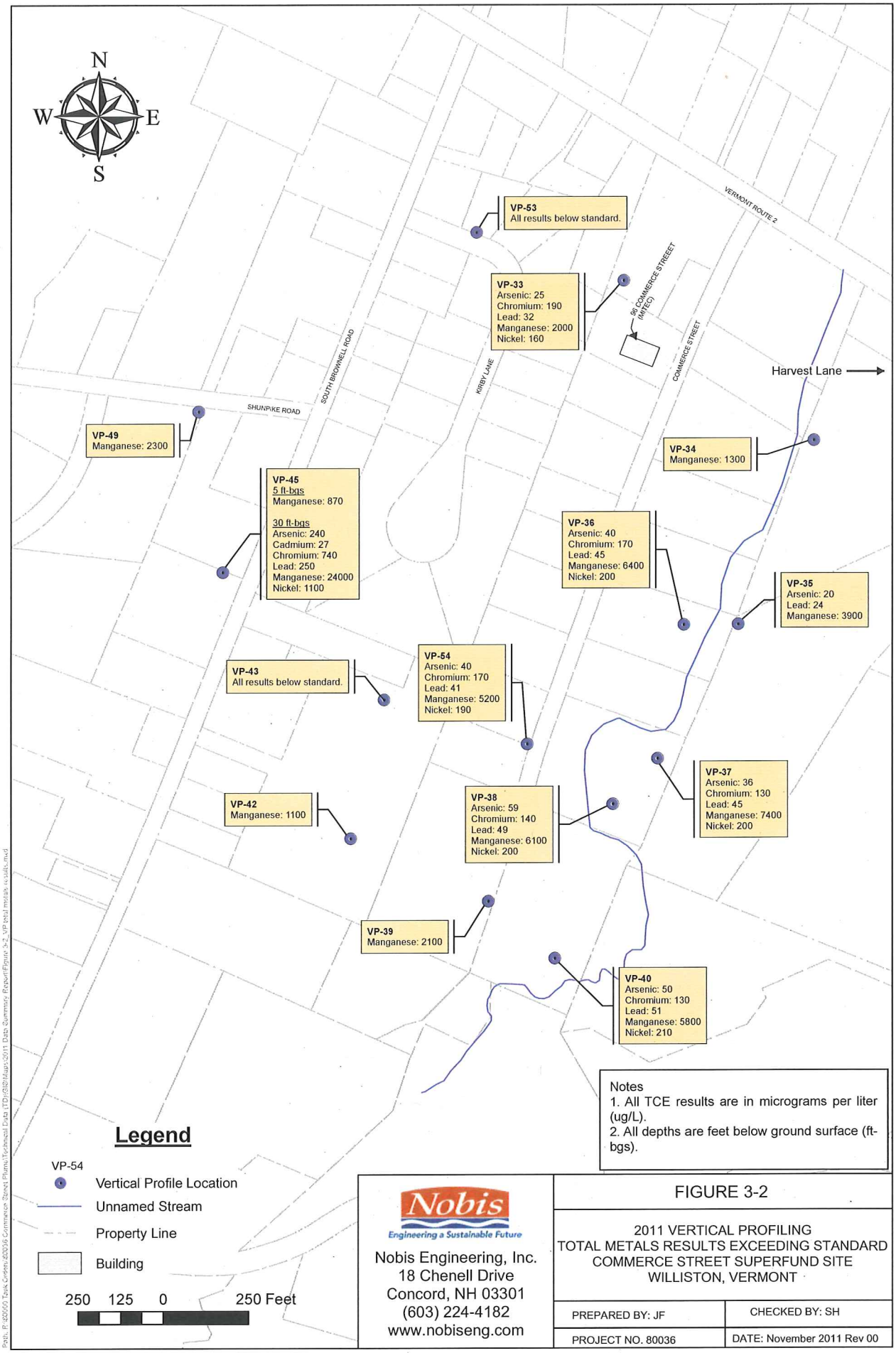
FIGURE 3-1

2011 VERTICAL AND WATERLOO PROFILING
TCE RESULTS WITH DEPTH
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00

Path: P:\80000 Task Orders\80036 Commerce Street Plume\Technical Data \TD\GIS\Maps\2011 Data Summary Report\Figure 3-1_VP TCE results.mxd



Path: R:\80000 Tank Farms\80036 Commerce Street Plume\Technical Data (TDs)\GIS\Maps\2011 Data Summary Report\Figure 3-2_VP total metals results.mxd

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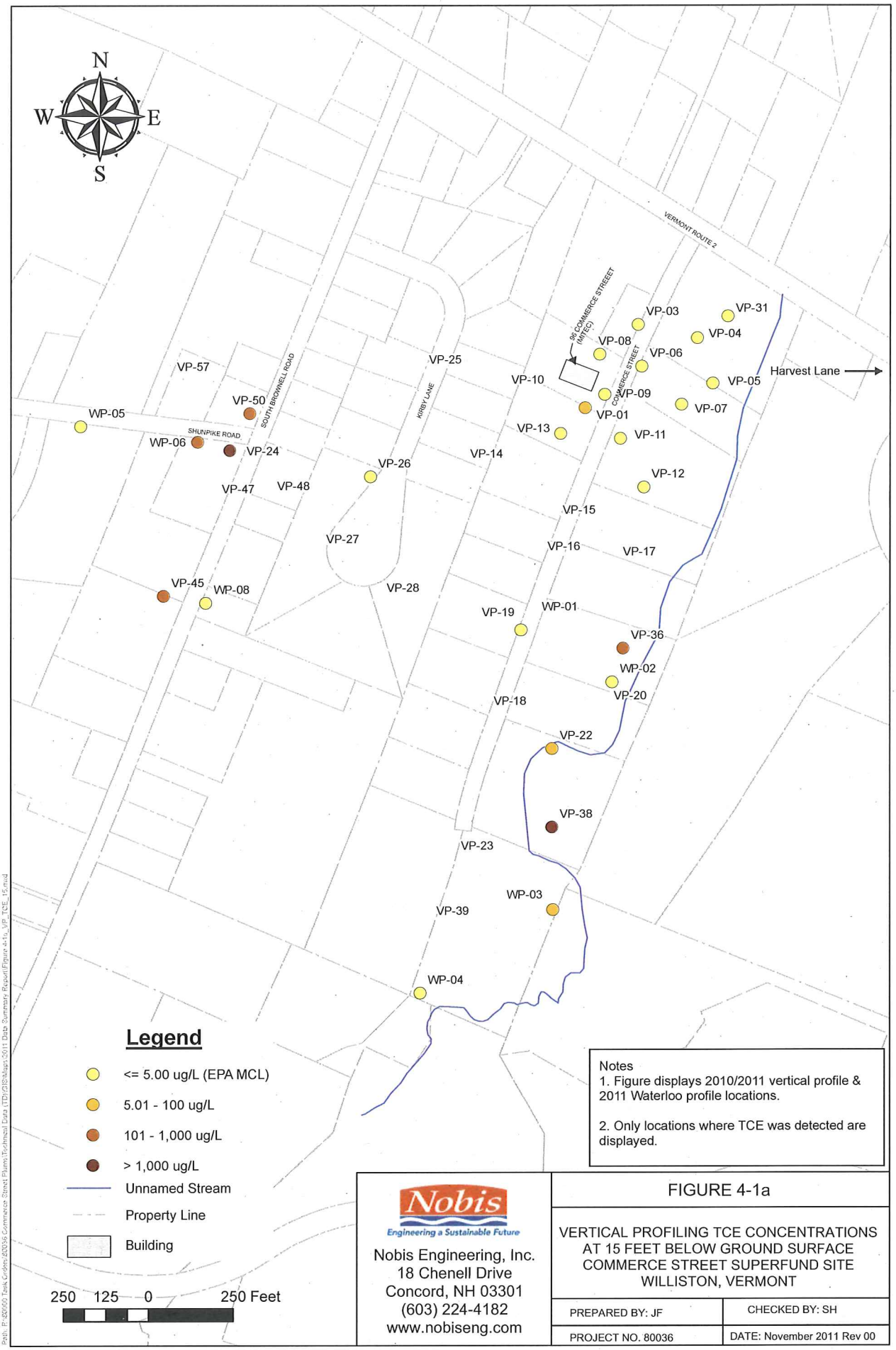
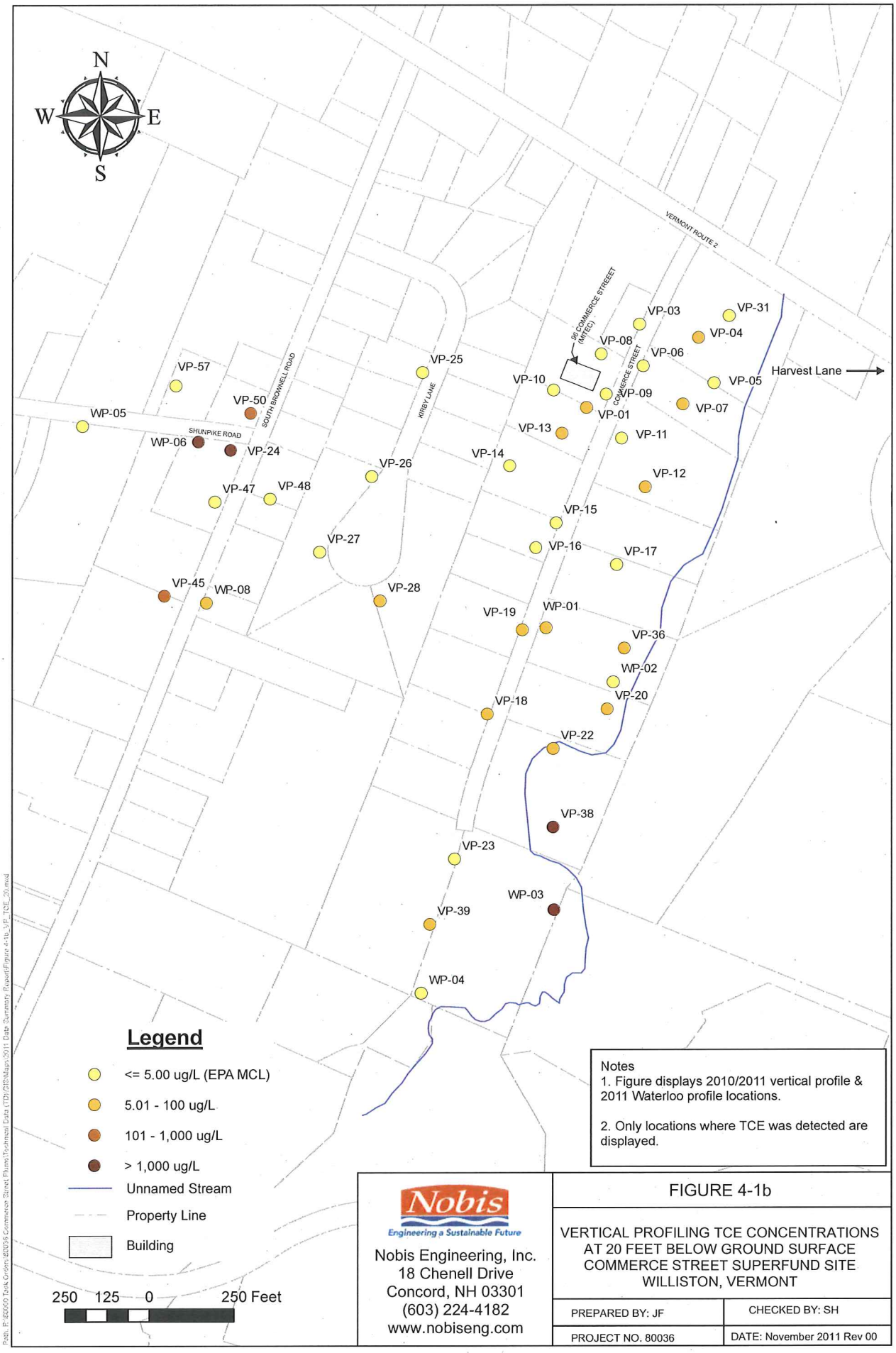
FIGURE 3-2

2011 VERTICAL PROFILING
TOTAL METALS RESULTS EXCEEDING STANDARD
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00


N
W
E
S
VERMONT ROUTE 2
90 COMMERCE STREEET (MITEC)
COMMERCE STREET
Harvest Lane
SOUTH BROWNELL ROAD
KIRBY LANE
SHUNPIKE ROAD
VP-03
VP-31
VP-04
VP-08
VP-06
VP-25
VP-57
VP-10
VP-05
VP-09
VP-07
VP-50
WP-05
VP-01
VP-13
VP-11
WP-06
VP-24
VP-14
VP-26
VP-12
VP-47
VP-48
VP-15
VP-27
VP-16
VP-17
VP-45
WP-08
VP-28
VP-19
WP-01
VP-36
WP-02
VP-20
VP-18
VP-22
VP-38
VP-23
WP-03
VP-39
WP-04
Legend
<= 5.00 ug/L (EPA MCL)
5.01 - 100 ug/L
101 - 1,000 ug/L
> 1,000 ug/L
Unnamed Stream
Property Line
Building
250 125 0 250 Feet
Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.
2. Only locations where TCE was detected are displayed.
Nobis
Engineering a Sustainable Future
Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
(603) 224-4182
www.nobiseng.com
FIGURE 4-1a
VERTICAL PROFILING TCE CONCENTRATIONS AT 15 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT
PREPARED BY: JF
CHECKED BY: SH
PROJECT NO. 80036
DATE: November 2011 Rev 00
Path: P:\80000 Tank Corbin\80036 Commerce Street Plume\Technical Data (TD)\GIS\Maps\2011 Data Summary Report\Figure 4-1s_VP_TCE_15.mxd



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(603) 224-4182
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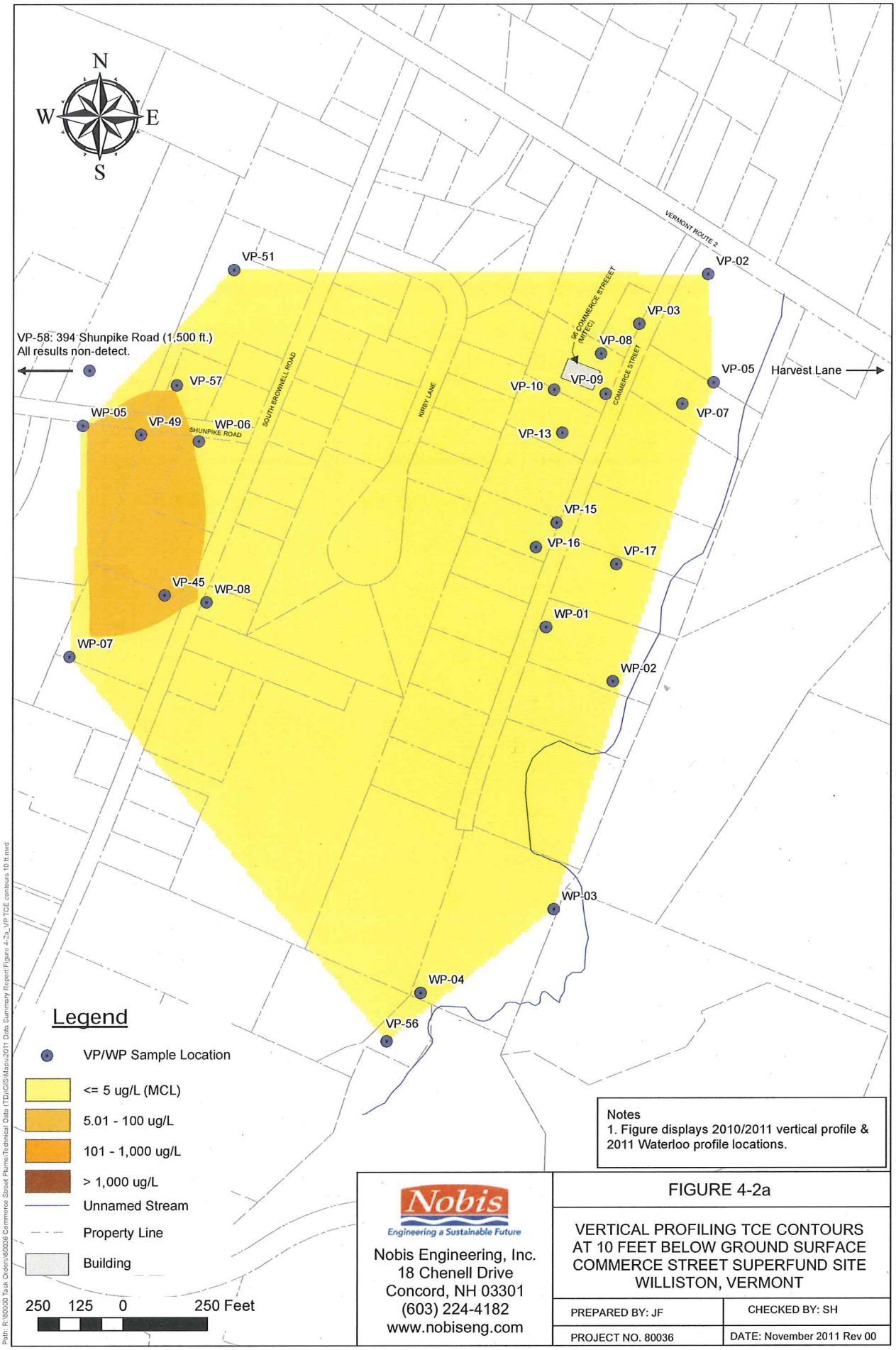
FIGURE 4-1b

VERTICAL PROFILING TCE CONCENTRATIONS
AT 20 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00



Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.

Nobis Engineering, Inc.
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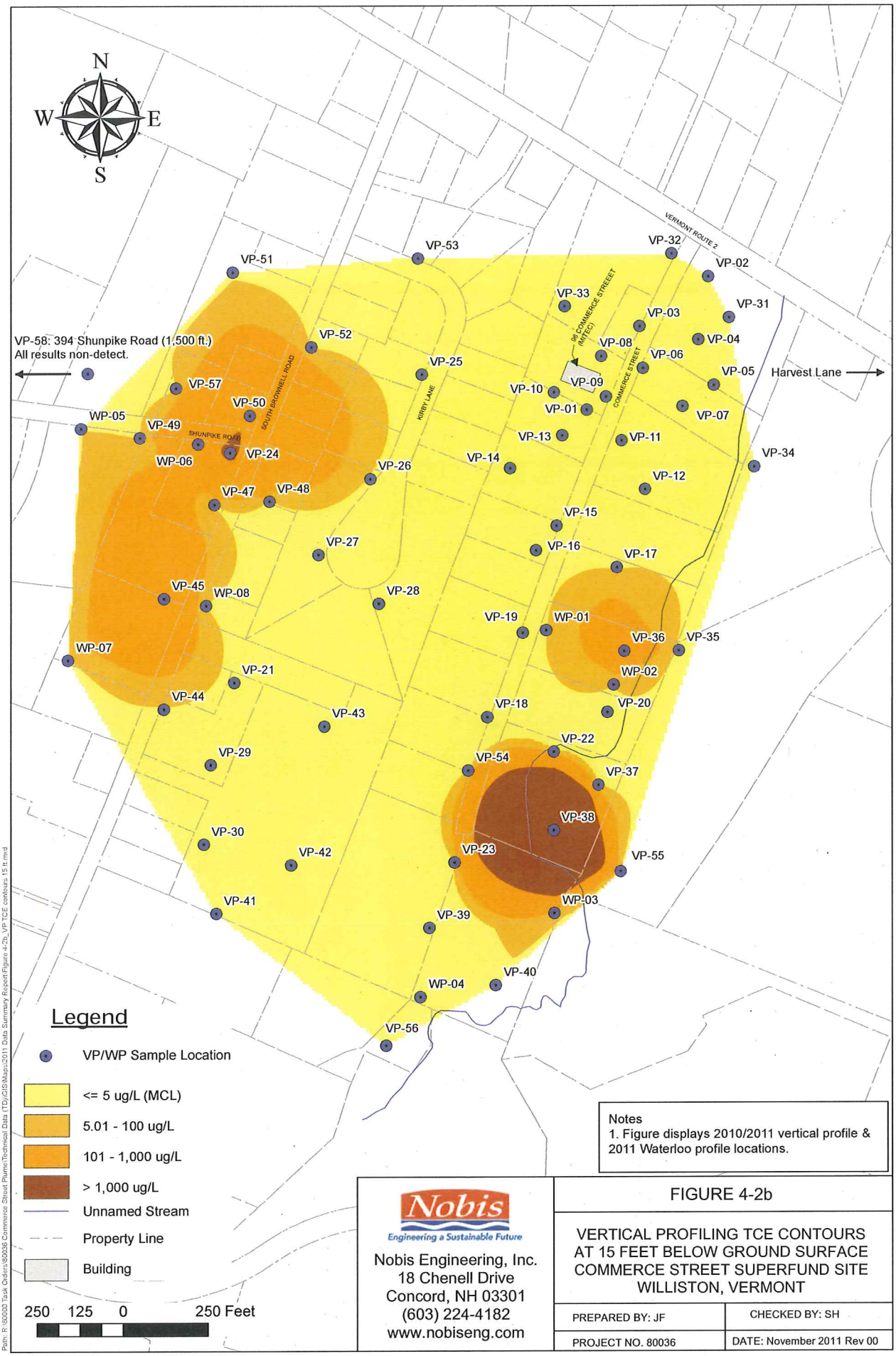
Concord, NH 03301
(603) 224-4182
www.nobiseng.com

FIGURE 4-2a

VERTICAL PROFILING TCE CONTOURS
AT 10 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00

Path: R:\80000 Task Orders\80036 Commerce Street Plume\Technical Data (TD)\GIS\Maps\2011 Data Summary Report\Figure 4-2a_VP TCE contours 10 ft.mxd


N
W
E
S
VP-58: 394 Shunpike Road (1,500 ft.)
All results non-detect.
VERMONT ROUTE 2
Harvest Lane
SHUNPIKE ROAD
SOUTH BROWNELL ROAD
KIRBY LANE
COMMERCE STREET
98 COMMERCE STREEET (MITEC)
VP-51
VP-53
VP-32
VP-02
VP-33
VP-31
VP-03
VP-52
VP-04
VP-08
VP-06
VP-25
VP-05
VP-57
VP-10
VP-09
VP-50
VP-01
VP-07
WP-05
VP-49
VP-13
VP-11
VP-24
VP-34
WP-06
VP-26
VP-14
VP-12
VP-47
VP-48
VP-15
VP-27
VP-16
VP-17
VP-45
WP-08
VP-28
VP-19
WP-01
VP-36
VP-35
WP-07
VP-21
WP-02
VP-44
VP-43
VP-18
VP-20
VP-22
VP-29
VP-54
VP-37
VP-38
VP-30
VP-23
VP-55
VP-42
VP-41
WP-03
VP-39
VP-40
WP-04
VP-56
Legend
VP/WP Sample Location
<= 5 ug/L (MCL)
5.01 - 100 ug/L
101 - 1,000 ug/L
> 1,000 ug/L
Unnamed Stream
Property Line
Building
250 125 0 250 Feet
Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.
Nobis
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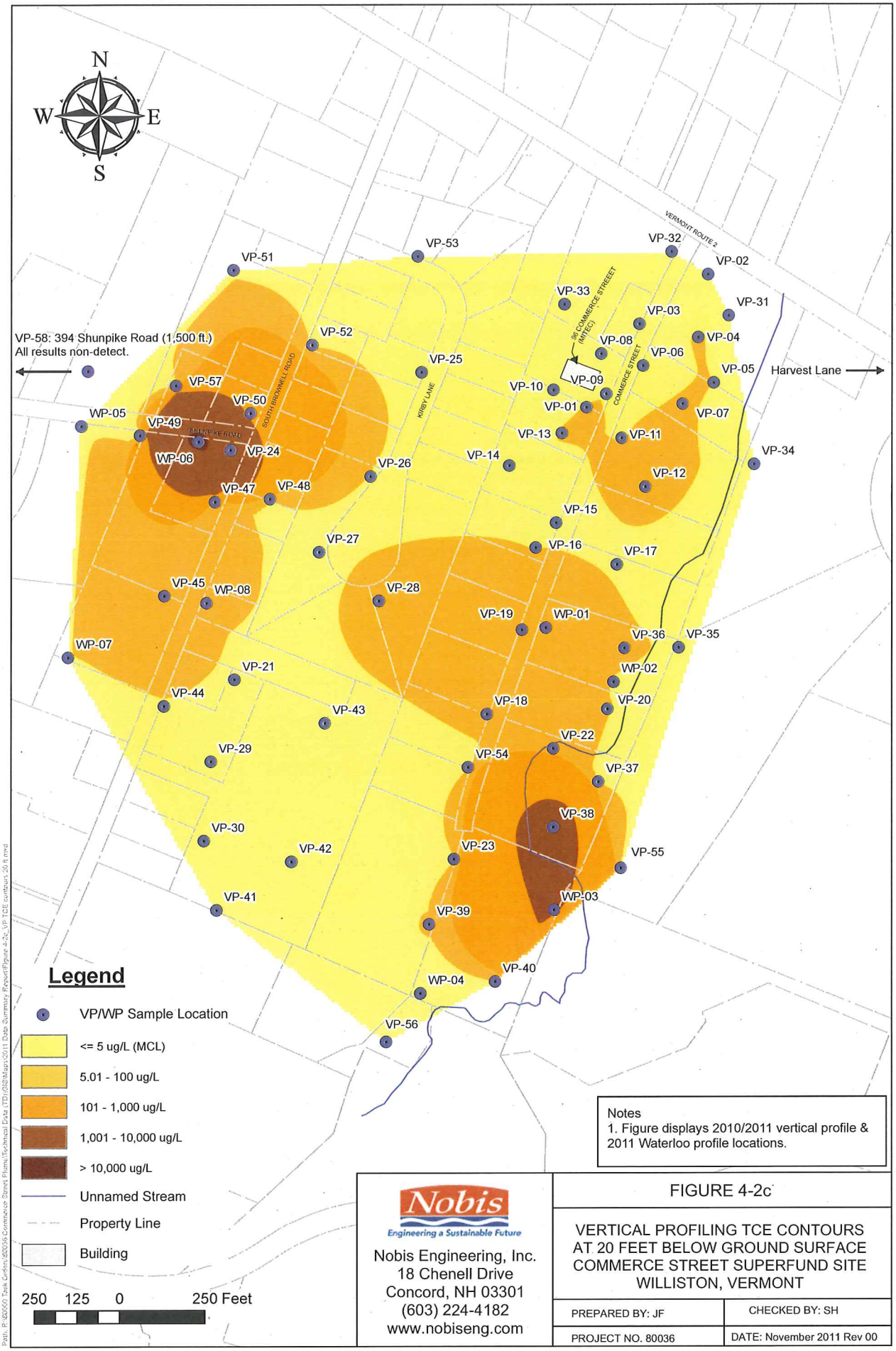
Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
(603) 224-4182
www.nobiseng.com
FIGURE 4-2b
VERTICAL PROFILING TCE CONTOURS AT 15 FEET BELOW GROUND SURFACE COMMERCE STREET SUPERFUND SITE WILLISTON, VERMONT
PREPARED BY: JF
CHECKED BY: SH
PROJECT NO. 80036
DATE: November 2011 Rev 00
Path: R:\80000 Task Orders\80036 Commerce Street Plume\Technical Data (TD)\GIS\Maps\2011 Data Summary Report\Figure 4-2b_VP TCE contours 15 ft.mxd



Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.

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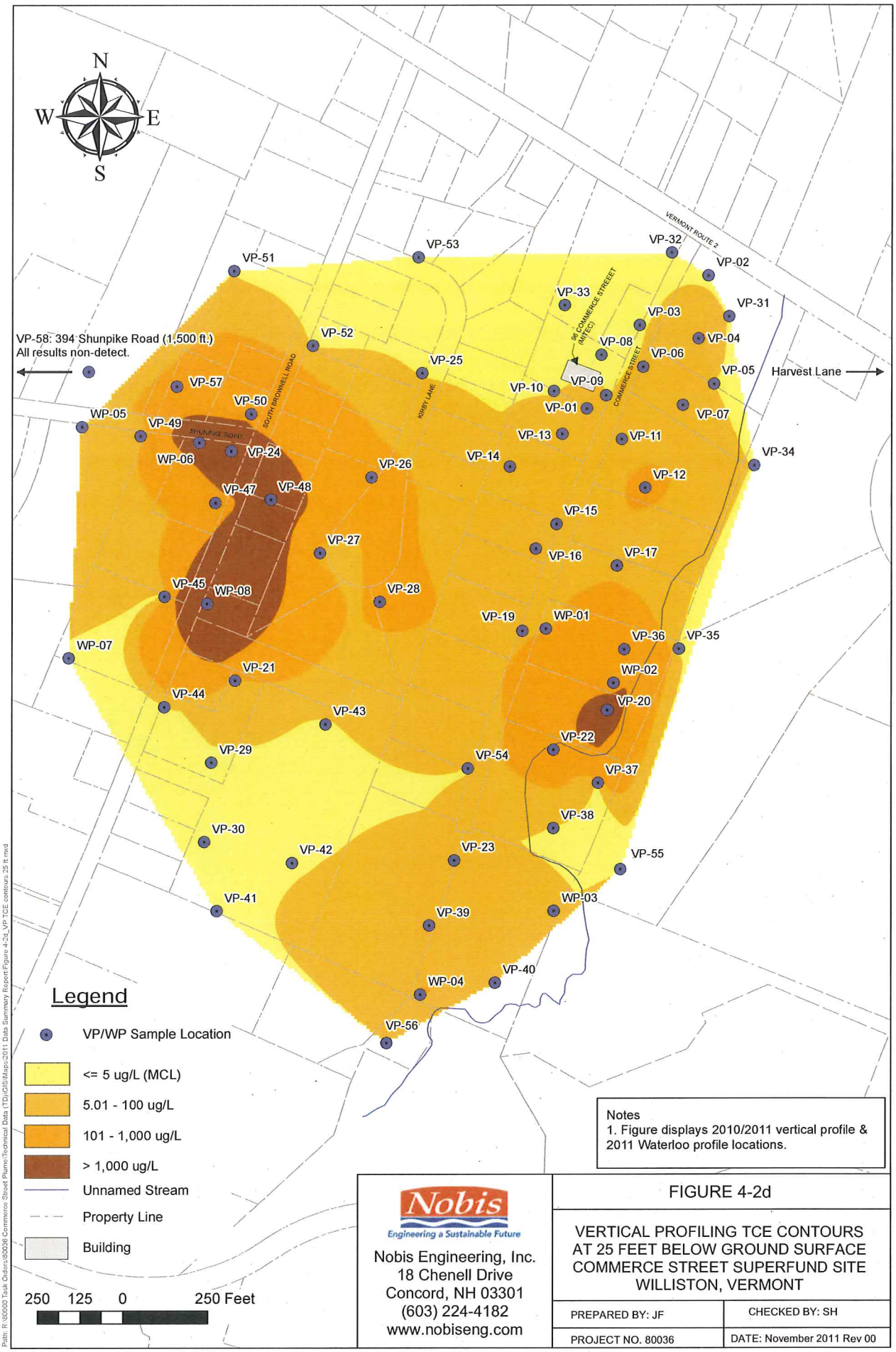
FIGURE 4-2c

VERTICAL PROFILING TCE CONTOURS
AT 20 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00

Path: P:\80000 Task Orders\80036-Commerce Street Plume\Technical Data (TD)\GIS\Maps\2011 Data Summary Report\Figure 4-2c_VP TCE contours 20 ft.mxd



Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.

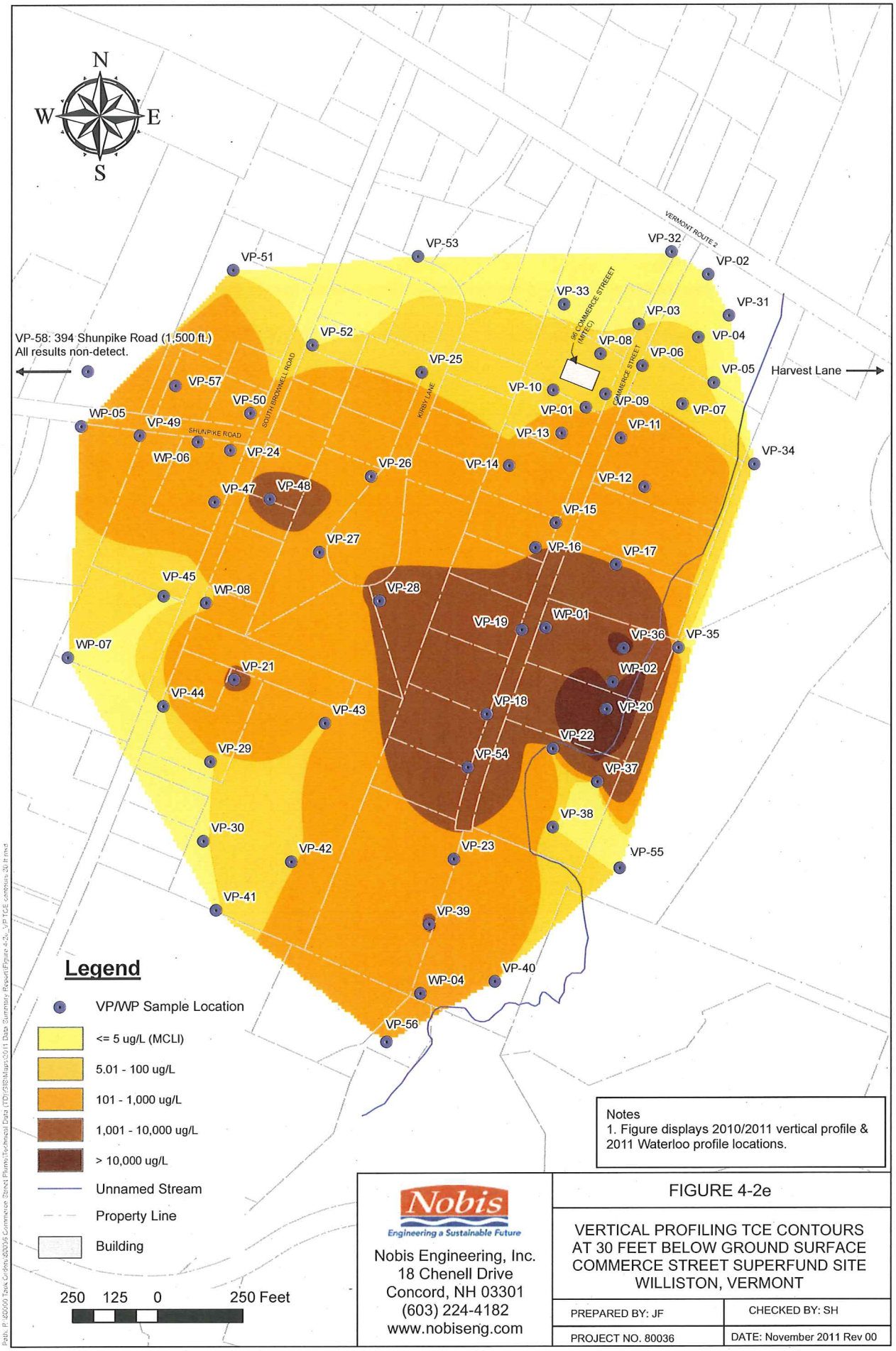
Path: R:\80000 Task Orders\80036 Commerce Street Plume\Technical Data (TD)\GIS\Maps\2011 Data Summary Report\Figure 4-2d_VP TCE contours 25 ft.mxd

Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
(603) 224-4182
www.nobiseng.com

FIGURE 4-2d

VERTICAL PROFILING TCE CONTOURS AT 25 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00



Notes
1. Figure displays 2010/2011 vertical profile & 2011 Waterloo profile locations.

Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
(603) 224-4182
www.nobiseng.com

FIGURE 4-2e

VERTICAL PROFILING TCE CONTOURS
AT 30 FEET BELOW GROUND SURFACE
COMMERCE STREET SUPERFUND SITE
WILLISTON, VERMONT

PREPARED BY: JF	CHECKED BY: SH
PROJECT NO. 80036	DATE: November 2011 Rev 00

Town of Williston

Stormwater Management Program 2013

Appendix 7

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION (CCRPC)
AN AGREEMENT FOR MISCELLANEOUS CONSULTANT SERVICES WITH
WINOOSKI NATURAL RESOURCES CONSERVATION DISTRICT
JUNE 2011 - JUNE 2014

THIS AGREEMENT by and between the Chittenden County Regional Planning Commission, a public body formed by its member municipalities, as enabled under 24 VSA 4341, with its principal place of business at 110 West Canal Street, Suite 202, Winooski, Vermont 05404, hereinafter referred to as the "CCRPC", and Winooski Natural Resources Conservation District, with its principal place of business located at 617 Comstock Road, Suite 1, Berlin, VT 05602 hereinafter referred to as the "CONSULTANT." With regards to this Agreement, the CCRPC is acting as Lead Agency on behalf of the Chittenden County Public Involvement and Participation Program, a collaborative effort governed by an MOU signed in early 2011 by eight municipalities, three other entities and the CCRPC, hereinafter referred to as the "CCST", short for Chittenden County Stream Team.

The MOU signatories are required to implement a Program to collectively satisfy the requirements for Minimum Control Measure Two ("Public Education and Outreach") of the Phase II NPDES permit for Program Years July 2011 through June 2016.

CONSULTANT responded in a timely fashion [ATTACHMENT B] to an RFP [ATTACHMENT A] issued by the CCRPC, its proposal was reviewed along with others and was selected by CCRPC to implement the Scope of Work, herein

1. SCOPE OF WORK; DELIVERY

CONSULTANT shall perform or cause to be performed, and timely deliver to the CCRPC, the following items:

Anticipated tasks for the first year of the program are as follows. Further direction shall be given to the CONSULTANT at a June 2011 project kickoff meeting and throughout the life of the project by CCRPC:

1. Regular Tasks:

- Maintain Facebook page with regular postings and work to steadily increase its "fans/friends" list
- Maintain www.ccstream.org website with up to date information on stormwater related workshops and projects sponsored by CCST as well as other partners;
- Recruit and maintain volunteers from member communities, recruit neighborhood leaders to help spread the word and build esprit de corps by articulating the mission and vision of CCST, staying in touch with volunteers and keeping it fun!

o Organize quarterly Steering Committee meetings and communicate with members between meetings.

o Maintain a simple accounting system or spreadsheet to track hours and expenses and activities carried out

o Communicate regularly with the CCRPC on anticipated tasks, expenditure tracking

o Build relationships with and leverage expertise from other organizations working on water quality issues (i.e. Friends of the Winooski, Lake Champlain Committee, Green Up Day, Lake Champlain Basin Program) including potential joint sponsorship of workshops and projects.

o Solicit and secure Associate memberships ($100 minimum contribution), donations, or in-kind purchases from individuals, the business community and others to add to or replace dues paid by members.

2. Event-driven tasks

o Host a Spring kickoff event to get neighborhood leaders in touch with one another and excited about the upcoming field season;

o Hold outreach events at spring farmers' markets or other spring/early summer events in three municipalities per year to continue to reach new volunteers;

o Complete three workshops or projects in each year with at least one event in each of the areas of the full members over the five year permit period; reasonable fees may be charged for workshop participation if attendee receives a tangible asset such as a rain barrel.

o Provide guidance to volunteers on techniques and materials they can use to host their own projects or workshops.

3. Annual Tasks

o Prepare an annual summary including the number of events, number of participants and other measureable quantities showing how CCST met the MCM-#2 requirements that members can use in their annual reports to Vermont ANR.

o Recognize volunteers who take the lead in spreading the word to their neighbors or take on other leadership role

Tasks for each subsequent year, July 2012-June 2013, July 2013-June 2014 and so on, shall be detailed in the spring of year by the CCRPC in consultation with the Project Steering Committee and are considered to be incorporated by reference. If CCRPC asks WNRCD to complete task (s) outside the scope of the above or beyond the amounts specified, WNRCD shall identify the anticipated cost on a Time and Materials basis to perform the requested task(s). CCRPC shall

then respond or not with an authorization to proceed. Such tasks and costs shall be understood to be in addition to tasks (1) – (3) above.

2. PAYMENT PROCEDURES

On behalf of the RSEP, the CCRPC shall pay to the CONSULTANT, on a time and materials basis, monies due for tasks, or portions of tasks, as outlined in the RFP [Attachment A]. Scope of Work and the Proposal submitted by WNRCD [see Attachment B], that are completed in accordance with the requirements of this Agreement. Requests for payment shall be accompanied by a brief description of the work performed, including expense line items, and shall be made directly to the CCRPC for all work. Invoices shall include a breakout detailing the hourly rates per employee and the hours expended on various tasks. Invoices shall be submitted monthly directly to the CCRPC at the address listed above. One copy is required submitted via email as a PDF or paper via US Mail or fax.

For the initial 13 month period, June 2011 through June 2012, the following amounts are set by category for this Agreement and shall corresponded in a general fashion with the allocation of hours as noted in ATTACHMENT B.

Contractor staff and partner staff costs	$12,316
Rates for this initial period shall be $35 per hour for Justin Kenney and $32 per hour for Ann Smith.	
Project-related expenses	$5,600
CCRPC shall only be liable for reimbursement of contractor expenses authorized by CCRPC prior to any notice of termination being sent or for payment of project-related expenses such as advertising previously authorized by CCRPC.	
TOTAL	$17,916

For the following two years, commencing July 2012, a new budget for this contract shall be established for each year. Total budget for the program shall depend upon the number of members participating and any grants or donations received or other monies. The Steering Committee of the signatories to the MOU shall determine the funds available for the Contractor to implement the required Program and funds to pay for Lead Agency services.

Budget

The minimum total annual budget for this Program is estimated at $19,800 comprised of dues from 11 members at $1,800 each. (Additional funds may be raised through workshop fees, donations and associate member dues. Use of any additional funds will be decided by the Steering Committee. Additional funds could be used to reduce members annual dues, expand the Scope of Work for the Contractor or the Lead Agency and/or uses consistent with the governing MOU and or the Work Plan) There is also a possibility that other MS-4 permitees could join the effort in future years. For the period, June 2011 through June 2012, $17,916 is allocated for

Contractor costs, $1,980 for Lead Agency fees and $84 in reserve.

The performance of the contractor will be assessed on an annual basis each spring.

In the performance of the tasks above, the contractor, at minimum

a) shall participate in a 2 hour program kickoff meeting in early June with CCRPC staff and others to review the Scope of Work in detail so program and contract deliverables are clear.
b) work closely with CCRPC staff and representatives of the 11 participating MS-4 entities .
c) should be aware that representatives and/or staff of the MS-4 entities noted above can provide guidance on the implementation of the programs and workshops and potentially provide ancillary assistance at the events themselves.
d) be aware that the Stream Team already has a blue 10' x 10" booth tent[E-Z Up Instant Shelter], a 10 ft x 1 ft. white banner labeled "Chittenden County Stream Team" and a 7-amp cordless drill with various saw hole attachments for rain barrel fabrication.
e) should be aware that the CCRPC will not reimburse the contractor for mileage expenses.
f) should utilize pre-existing materials to the maximum extent possible. Some options for pre-existing materials can be seen at:
http://www.ccstreamteam.org
http://www.vacd.org/winooski/index.shtml
http://www.sburlstormwater.com/resources/disconnect.pdf
http://www.smartwaterways.org/prob.html
http://www.anr.state.vt.us/dec/waterq/planning/docs/pl_communitystormwatereducationfinal126.pdf.
http://www.lcbp.org/action.htm

3. RETENTION OF RECORDS

The CONSULTANT shall retain in its files all books, documents, papers, accounting records, and other evidence pertaining to costs incurred for work under this Agreement for a period of at least three (3) years after payment of the final voucher by CCRPC. Upon written request by the CCRPC, the consultant shall provide access to these records, at reasonable times and in a reasonable manner, during the contract period or anytime within the aforementioned retention period and shall furnish to CCRPC copies of these documents upon request and at reasonable cost.

4. OWNERSHIP OF WORK

All data and materials furnished to the CONSULTANT by the CCRPC in connection with the scope of services are, and will remain, the property of CCRPC.

5. COPYRIGHTS AND RIGHTS IN DATA

All data, materials, and work products associated with this project, whether preliminary or final and whether in paper or electronic format, shall be the property of the CCRPC and if

protected by copyright, trademark or license shall be done so only to the benefit of the CCRPC. The CCRPC shall retain all publication and copy rights, subject to applicable law. Materials collected by CONSULTANT in the course of producing the work described in this Agreement may be used by CONSULTANT with the express written approval of CCRPC, which approval shall not be unreasonably withheld.

6. SETTLEMENT OF MISUNDERSTANDINGS

To prevent misunderstandings and litigation, the parties mutually agree that a mutually agreeable mediator shall act as referee on all questions arising under the terms of this Agreement. Nothing herein shall be construed as preventing either party to this Agreement from pursuing any and all remedies for the resolution of disputes available by law.

7. GENERAL COMPLIANCE WITH LAWS

CONSULTANT shall comply with all Federal, State and local laws and ordinances applicable to any of the work involved under this Agreement. The provisions of this Agreement shall be applied and interpreted in a manner consistent with each other so as to carry out the purposes and intent of the parties. If, for any reason, any provision of this Agreement is unenforceable or invalid, that provision shall be deemed severed from this Agreement, and the remaining provisions shall be carried out with the same force and effect as if the severed provision had not been a part of this Agreement. This Agreement shall be governed by law of the State of Vermont.

8. ACCEPTANCE

CCRPC shall have twenty (20) days from the date that the work is received in its offices to reject in writing all or a part of the same if it is not in conformance with this Agreement. Any notice of rejection shall be sent to CONSULTANT'S address, listed above, and shall state the reason for such rejection. Any work not rejected in writing by CCRPC within the time periods stated above, shall be deemed accepted.

9. AMENDMENT

No changes or amendments to the Agreement shall be effective unless reduced to writing and acknowledged by a duly authorized representative of both the CCRPC and CONSULTANT.

10. TERMINATION AND SUSPENSION

The CCRPC or the CONSULTANT may cancel this agreement by issuing written notice to the other party no less than forty-five (45) days before the proposed termination date.

11. EFFECTIVE DATE AND LENGTH OF AGREMENT.

The effective date of this Agreement shall be June 1, 2011 and shall terminate on June 30, 2014 unless extended by writing by mutual agreement of the Parties.

CONSULTANT

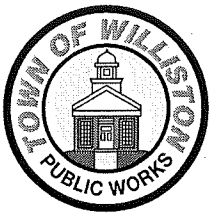
Justin Kenney
Winooski Natural Resources Conservation District

5/25/11
Date

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

5/26/11
Date

ATTACHMENT A	RFP issued by the CCRPC for "Implementation of a five-year Chittenden County Stormwater Public Involvement and Participation Program"
ATTACHMENT B	Proposal from WNRCD dated April 22, 2011



Town of Williston

Stormwater Management Program 2013

Appendix 8

Chapter 29
Watershed Health

health in Williston by regulating construction site erosion and stormwater management in new developments and on redevelopment sites. This chapter also establishes standards for the provision and protection of watershed protection buffers along streams and around wetlands and lakes.

These standards help protect water quality and watershed

29.1 Purpose - Authority

29.1.1 What is the purpose of these standards? In adopting these standards the Selectboard makes the following findings:

- it is well documented that land development - which alters the volume, velocity, and quality of surface runoff – is likely to adversely affect nearby streams, including the capacity and stability of their channels, their physical and chemical characteristics, and the health of the biological communities they support;

- federal law (see 33 U.S.C. 1293(d)) requires the State of Vermont to maintain a list of streams that are impaired, that is, that do not fully support certain functions due to poor water quality;

- the Allen Brook, Williston's principal stream, appears on that list because scientific surveys have shown it to be impaired for aquatic life support and contact recreation due to land development and the accompanying stormwater runoff and erosion;

- the Muddy Brook, Williston's natural boundary with South Burlington, also appears on Vermont's list of impaired waters because it fails to provide aquatic life support due to a lack of riparian buffers, land development, and erosion;

> See *http://www.anr.state.vt.us/dec/waterq/planning/docs/pl_2008.303d_Final.pdf* for Vermont's list of impaired waters. For factual background see the *Watershed Improvement Plan and Recommendations for a Total Maximum Daily Load (TMDL) for Sediment: Allen Brook, Williston Vermont: Final Report – March 29, 2003* by Lori Barg, Kari Dolan, Cully Hession, Chris Cianfrani, and Bob Kort, State of Vermont, Department of Environmental Conservation, Water Quality Division.

- the Town of Williston is subject to state and federal permitting requirements as a municipal small separate storm sewer (MS4) operator;

- the general permit (3-9017, as amended) under which Williston operates as an MS4 requires the town to adopt "minimum control measures," including programs for the reduction of pollutants from construction sites and for the post-construction management of stormwater runoff from new developments and redevelopment sites;

- while the town has actively worked on watershed health through its investments in stream restoration and the application of its regulations, restoring the health of the Allen Brook, preventing the addition of other local

streams to the list of impaired waters, and complying with the requirements imposed by the MS4 permit make it necessary to adopt these standards.

29.1.2 Under what authority does the town adopt these standards? These standards are adopted under the authority of 24 V.S.A. § 4417(9). As noted in WDB 29.1.1, above, their adoption is also specifically required by 4.2.3 and 4.2.5 of General Permit 3-9017 (as amended February 19, 2004), as issued by Vermont Agency of Natural Resources, Department of Environmental Conservation.

29.2 Applicability

29.2.1 What activities are subject to these standards? These standards apply to any development for which a permit is required by this bylaw.

29.2.2 Are there any exceptions from these standards? As provided by WDB 4.2.1.2., accepted agricultural and forestry practices are exempt. Developments in which the total cumulative land disturbance including all clearing, grading, and excavation, is less than ¼ (one-quarter) acre are also exempt from the standards adopted in this chapter, but are encouraged to monitor and minimize runoff and erosion, taking whatever measures are needed to protect neighboring properties and water quality.

29.2.3 What about small projects? These standards recognize that the level of runoff and erosion control required to protect water quality varies with the size and location of the proposed development.

29.2.3.1 Low Risk Development. WDB 29.3 sets relatively simple runoff and erosion control standards for smaller developments that pose a relatively low risk of accelerated runoff, erosion, and sedimentation.

29.2.3.2 All Other Development. WDB 29.4 establishes runoff and erosion control standards for larger developments and development in vulnerable areas.

29.2.4 What about routine maintenance? What about emergencies? These standards do not apply to the routine maintenance of public and private roads or utilities, including stormwater management works, nor do they apply to emergency repairs required by flooding, slope failures, or other natural hazards or civil emergencies, like a bridge failure. It is understood, however, that runoff and erosion control measures will be incorporated into maintenance activities where necessary, as part of the "good housekeeping" practices required by the town's MS4 permit.

29.3 Low Risk Development

29.3.1 What is a Low Risk Development? A low risk development is one in which the cumulative land disturbance is greater than ¼ (one-quarter) acre, but less than two (2) acres, in which all land that will be disturbed is outside the watershed protection buffers established by this chapter, and in which all land that will be disturbed has a slope of less than eight percent (8%).

29.3.2 What runoff and erosion control standards apply to Low Risk Development?

29.3.2.1 State Handbook. Applications for permits for low risk developments shall be accompanied by a completed Runoff and Erosion Control Checklist that shows how the applicant will comply with the guidance provided in the current edition of Vermont's *Low Risk Site Handbook for Erosion Prevention and Erosion Control.*

Where can I find the *Low Risk Site Handbook for Erosion Prevention and Erosion Control*? On-line at: http://www.vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf

29.3.2.2 Additional Standards. Low risk developments must also comply with WDB 29.5.1 and 29.5.9-12.

29.4 Runoff and Erosion Control Plans for Other Developments

29.4.1 When must a runoff and erosion control plan be submitted? All applications for permits for developments that are not exempted by WDB 29.2.3.1, or defined as 'low risk' by WDB 29.3.1, above, shall be accompanied by a professionally-prepared runoff and erosion control plan that shows how compliance with the performance standards of WDB 29.5 will be attained both during the construction of the proposed development and the continuing use of the site.

29.4.2 What must be included in a runoff and erosion control plan? Runoff and erosion control plans shall be based on a grading plan of the site and its immediate environs, showing existing and proposed contours at intervals of no more than two feet and all information required by the Erosion and Runoff Control Plan Checklist. EXCEPTION: Detailed contour mapping is not required for portions of a site that will not be disturbed, but sufficient information must be provided to show how the transition from disturbed to undisturbed areas will be made.

29.4.3 How will a proposed runoff and erosion control plan be reviewed? The town's review of a proposed runoff and erosion control plan will begin with a meeting between the Administrator and the DPW or their designees and the applicant's designer. This meeting will ordinarily be on-site. If the application for a permit is approved, there will also be a pre-construction meeting, as required by WDB 29.5.3.

29.5 Runoff and Erosion Control Standards. Because these performance standards recognize that there is a different solution for every site, they sometimes use permissive terms, like 'should.' The use of permissive terms does not constitute an exception to a performance standard. It indicates only that the town is willing to review a variety of possible ways of achieving compliance.

29.5.1 Design to minimize runoff and erosion. The proposed site plan should fit the site, with the area to be disturbed, cut and fill, and impervious surfaces being minimized.

29.5.1.1 Avoid Slopes. Development should be directed away from slopes. This bylaw calls for reduced densities on slopes over 15% (see Chapter 19 and the various zoning districts). Development is prohibited (except where a variance can be justified) on slopes of 30% or more.

29.5.1.2 Fit the Terrain. Architectural forms and site improvements should fit the terrain. Access drives and roads, parking and loading areas, utility lines, and the long axes of buildings should run more or less parallel to, not more or less perpendicular to slopes. Where buildings cross slopes, floors should be staggered with the slope. Additional site planning

and design standards designed to ensure that development fits the terrain are imposed in some zoning districts, including the ARZD, GZDN, GZDS, and RZD.

29.5.1.3 Phase Construction. The area disturbed at any one time shall be minimized in both time and space. The runoff and erosion control plan shall show how clearing, grading, excavation, and fill will be phased so that disturbance is promptly followed by revegetation, and/or structural stabilization of the site, including temporary stabilization where areas will remain disturbed for more than 15 days. A copy of the phasing schedule and a checklist on which the installation of measures by phases is recorded shall be maintained on the site for review by the town when inspections are made.

29.5.1.4 Minimize Impervious Surfaces. The extent of paving and other impervious surfaces should be minimized by thoughtful site planning that keeps roads as narrow and as short as possible, and that keeps surface parking areas small. The use of porous pavements where site conditions permit is also strongly encouraged, and may be required of uses that propose to place extensive parking areas in impaired watersheds.

29.5.2 Mark disturbance limits. Land disturbance (clearing, grading, excavation, and fill) shall be confined within limits that are clearly marked on the site during construction. Disturbance limits must be shown on the runoff and erosion control plan, then established in the field, subject to inspection before any clearing, grading, excavation, or fill begins. Disturbance limits must be marked with a fence or other barrier sufficiently durable to last through the anticipated construction period. This fence or barrier should be supplemented with brightly colored flagging or tape. Work outside the approved disturbance limits is a violation of this bylaw, subject to enforcement, as provided by WDB 7.4-7.6.

29.5.3 Hold a pre-construction meeting. Before any work for which a runoff and erosion control plan is required is begun, the disturbance limits shall be marked on the site and the applicant shall arrange an on-site preconstruction meeting between the town staff and all design professionals, contractors, and subcontractors who will be responsible for the observance of those limits. The purpose of this meeting shall be to review the runoff and erosion control plan for construction, including the sequence and schedule for the installation of runoff and erosion control measures, and the importance of maintaining those measures during the construction period.

29.5.4 Divert runoff from disturbed areas. Disturbed areas shall be protected from surface runoff by diversion dikes or channels, silt barriers, filter strips, or other measures until they are revegetated or otherwise stabilized.

29.5.5 Stockpile and replace topsoil. All topsoil removed shall be stockpiled and used in the revegetation of the site. To put it another way, the topsoil from the site shall be used there, and not replaced with an inferior material.

29.5.5.1 Silt Fence. Topsoil stockpiles shall be surrounded by a silt fence or an equally effective sediment control measure that also protects the stockpile from damage during construction activity.

29.5.5.2 Temporary Cover. Topsoil stockpiles shall be stabilized with mulch that is renewed weekly or, if the stockpile will not be worked for more than a week, by a mulch followed by a temporary cover crop.

29.5.6 Protect retained vegetation. Existing vegetation that is to be retained must be protected from damage during construction, as required here and, in more detail, by the *Public Works Standards*. The runoff and erosion control plan must include a schedule (see the *Runoff and Erosion Control Plan Checklist*) showing that all measures required to protect existing vegetation will be put in place before other construction activities begin. This schedule may apply to the entire site or to sequential phases of construction.

29.5.6.1 Earthwork Within the Dripline. There should be no clearing, grading, excavation, or other construction activity, including the placement of underground utilities, within the drip line of trees that are to be retained. The Administrator may permit minor exceptions to this standard where the terrain or the location of existing utilities and/or buildings make compliance infeasible.

29.5.6.2 Storage Within the Dripline. There shall be no storage or parking of construction equipment, materials, vehicles, or waste on or around trees and roots or other vegetation that is to be retained. This specifically prohibits the dumping of paint, petroleum products, concrete or stucco mix, dirty water, or any other material that may be deleterious to vegetation that is to be retained.

29.5.6.3 Use of Trees. The use of trees as a winch supports or anchorages, as temporary power poles, as sign posts, or for other similar functions is prohibited.

29.5.6.4 Pruning. Trees and shrubs that are to be retained should be properly pruned before construction begins. This will maximize their ability to withstand damage.

29.5.6.5 Porous Pavement. See WDB 29.5.1.4, above. The use of porous pavements protects existing root systems.

29.5.7 Anticipate and limit accelerated runoff

29.5.7.1 Channel Design. All filter strips, swales, grassed waterways, other channels, and outlets shall be designed and constructed to handle the anticipated increase in the volume and velocity of runoff without flooding or channel erosion.

29.5.7.2 Pre-Construction Rate. Runoff shall be retained on site and infiltrated and/or released at a rate not exceeding the pre-development rate of release.

29.5.8 Trap sediment on-site. Sediment resulting from accelerated soil erosion shall be retained on the site, with proposed provisions for regular maintenance and sediment disposal included in the construction schedule and in the maintenance manual and schedule required by the *Runoff and Erosion Control Plan Checklist.*

29.5.9 Make runoff and erosion control measures an asset. Filter strips, swales, grassed waterways and others channels, stormwater ponds, and other erosion and runoff structures shall be integrated into the landscaping plan for a site, contributing to the appearance and marketability of the proposed development and the community, as well as to watershed protection.

29.5.9.1 Lower Density Development. In lower density developments, erosion and runoff control measures should blend in with the topography and vegetation of surrounding woods and fields. As much runoff retention and sediment trapping as possible shall occur on the

surface or in shallow structures that mimic the vegetative composition and structure of natural wetlands and riparian areas.

29.5.9.2 Higher Density Development. Landscaped areas in higher density developments, including those required by Chapter 18 of this bylaw, should also, to the extent possible, be used for stormwater management. Given the higher impervious coverage, underground storage and mechanical treatment may also be used to comply with these performance standards.

29.5.10 Use appropriate plant materials. Proposed plant materials and planting mixes shall be suitable for the site and the intended application. The requirements of WDB 23.7 apply to all plant materials specified in runoff and erosion control plans.

29.5.11 Maintain runoff and erosion control measures. Runoff and erosion control measures must be installed as designed and properly maintained. Failure to maintain the required measures is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6.

29.5.12 Schedule inspections during construction. In order to ensure proper functioning and maintenance of required erosion and runoff control measures during the construction period, the applicant shall provide for regular inspections of all runoff and erosion control measures by a qualified professional during the construction period. An inspection and the repair or restoration of all measures is required after any precipitation event exceeding one inch. Reports on routine inspections shall be provided to the Administrator and DPW within five working days after each inspection is made.

29.5.13 Winter Construction. It is best to avoid winter construction, but Williston recognizes that this is not always possible. Where it is not, additional runoff and erosion control measures may be required. These measures are established in the state handbooks that are adopted by reference in WDB 29.5.14.

29.5.14 Where can I find more specific guidance for complying with these performance standards?

29.5.14.1 State Handbook: Construction. All construction site erosion control measures shall comply with the *Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites*, Special Publication No. 3, Vermont Geological Survey, or its successors, and with the current edition of the *Town of Williston Public Works Standards*.

29.5.14.2 State Handbook: Permanent. All long-term runoff and erosion control measures shall comply with *The Vermont Stormwater Management Manual for Watershed Improvement Permits, Volumes I and II*, Vermont Agency of Natural Resources, April and August, 2002 or their successors, and with the current edition of the *Town of Williston Public Works Standards*.

Additional Resources. The Environmental Protection Agency provides resources about low impact design to minimize stormwater runoff at http://www.epa.gov/nps/lid/#guide.

29.6 Required Improvements. All runoff and erosion control measures required for compliance with the standards established in this chapter are required improvements, subject to the requirements of Chapter 7 of this bylaw.

29.7 Discharge of Non-Stormwater Waste. Discharging non-stormwater wastes into any stormwater or street drainage system, public or private is a violation of this bylaw, subject to enforcement, as provided by WDB 7.4-7.6.

29.7.1 May I connect footing, foundation, or roof drains, or sump pumps to stormwater systems? Footing, foundation, and roof drains, and sump pumps should ordinarily be daylighted or infiltrated. They may be connected directly to a stormwater system only with the written permission of the DPW.

29.7.2 Must existing connections to stormwater systems be disconnected from stormwater systems? Whenever possible. Approval of any permit may be conditioned on the disconnection of existing footing, foundation, and/or roof drains or sump pumps.

29.8 Wetlands Protection

29.8.1 How will I know if I have wetlands on the site of my proposed development? A wetlands delineation prepared by a professional wetlands scientist in accord with the current guidelines of the Army Corps of Engineers must accompany all applications for discretionary permits for development on sites where wetlands are known or suspected to exist. The need for a wetlands delineation will be determined during pre-application review.

What is a wetland? Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year."

29.8.2 Are Class II wetlands protected in Williston? Class II wetlands are protected by state law and this bylaw. They must generally remain in their natural vegetation, but may be crossed by roads, trail, or utility lines where there is no feasible alternative to such a crossing and where all work is conducted in compliance with an approved runoff and erosion control plan and a Conditional Use Permit approved by the Agency of Natural Resources.

29.8.3 Are Class III wetlands protected in Williston? Class III wetlands generally are not protected by state law, but may be protected by this bylaw and are definitely regulated by the Army Corps of Engineers. The DRB may, upon the recommendation of the Conservation Commission, require that Class III wetlands with significant functional values remain in their natural vegetation. The Conservation Commission may also recommend, and the DRB require, that a functional assessment of the Class III wetlands on the proposed development site be provided along with the delineation.

Wetlands Classes? State and Federal Wetland Regulations. There are no Class I wetlands in Williston. Class II wetlands appear on, or are contiguous to wetlands that appear on, the *Vermont Significant Wetlands Inventory Maps* prepared by the Agency of Natural Resources. Class III includes all other wetlands. Information on Vermont's state wetlands regulations may be found on-line at: http://www.anr.state.vt.us/dec/waterq/wetlands.htm. Information on the Army Corps of Engineers regulation of wetlands may be found at http://www.usace.army.mil/cw/cecwo/reg/

29.9 Watershed Protection Buffers. This section establishes watershed protection buffers for all streams, ponds, and lakes, and for certain wetlands.

29.9.1 Are buffers required around lakes and ponds? Yes. There shall be a buffer of at least 150 feet above the ordinary high water mark of all ponds or lakes that have more than a half-acre (21,780 SF) of water surface;

29.9.2 Are buffers required along streams? Yes.

29.9.2.1 Named Streams. There shall be a buffer of at least 150 feet above the ordinary high water mark of the Allen Brook, the Muddy Brook, the Sucker Brook, and the Winooski River.

29.9.2.2 Other Streams. There shall be a buffer of at least 50 feet above the ordinary high water mark of all unnamed streams – perennial or intermittent - identified on the 7.5' U.S. Geological Survey quadrangles covering the town, or on the Williston Field Stream Survey maps of the Allen and Muddy Brook watersheds prepared by the Vermont Department of Environmental Conservation.

29.9.3 Are buffers required around wetlands? Yes.

29.9.3.1 Class II Wetlands. There shall be a buffer of at least 50 feet above the delineated boundary of any Class II wetland.

29.9.3.2 Class III Wetlands. The DRB may, upon the recommendation of the Conservation Commission, require a buffer above Class III wetlands that have important functional values.

29.9.4 What is the relationship of watershed protection buffers and special flood hazard areas? The watershed protection buffers required by WDB 28.6.1through 28.6.3 shall be expanded, where necessary, to include special flood hazard areas.

Special Flood Hazard Areas. These areas are mapped for the National Flood Insurance Program and may sometimes include more area than the watershed protection buffers required by WDB 29.8. The official maps are on file with Williston Planning. See Chapter 28 of this bylaw for additional regulations applicable to Special Flood Hazard Areas.

29.9.5 Can any use be made of the land in watershed protection buffers? Watershed protection buffers shall remain undeveloped, except as provided here.

29.9.5.1 Vegetation. Watershed protection buffers shall remain in native or cultivated vegetation that serves as an effective filter for surface runoff. Where effective filtering vegetation is not present, the buffer shall be restored to a combination of wetland, riparian, forest, and/or meadow vegetation appropriate to the site. Removal or cutting of live or dead vegetation from a watershed protection buffer is prohibited except where the buffer is used for accepted agricultural or forestry practices, where a hazardous tree is present, or where it is necessary to control invasive species. All native vegetation cut within the buffer should be left in place whenever possible.

29.9.5.2 Lawns. Conventional turf grass lawns do not provide an effective filter for surface runoff and may not be included in the watershed protection buffers required by this section.

29.9.5.3 Impervious Surfaces. Development within watershed protection buffers shall be limited to utility and road crossings; trails and trail crossings, with minor related facilities like signs and benches; and runoff and erosion control measures.

- All work within a watershed protection buffer shall proceed in accordance with the runoff and erosion control standards of this chapter.
- Utility and road crossings of watershed protection buffers shall be consolidated wherever possible, and both the width and length of such crossings minimized. Minimum disturbance trenching may be required for utility lines.

- The runoff and erosion control measures permitted in watershed protection buffers shall be limited to outfall structures or other measures whose function requires such a location. Permanent stormwater works, including above or below ground detention and treatment, shall be permitted only where no alternative, upland location is feasible.

29.9.5.4 Outdoor Storage. Outdoor storage is not permitted in watershed protection buffers.

29.9.5.5 Lawn Chemicals. No lawn chemicals, including fertilizers, herbicides, and pesticides may be used in watershed protection buffers. The Administrator may permit an exception to this standard for the control of invasive plants by, or under the direction, of a public agency. This prohibition does not apply to accepted farm and forest practices, which are exempt, nor does it prohibit the use of compost or another organic fertilizer in conservation plantings.

29.9.5.6 Owners' Responsibilities. The covenants for developments that include watershed protection buffers shall include a reference to the standards adopted here (WDB 29.9.5) and in WDB 29.9.6. In developments where an owner's association is required, that association is responsible for the protection of the watershed protection buffers.

29.9.6 How will people know where watershed protection buffers are? Watershed protection buffers must be marked on the ground as well as on the final plans. This may be accomplished using plantings, fences, or other landscape features, like a line of boulders. The DRB may permit an exception to this standard where a watershed protection buffer is marked by a definite change in the terrain.

29.9.7 Is it possible to obtain a variance to permit more development within a watershed protection buffer? Additional development within watershed protection buffers may be made possible by variance, as provided by Chapter 8 of this bylaw. To approve such a variance, the DRB must make all of the findings required by WDB 29.9.7.1 and 29.9.7.2 as well as all findings required by WDB 8.1.

29.9.7.1 Impervious Cover. The development permitted by variance will result in a total impervious cover of no more than 10 percent within the buffer.

29.9.7.2 Buffer Width. The development permitted by variance will leave the largest buffer possible consistent with the need to allow a permitted use. In no case shall a 150-foot buffer be reduced below 75 feet or a 50-foot buffer be reduced below 25 feet.

29.9.7.3 Special Flood Hazard Areas. There are additional limitations on variances in special flood hazard areas. See WDB 28.7.1.

29.9.8 What about nonconforming uses and structures in watershed protection buffers? Nonconforming uses and structures located within watershed protection buffers may be changed,

maintained, repaired, enlarged, and replaced as provided by Chapter 2 of this bylaw, but only if all work complies with the standards established in this chapter. EXCEPTION: No change in use that permits the processing, manufacture, storage, or handling of regulated hazardous materials, other potential pollutants, or materials that could be dispersed downstream during a flood will be permitted.

29.10 Source Water Protection Areas

29.10.1 What is a source water protection area? Source water protection areas contribute, or at least potentially contribute, ground or surface water to drinking water supplies.

> ***Source Water Protection?*** Williston currently includes two source water protection areas. One surrounds the well that serves the Porterwood development on Old Creamery Road. The other is the watershed of Lake Iroquois, which is part of the larger watershed of Shelburne Bay. Shelburne Bay is the source for the Champlain Water District, which supplies water to Williston and other communities.

29.10.2 What additional standards apply to development in source water areas? No specific standards apply, but the administrator may refer any proposed development in a source water protection area to the water provider for comment.

Town of Williston

Stormwater Management Program 2013

Appendix 9

Chapter 23 – Landscaping

This chapter provides performance standards for the landscaping of all development for which a discretionary permit is required, including higher density residential, mixed-use, commercial, industrial, and institutional developments.

These standards seek to:

- protect functional existing vegetation as development occurs;
- protect water quality by integrating landscaping with measures to control stormwater runoff and erosion;
- limit runoff and allow for groundwater and wetlands recharge by maintaining vegetated spaces in developing areas;
- protect urban wildlife habitat by requiring species diversity and vertical structure in most landscaped spaces;
- ensure land use compatibility by requiring effective landscaped buffers between potentially incompatible uses;
- create favorable microclimates and reduce energy consumption in developed spaces;
- complement other requirements of this bylaw, including the requirements for erosion and runoff control, watershed protection buffers, the provision of neighborhood parks, the provision of trails; and site maintenance; and
- maintain and enhance the appearance and character of individual developments and the community.

23.1 Applicability – Landscape Plans

23.1.1 Do these standards apply to my project? These standards apply to all development for which a permit is required.

23.1.2 How do these requirements interact with other requirements of this bylaw? Virtually every development in Williston is required to provide open space. Some of that open space must be left in its existing condition and some of it must be landscaped, as required by this chapter. Both types of requirements may apply to the same development. Areas in which existing vegetation generally must be retained are listed below. This chapter applies to all other open areas, including landscaped buffers and setbacks.

23.1.2.1 Open Fields and Meadows. The annual mowing of open field and meadows may be required by the DRB to preserve scenic views. Where mowing is required, the DRB may impose a requirement that mowing take place after June 15 in order to protect nesting birds.

23.1.2.2 Open Space Development.

- Residential subdivisions in the ARZD are generally (there is an exception for parcels under 10.5 acres) required to provide substantial open space, not all of which will necessarily falls into one of the other categories listed here. This required open space is generally to be left in the existing vegetation, but certain exceptions may be required or permitted by Chapter 31, which may also require the enhancement of existing vegetation.

- Residential subdivisions in the RZD and VZD may be required to provide substantial open space, not all of which will necessarily fall into one of the other categories listed here. This required open space is generally to be left in the existing vegetation, but certain exceptions may be permitted by the DRB.

23.1.2.3 Watershed Protection. Existing riparian and wetlands vegetation is to be retained within the watershed protection buffers required by Chapter 29 of this bylaw.

23.1.2.4 Wildlife Habitat. Existing vegetation is to be retained in habitat conservation areas that are protected from development.

23.1.2.5 Woodland and Forest. Existing woodland and forest vegetation must be retained outside any clearing limits imposed by the DRB.

23.1.2.6 Forest Management. None of the above preclude pruning, thinning, or the selective harvest of trees in accordance with a forest management plan.

23.1.3 Must I submit a landscaping plan? Yes. All applications for a discretionary permit must be accompanied by a landscaping plan, the required contents of which are listed in the *Landscaping Plan Checklist*. This requirement does not apply to proposed developments in which no new landscaping is required by this or other chapters of this bylaw.

23.2 Existing Vegetation

23.2.1 Can I clear an entire site of existing vegetation The clearing of an entire site of more than one-half (1/2) acre at one time is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6. Vegetation must be removed from larger sites in phases. This may eventually lead to removal of vegetation from an entire site, but note that WDB 23.2.2 requires functional existing vegetation to be retained wherever possible.

23.2.2 Can I replace all existing vegetation? Existing vegetation that can effectively serve the landscaping functions listed in the introduction to this chapter shall be retained to the extent possible, while accommodating the permitted level of development. An application for a permit may be rejected solely on the grounds that it fails to retain existing vegetation where that vegetation can fulfill the functions listed in the introduction to this chapter.

23.2.3 Must I protect existing vegetation during construction? Yes. Existing vegetation that is to be retained must be protected from damage during construction, as required by the *Public Works Standards*. The landscaping plan must include a schedule showing that all measures required to protect existing vegetation will be put in place before other construction activities begin. This schedule may apply to the entire site or to sequential phases of construction.

23.3 Landscaped Buffers

23.3.1 Must a development provide landscaped buffers for adjoining uses? Table 23.A shows where landscaped buffers are required. It also summarizes the principal standards for the design of those buffers, which are set forth in detail below.

23.3.2 How wide must the required landscaped buffers be? Table 23.A establishes a minimum width for landscaped buffers of different types in different situations. This minimum width may, in some cases, be reduced by the inclusion of an earthen berm or screening fence, as provided by WDB 23.3.3. The types of landscaped buffers are described below. The landscaping plan must show the dimensions of the proposed buffer/s, including all crossings and inclusions; a planting design and schedule appropriate for the proposed buffer type; and one or more typical cross-sections. Plant selection is subject to the requirements of WDB 23.7.

23.3.2.1 Watershed Protection Buffers. A watershed protection buffer required by Chapter 29 may be used as a landscaped buffer required by Table 23.A. Where the watershed protection buffer consists primarily of marsh or open water, it shall be supplemented by a Type III or IV landscaped buffer, whichever is most appropriate to the context, of at least eight (8) feet in width.

> ***DRB Discretion.*** 'Context' simply means the surroundings. Determining what type of landscaped buffer will be appropriate in a particular context is an important exercise of discretion for the DRB, with the advice of the advisory boards. The DRB and the advisory boards also have the discretion to determine whether or not a berm and/or a screening fence are needed in a landscaped buffer, and to review the design of berms and fences.

23.3.2.2 Type I - Existing Vegetation. A landscaped buffer composed primarily of existing woodland or forest that must be of sufficient height and density to provide an effective visual buffer. Where this type of buffer is proposed, the landscaping plan shall include photographic documentation of the buffer's effectiveness. The landscaping plan shall also propose supplemental new plantings where the existing vegetation is too thin to be an effective visual buffer. This type of buffer must be relatively wide to sustain its habitat value and to function as a woodland or forest that needs only minimal maintenance. Other types of buffers may be narrower, but are assumed to require regular maintenance.

23.3.2.3 Type II - Dense Plantings. A Type II landscaped buffer must be composed primarily of continuous dense screening vegetation that will grow to at least six (6) feet in height. The screening vegetation or hedge must be supplemented, on the exterior side, by a Type III or IV landscaped buffer, whichever is most appropriate to the context, of at least (8) feet in width. This type of buffer is most appropriate in re-development projects where space is limited. The buffer width reduction provided for in WDB 23.3.3 shall be given where the DRB requires a berm or fence.

23.3.2.4 Type III – Informal Plantings. A Type III landscaped buffer must be composed of a planted area that includes a ground cover, a partial understory of shrubs and small trees, and major trees. The minimum density of planting per 100 feet of buffer shall be a full ground cover, two major trees, three ornamental or understory trees, and any combination of shrubbery or flower beds that occupies at least 50% of the area at the time of planting. This type of buffer can be used in many circumstances. The DRB may require an earthen berm, a screening fence or wall, and/or additional plant materials where the uses being separated are substantially different in intensity. The buffer width reduction provided for in WDB 23.3.3 shall be given where the DRB requires a berm or fence.

23.3.2.5 Type IV – Formal Plantings. A Type IV landscaped buffer is a park-like landscaped area that includes a ground cover of turf and major trees. It may also include ornamental trees, shrubs, flowers, and planters. Plantings are usually evenly distributed, although an artistic departure from pattern may be permitted. The minimum density of planting per 100 feet of buffer shall be: a full ground cover of turf and three major trees. This type of buffer is most appropriate between uses of similar intensity or along public ways. It does not include a berm or a fence.

23.3.3 Will screening berms or fences be required? Can a screening berm or fence be used to reduce the width of a required buffer? In some cases.

23.3.3.1 Earthen Berms. An earthen berm may be required to increase the effectiveness of a landscaped buffer for outdoor storage and/or work areas, including areas where trucks or heavy machinery will be parked. The landscaping plan shall show the contours of the proposed berm and one or more cross-sections detailing its construction. The required buffer width may be reduced by the height of the berm, but not by more than 25%.

- Berms should not ordinarily be more than six feet in height. The DRB may, however, permit a higher berm where physical characteristics of the site, like grade changes, warrant it.
- No berm shall have a slope greater than 3:1, except where a retaining wall is used.
- Retaining walls shall be constructed of, or faced with timber, native or cast stone, or masonry that matches or complements buildings on the site.
- Retaining walls should ordinarily face inward, away from public ways. The DRB may, however, permit an exception where an outward-facing retaining wall results in less grading.
- Plans calling for retaining walls that are four feet or more in height shall be accompanied by engineering specifications demonstrating that the proposed retaining walls are capable of bearing the anticipated load.

23.3.3.2 Screening Fences. An opaque fence may be required to increase the effectiveness of a landscaped buffer for outdoor storage and/or work areas, including areas where trucks or heavy machinery will be parked. The landscaping plan shall show the location of the screening fence and provide one or more elevations detailing its construction. The buffer's width may be reduced by the height of the fence, but not by more than 25%. The height and design of a screening fence is subject to design review and approval by the DRB. Fence materials, patterns, and colors should match or complement the materials, architectural details, and colors used on buildings on the site.

23.3.4 Are any impervious surfaces permitted in landscaped buffers? Yes.

23.3.4.1 Crossings. Landscaped buffers may be crossed by driveways, roads, sidewalks, trails, and utility lines, including necessary risers and boxes, serving the development. The width of these crossings will necessarily vary with the scale and nature of the development, but should be minimized.

Table 23.A - Landscaped Buffer Matrix

use providing buffer	adjoining use	Minimum Buffer Width Type I(1)	Type II(2)	Type III(3)
open space residential, ARZD	Any other use	*Open space developments must provide ample buffers. See Chapters*		
other residential subdivisions, one and two family dwellings	agriculture/conserved lands	50 feet	not permitted	36 feet
	open space residential	50 feet	not permitted	9 feet
	other residential subdivisions	50 feet	not permitted	9 feet
	higher density residential	50 feet	13 feet	23 feet
	mixed use, including residential	50 feet	13 feet	23 feet
	retail/service commercial	50 feet	13 feet	27 feet
	heavy commercial/industrial (4)	50 feet	13 feet	36 feet
	public ways	*See the dimensional standards for your zoning district. See also Ch*		
higher density residential in the MDRZD or VZD	agriculture/conserved lands	50 feet	not permitted	36 feet
	open space residential	50 feet	not permitted	9 feet
	other residential subdivisions	50 feet	13 feet	23 feet
	higher density residential	50 feet	13 feet	9 feet
	mixed use, including residential	50 feet	13 feet	9 feet
	retail/service commercial	50 feet	13 feet	23 feet
	heavy commercial/industrial (4)	50 feet	13 feet	36 feet
	public way	*See the dimensional standards for your zoning district. See also Ch*		
mixed use including residential	agriculture/conserved lands	50 feet	not permitted	36 feet
	open space residential	50 feet	not permitted	23 feet
	other residential subdivisions	50 feet	13 feet	23 feet
	higher density residential	50 feet	13 feet	9 feet
	mixed use, including residential	50 feet	13 feet	9 feet

Table 23.A, continued

	neighbor	Minimum Buffer Width · Type I(1)	Type II(2)	Type III(3)
	retail/service commercial	50 feet	13 feet	23 feet
	heavy commercial/industrial (4)	50 feet	13 feet	27 feet
	public way	*See the dimensional standards for your zoning district. See also Cha*		
retail/service commercial	Agriculture/conserved lands	50 feet	not permitted	36 feet
	open space residential	50 feet	not permitted	23 feet
	other residential subdivisions	50 feet	13 feet	27 feet
	higher density residential	50 feet	13 feet	23 feet
	mixed use, including residential	50 feet	13 feet	23 feet
	retail/service commercial	50 feet	13 feet	9 feet
	heavy commercial/industrial (4)	50 feet	13 feet	23 feet
	public way	*See the dimensional standards for your zoning district. See also Cha*		
heavy commercial/industrial	Agriculture/conserved lands	50 feet	not permitted	36 feet
	open space residential	*Open space developments must provide ample buffers. See Chapters*		
	other residential subdivisions	50 feet	23 feet	36 feet
	higher density residential	50 feet	23 feet	27 feet
	mixed use, including residential	50 feet	23 feet	27 feet
	retail/service commercial	50 feet	13 feet	23 feet
	heavy commercial/industrial (4)	50 feet	13 feet	9 feet
	public way	*See the dimensional standards for your zoning district. See also Cha*		

(1) Minimum 50 feet width for Type I is based on typical tree height and reflects the protection of habitat values and low maintenance needs of remnant woodland or forest.
(2) Type II buffer heights are based on the width of a hedge plus an 8-foot planting strip. Type II is permitted only where space limitations preclude use of the other typ
(3) Type III and IV buffer heights are based on the maximum building height, or fractions thereof.
(4) All outdoor storage and work areas are to be treated as heavy commercial/industrial.

23.3.4.2 Sidewalks/Trails. Sidewalks and trails may run within and parallel to a landscaped buffer. The width of the sidewalk or trail shall not, however, be counted as part of the width of the buffer.

23.3.4.3 Light Standards. The bases of standards for approved outdoor lighting may be placed in a landscaped buffer.

23.3.4.4 Miscellaneous. The base of a permitted free-standing or directional sign may be placed in a landscaped buffer. Landscaped buffers may also include retaining walls, planters, minor impervious surfaces that are part of runoff and erosion control works; and sculptures or other works of art.

23.3.5 Do landscaped buffer requirements eliminate setback requirements? Where they are required, they eliminate side and rear setbacks, but do not eliminate front setbacks. Landscaped buffers replace rear and side yard requirements for uses other than one and two family dwellings. Front setback requirements vary with the type of street and may be found in the chapters establishing the individual zoning districts.

23.3.6 Should landscaped buffers be used as part of development's stormwater management system? Required landscaped buffers must function as part of the development's stormwater management system wherever feasible. See WDB 29.5 and other provisions of Chapter 29 of this bylaw concerning the role of vegetation in stormwater management.

23.4 Landscaped Screening Utility installations, mechanical equipment, solid waste containers, and the like must be fully screened from view from neighboring properties and public ways.

23.4.1. How should screening be provided? Screening for utility installations, mechanical equipment, solid waste containers, and the like must include a dense evergreen hedge and other plant materials that are at least five (5) feet deep. The DRB may permit an exception to this standard where space constraints prevent provision of an adequate hedge. Where such an exception is made, screening must be accomplished using a fence or wall that complies with WDB 23.4.2.

23.4.2 Will more screening ever be required? Possibly. The DRB may require that a berm, fence, or wall be used supplement the landscaped screening. Fence or wall materials, patterns, and colors must match or complement the materials, architectural details, and colors used on buildings on the site.

23.5 Landscaping Parking Lots Parking lots are subject to the same buffering requirements as the uses they serve. These standards call for additional landscaping within larger parking lots.

23.5.1 Is landscaping required within parking areas? Yes.

23.5.1.1 5% Landscaping. Parking areas that include more than 24 spaces shall be broken up by landscaped islands or medians that occupy a minimum of five percent (5%) of the parking area.

23.5.1.2 Rank Length No single rank of parking spaces shall include more than 24 spaces without being broken up by one or more landscaped islands or medians.

23.5.1.3 Shade Trees. Parking lot landscaping shall include large high branching deciduous shade trees that will help keep paved surfaces cool by creating a canopy that is as continuous as possible over the parking area.

23.5.1.4 Soil Volume. Landscaped islands and medians must have an uncompacted soil volume sufficient to support long-term health of the proposed plant materials. The DRB may require the use of porous pavement and/or structural soils to help ensure the success of plantings.

23.5.2 Should parking lot landscaping be integrated into the stormwater system? Yes. Wherever feasible, parking lot landscaping should be designed to function as part of the stormwater management system required by Chapter 29 of this bylaw.

23.5.3 What about snow storage and landscaping? Aren't they incompatible? Landscaping and snow storage can co-exist. Salt-tolerant plant materials must used in and around parking areas and in the snow storage areas required by WDB 16.6. Plant materials selected for these areas must also have a growth form that is not subject to, or that resists, the physical damage that can be caused by snow moving equipment and the stacking of snow. See WDB 16.6 for more on snow storage.

23.6 Landscaping Setbacks from Roads

23.6.1 Is landscaping required along public and private roads? Almost always. Chapter 26 of this bylaw requires street trees along both sides of new roads, public or private, and along the existing road frontage of redevelopment projects. A landscaped front setback area is also required in most zoning districts.

23.6.2 Are there additional landscaping requirements in the VZD? Landscaping must be consistent with the historic character of the Village. See Chapter 42 of this bylaw.

23.7 Plant Materials

23.7.1 What criteria should be used in selecting plant materials? Plant materials should include a variety of species (see WDB 23.7.3), that are:

- native to Vermont, where possible;
- exhibit Vermont fall foliage, where possible;
- well-adapted (hardy) for the site;
- suitable for the functions the landscaping must perform; and
- that provide color throughout the growing season and into winter.
- Salt-tolerant species must be used near roads, parking areas, and pedestrian ways.

Which tree should I use? A useful guide to the selection of trees that appropriate for different functions and sites is *Recommended Trees for Vermont Communities,* a copy of which is available for review at Williston Planning.

23.7.2 Are the plants that may be used limited? Yes. The species listed in Table 23.B must not be used.

Table 23.B – Prohibited Species

Common Name(s)	Scientific Name
TREES	
Norway Maple	*Acer platanoides*
Amur Maple	*Acer ginnala*
Tree of Heaven	*Ailanthus altissima*
Black Locust	*Robinia pseudoacacia*
SHRUBS	
Japanese barberry	*Berberis thunbergii*
Common Barberry	*Berberis vulgaris*
Bush Honeysuckles (many varieties)	*Lonicera, spp.*
Russian Olive	*Elaeagnus angustifolia*
Autumn Olive	*Elaeagnus umbellata*
Multiflora Rose	*Rosa multiflora*
Common Buckthorn	*Rhamnus cathartica*
Glossy Buckthorn	*Rhamnus frangula*
Burning Bush	*Euonymous alata*
HERBACEOUS	
Celandine	*Chelidonium majus*
Oriental Bittersweet	*Celastrus orbiculatus*
Flowering Rush	*Butomus umbellatus*
Common Reed	*Phragmites australis*
Goutweed	*Aegopodium podagraria*
Garlic Mustard	*Allaria petiolata*
Purple Loosestrife	*Lythrum salicaria*
Pale Swallow-wort	*Vincetoxicum hirundinaria*
Japanese knotweed	*Polygonum cuspidatum*
Wild Chervil	*Anthriscus sylvestris*
Yellow-flag iris	*Iris pseudacorus*

23.7.3 What does a 'variety' of species mean? Species diversity must be maintained to ensure that landscaping continues to function when one or more plant species are affected by a pest or disease. No more than 15% of the plants (excepting turf grass and other ground covers) used on a site may be from the same genus.

23.7.3.1 Green Ash. The use of green ash - which currently accounts for over 40% of all new tree plantings in Williston – in required plantings is banned. The DRB may permit an exception to this prohibition to support a particular landscape design concept.

23.7.3.2 Departures. The DRB may approve departures from this standard to support a particular landscape design concept.

23.7.4 Are there specifications for plant materials and their installation? Yes.

23.7.4.1 American Standard. Plant materials shall conform to ANSI Z60.1 the *American Standard for Nursery Stock.*

23.7.4.2 Size of Materials. The minimum size of new plant materials installed in required plantings shall be as follows:

- large trees – 2 ½ inch caliper
- medium and small trees – 2 inch caliper
- shrubs, ornamentals – 2 gallon

Departures from these standards may be proposed, and approved by the DRB, for mass plantings.

23.7.4.3. Soil Volume. The landscaping plan must demonstrate that there is an un-compacted soil volume sufficient to support the long-term health of all plant materials. This standard is especially important in urban parks and plazas, and in narrow planting strips. The DRB may require the use of porous pavement and/or structural soils under adjoining paved surfaces to help ensure the success of plantings.

Soil Volume? Recommended un-compacted soil volumes for trees are listed in *Recommended Trees for Vermont Communities.*

Structural Soil? Structural soil is designed to provide adequate support for paved surfaces like parking lots and sidewalks, while also serving as a suitable medium, for tree growth and health. Specifications for structural soil are included in the *Public Works Standards*. For more information about structural soil, visit the Cornell University web site: http://www.hort.cornell.edu/department/faculty/bassuk/uhi/

23.7.4.4 In Snow Storage Areas. Salt-tolerant plant materials must used in and around paved areas and in the snow storage areas required by WDB 16.6. Plant materials selected for these areas must also have a growth form that is not subject to, or that resists, the physical damage that can be caused by snow moving equipment and the stacking of snow.

23.8 Landscaping Installation and Maintenance

23.8.1 Are there requirements for the installation of landscaping? Yes

23.8.1.1 Supervision. Installation of landscaping in development containing more than 20,000 square feet of landscaping must be supervised by a landscape architect, a certified arborist, or a certified horticulturist.

23.8.1.2 ANSI Standard. Trees and shrubs shall be installed in compliance with the current edition of *ANSI A290 – Best Management Practices – Tree Planting,*

23.8.1.3 Distance from Curb. No tree may be planted closer to any curb or sidewalk than the following: small trees – 3 feet; medium trees – 4 feet; large trees – 5 feet (tree species are identified as small, medium or large in *Recommended Trees for Vermont Communities*).

23.8.1.4 Other Utilities. Tree location must be coordinated with the location of light standards and other overhead utilities.

23.8.1.5 Inspection. Landscaping is subject to the inspection requirements of WDB 7.1.7.

23.8.2 Are there landscaping maintenance requirements? Yes. Landscaping is a 'required improvement,' as defined in Chapter 7 of this bylaw, subject to all requirements that chapter imposes. See also the maintenance requirements of WDB 16.3.1.

23.8.3 Must new landscaping be watered? Landscaping plans required by WDB 23.1.3 shall include provisions for the timely irrigation whenever it will be necessary to support newly-installed plant materials. 'Timely' irrigation is once a week in any week during the growing season when natural precipitation has totaled less than one (1) inch.

23.8.4 Must a maintenance manual be provided? Where there will be more than 20,000 square feet of landscaping, the landscaping plan shall include a maintenance manual.

Town of Williston

Stormwater Management Program 2013

Appendix 10

Chapter 14
Off-Street Parking & Loading

This chapter sets standards for off-street parking and loading. Its intent, consistent with Policy 4.2.4 and other guidance from the *Town Plan*, is to minimize the area devoted to surface parking while still ensuring that there is a reasonable supply of parking, including spaces that can be safely used by those whose mobility or vision is impaired.

Minimizing the area devoted to surface parking will:

- protect watershed health, which may be adversely impacted by accelerated runoff from new impervious surfaces;
- conserve energy and make outdoor spaces more useable by moderating microclimatic extremes on intensively developed sites; and
- make it more pleasant to walk or cycle in Williston by contributing to streetscapes that are both comfortable and lively.

It is also specifically the intent of these standards to encourage shared parking arrangements, the use of parking structures, and the use of porous pavements.

14.1 Applicability

14.1.1 Do these standards apply to all development? Yes. The standards adopted in this chapter apply to all development for which a permit is required by this bylaw. Existing and proposed parking and loading areas must be clearly shown on the plans submitted with any application for a permit.

14.1.2 Do other requirements of this bylaw apply to off-street parking and loading areas? Yes. Off-street parking and loading areas must comply with all relevant standards of this bylaw. Some particularly relevant standards are cited below.

14.1.2.1 Drainage/Stormwater. Chapter 29 of this bylaw sets standards for stormwater management that apply to off-street parking and loading areas.

14.1.2.2 Landscaping. See Chapter 23 and specifically WDB 23.5 for the landscaping requirements that apply to off-street parking and loading areas.

14.1.2.3 Snow Removal/Storage. WDB 16.6 sets standards for snow removal and storage that apply to off-street parking and loading areas.

14.2 Off-Street Parking Requirements

14.2.1 How many off-street parking spaces are permitted for a given use? Table 14.A establishes the number of off-street vehicle (Column A) and bicycle (Columns B and C) parking spaces that are required for typical land uses. For uses that are not listed in the table, see WDB 14.2.3. The minimum number of accessible off-street vehicle parking spaces required is given by Table 14.B. It is important to understand that the numbers in Column A of Table 14.A are both minimums (you must provide at least this many vehicle parking spaces) and maximums (you may not provide more vehicle parking spaces). The required number of off-street parking spaces may be changed only on the basis of a shared parking analysis (see WDB 14.2.2) or as provided by WDB 14.2.4 or 14.2.5.

DRAFT Table 14.A - Minimum/Maximum Off-Street Parking Permitted - Minimum Bicycle Parking Per

	Column A	*Column B*	*C*
	Off-Street Motor Vehicle Spaces	**Total Bicycle Parking Spaces**	**Long Term Parking**
Land Use	***per 1000 SF gross floor area, unless otherwise specifi***		
Industrial Uses	1.00	5% of vehicular	75% of requ
Industrial uses are very diverse. Use 1.00 spaces per 1000 SF GFA as a starting point. The actual requirement will be set by the Administ			
Residential Uses			
One and Two Family Dwellings	2.00 per dwelling	none	nor
Accessory Dwellings	Two reserved spaces: See WDB 17.1.23.1.3.5		
Multiple-Family Dwellings	1.75 per unit	10% of vehicular	1 per 4
Senior Housing (independent living)	1.00 per dwelling	5% of vehicular	1 per 8
Senior Housing (assisted living)	0.35 per dwelling	5% of vehicular	75% of requ
Lodging Uses	1.00 per room	7% of vehicular	50% of requ
Conference space and restaurants should be accounted for separately.			
Recreational Uses			
Health Club	5.00	10% of vehicular	50% of requ
Other Recreational Uses	Too diverse to list. Will require individual a		is
Theaters, Places of Assembly	.25 per seat	7% of vehicular	nor
Includes churches, live and movie theaters, and similar gathering places. Associated offices and other spaces should be accounted for se schools should be accounted for separately.			

NOTE: The DRB may permit an exception to the bicycle parking requirements as provided by WDB 14.8.5

Table 14.A, cont.	Off-Street Motor Vehicle Spaces	Total Bicycle Parking Spaces	Long Ter Parking
Land Use	*per 1000 SF gross floor area, unless otherwise specifie*		
Educational and Health Care Uses			
Child Care Centers, Pre-School	.35 per student	10% of vehicular	75% of requ
Schools, K-8	.35 per student	30% of vehicular	20% of requ
Schools, 9-12	.35 per student	30% of vehicular	20% of requ
Community Colleges	.35 per student	30% of vehicular	20% of requ
Libraries	4.25	30% of vehicular	20% of requ
Hospitals, Clinics, Medical Offices	5.00	7% of vehicular	75% of requ
Nursing Homes	1.50	5% of vehicular	75% of requ
Veterinary Clinics	2.00	5% of vehicular	75% of requ
Office Uses			
Office Building	3.50	7% of vehicular	50% of requ
Offices w/ High Turnover	5.00	10% of vehicular	50% of requ
Retail Uses			
Convenience Stores	4.00	7% of vehicular	20% of requ
Supermarket/Groceries	5.00	7% of vehicular	20% of requ
Drugs	2.50	7% of vehicular	20% of requ
Bulky Retail (furniture, lawn and garden)	3.00	7% of vehicular	20% of requ
General Retail, Shopping Centers	4.00	7% of vehicular	20% of requ
Services			
Banks	4.75	7% of vehicular	50% of requ
Quality Restaurant	20.00	7% of vehicular	20% of requ
Fast Food Restaurant (no drive-through)	15.00	7% of vehicular	20% of requ

14.2.2 Can parking be shared by uses that have different peak hours of operation? Yes. In fact, this may be required. Retail, office, institutional and entertainment uses are expected to share off-street parking spaces wherever possible.

14.2.2.1 Calculations. The DRB may, when reviewing a pre-application, require that shared parking calculations be made for any development that includes uses with potentially different peak periods of parking demand. Shared parking analyses may also be voluntarily submitted by adjoining land owners. In either case, the analysis shall be conducted using the shared parking methodology published by the Urban Land Institute.

14.2.2.2 Distance To. Shared off-street parking spaces shall be no more than 600 feet from a main entrance for customer parking and no more than 1000 feet from an employee entrance for employee parking.

14.2.2.3 Easement. Shared parking arrangements run with the land and must be honored by successors in interest. Failure to do so will be a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6. Where different owners are involved in a shared parking arrangement, a draft easement providing for shared parking, including the number and location of the proposed shared spaces, must be submitted for review with the application for a discretionary permit. The signed easement, which must also specifically indicate how the costs of maintenance of the shared parking spaces will be shared, must be submitted with the final plans and recorded before a certificate of compliance may be issued, as provided by WDB 7.3.

14.2.2.4 Accessible Spaces. Given the need for proximity to the use served, the accessible parking spaces required by Table 14.B may not be shared.

14.2.3 What if a use is not listed in Table 14.A? The required number of off-street parking spaces shall be determined by the Administrator based on the similarity of the proposed use to one or more uses listed in Table 14.A and the Institute of Transportation Engineer's *Parking Generation*. The Administrator's determination of how many spaces will be permitted is subject to appeal using the procedure for the appeal administrative permits provided by WDB 5.4 of this bylaw.

14.2.4 How could I increase the number of permitted off-street parking spaces?

14.2.4.1 Build a Parking Structure. Consistent with Policy 3.3.4 of the *Town Plan* (which says this bylaw should include an incentive for structured parking) developments may increase the number of permitted off-street parking spaces by 25% by providing a multilevel parking structure. This incentive is available only where at least 30% of the off-street parking spaces required by Table 14.A are in the structure/s. All of the additional parking spaces permitted must be in the structure/s. Note also that there is a building height incentive for the provision of structured parking in the MUCZD, MURZD and TCZD.

14.2.4.2 Use Porous Pavement. Developments may increase the number of permitted off-street parking spaces by 15% by using porous pavement for a majority of all vehicular parking spaces required by Column A of Table 14.A. Porous pavement specifications must be approved by the Administrator, with the advice of the DPW.

14.2.4.3 Provide Spaces for Alternate Fuel Vehicles and Carpools. Off-street parking spaces that are dedicated to vehicles that operate primarily on alternative fuels (electric, hydrogen, natural gas, biodiesel) or that are dedicated to vehicles participating in a carpooling program

shall not be counted towards the total number of off-street parking spaces required by Table 14.A. These spaces – which must not make up more than five percent (5%) of the total number of off-street parking spaces required - must be clearly identified with a placard reserving their use for vehicles that operate primarily on alternative fuels or that are participating in a carpooling program.

14.2.5 How could I decrease the number of off-street parking spaces required by Table 14.A? Proposed reductions in the required number of off-street parking spaces must be approved by the DRB. They are not automatic.

14.2.5.1 Be Close to Public Transit. The DRB may permit a development that is within a 10-minute walk of a bus stop to reduce the required number of off-street parking spaces by as much as 20%, but only where the major employer/s in the proposed development commit to active participation in the Chittenden County Transit Authority's discount bus pass program.

14.2.5.2 Have On-Street Parking. The DRB may permit a one-to-one (on-street for off-street) reduction in the required number of off-street parking spaces for on-street parking that is available within 600 feet of a main entrance of the proposed development. This reduction of the number of off-street parking spaces may not, however, reduce the number of off-street parking spaces to less than two per dwelling.

14.2.5.3 Shared Parking. The number of off-street parking spaces required for a particular use may be reduced by a shared parking study required by WDB 14.2.2.

14.2.6 Can I reduce the area used for parking by using smaller spaces for compact cars? Yes. The DRB may permit compact car spaces (see Table 14.C for the dimensions) to comprise as many as 25% of the off-street parking spaces required by Table 14.A. These spaces shall be clearly identified by a sign and/or pavement marking that says "Compact Car Only."

14.2.7 Where must off-street parking spaces be located?

14.2.7.1 Ownership. Off-street parking spaces shall be provided on the same lot or parcel and under the same ownership as the use they serve, except where a shared parking arrangement is required or permitted by WDB 14.2.2.

14.2.7.2 Distance: Nonresidential. The off-street parking spaces serving nonresidential developments must be within 600 feet of a main entrance for uses requiring customer parking and within 1,000 feet of an employee entrance for employee parking.

14.2.7.3 Distance: Residential. The off-street parking space/s serving a dwelling must be within 100 feet of the principal entrance to that dwelling. The DRB may allow a longer distance between parking and a dwelling in mixed-use developments.

14.3 Accessible Parking. Note that these requirements are more demanding in some ways than those of the Americans with Disabilities Act (ADA).

14.3.1 What is the minimum required number of accessible off-street parking spaces? See Table 14.B.

14.3.2 Don't some uses need more or fewer accessible off-street parking spaces? The DRB may find that a development needs more or fewer accessible off-street parking spaces than are required

by Table 14.B and modify the requirements of that table accordingly. The DRB's action must still be consistent with the ADA. Examples of developments for which a modification may be appropriate include:

Table 14.B – Required Number of Accessible Off-Street Parking Spaces	
Total Number of Spaces	**Minimum Number of Accessible Spaces**
1-15	1
16-30	2
31-45	3
46-60	4
61-75	5
76-100	6
greater than 100 spaces	6+ 4% of the spaces greater than 100 rounded to the nearest whole number

14.3.2.1 Hospitals and Medical Offices: at least 10% of the off-street parking spaces serving visitors and patients must be accessible. Specialty medical offices serving persons with mobility impairments may need as many as 20% accessible spaces.

14.3.2.2 Developments with Valet Parking: No accessible off-street spaces are required in parking areas used for valet parking. An accessible passenger loading zone is required.

14.3.2.3 Industrial Uses. Industrial uses may be permitted to meet the ADA standards – which are somewhat lower - for the required numbers of accessible off-street parking spaces.

14.3.3 Where should accessible off-street parking spaces be located? Accessible off-street parking spaces and the routes between those spaces and the buildings or other destinations they serve must be clearly identified on the plans submitted with applications for permits.

14.3.3.1 Location of Accessible Routes. There must be a clearly marked accessible route that meets all ADA standards between the accessible off-street parking space required by Table 14.B and an accessible building entrance or other destination. Where a development has multiple accessible entrances or destinations, the required accessible off-street parking spaces should be dispersed and located near each accessible entrance.

14.3.3.2 Design of Accessible Routes. Accessible routes must be as short as reasonably possible, safe and convenient for people with mobility and visual impairments. Accessible routes should not cross aisles, driveways, or any other part of the vehicular circulation system on the site. The DRB may, however, permit an exception to this standard where physical constraints like difficult terrain or existing development make compliance infeasible.

14.4 Dimensional Standards

14.4.1 What are the minimum required dimensions of off-street parking spaces? The dimensional standards for off-street parking spaces appear in Table 14.C.**Table 14.C - Minimum Parking Space Dimensions**

Angle of Parking Space	Width of Space	Length of Space	Width of Angled Space	Length of Angled Space	Minimum Back-Up Length
STANDARD SPACES					
Parallel Parking	9.0'	22.0'	-	-	-
45° Angle	9.0'	20.0'	12.7'	20.5'	15.0'
60° Angle	9.0'	20.0'	10.4'	21.8'	18.0'
90° Angle	9.0'	20.0'	9.0'	20.0'	24.0'
Minimum aisle width (one-way)			10'		
Minimum aisle width (two-way)			20'		
COMPACT SPACES					
Parallel Parking	8.0'	20.0'	-	-	-
45° Angle	8.0'	18.0'	11.2'	18.3'	13.0'
60° Angle	8.0'	18.0'	9.2'	14.8'	15.0'
90° Angle	8.0'	18.0'	8.0'	18.0'	20.0'

14.4.2 What are the minimum required dimensions for accessible off-street parking spaces and the associated aisles? Accessible off-street parking spaces must be designed to accommodate vans. They shall be at least nine feet (9') wide with an adjacent aisle at least eight feet (8') wide. A sidewalk may be used as an access aisle for end spaces.

14.4.2.1 Shared Aisles. Accessible off-street parking spaces may share an access aisle by using front-in and back-in parking.

14.4.2.2 Obstructions. Planters, curbs, wheel stops, and similar installations, including cars overhanging a sidewalk, must not obstruct accessible routes. There shall be no snow storage along accessible routes.

14.4.2.3 Grade. The aisle serving an accessible off-street parking space must be level with that space, with a grade that does not exceed 1:50 (2%) in any direction.

14.4.2.4 Curb Ramps. Curb ramps must be located outside the aisle and parking space. To put it another way, accessible parking spaces and the adjacent aisles must be level and on the same grade. Grade changes (ramps) must be built into the adjacent sidewalk.

14.4.2.5 Signs/Pavement Markings. Accessible off-street parking spaces must be marked by a sign showing the standard symbol of accessibility. This sign must be affixed to a post or a building where it will be clearly visible from a vehicle searching for accessible parking spaces. Aisles must be marked with contrasting stripes or hatching on the pavement.

14.5 Off-Street Loading

14.5.1 Where are off-street passenger loading areas required? Off-street passenger loading areas shall be provided as explained below.

14.5.1.1 Institutional and Entertainment Uses. Day care centers, theaters, schools, and other places for public assembly must provide at least one safe off-street passenger loading area. The DRB may require additional off-street loading passenger loading areas for institutional and entertainment uses that have more than one principal entrance.

14.5.1.2 Other Uses. The DRB may require that any other use which adjoins an arterial or collector road provide a safe, off-street passenger loading area.

14.5.2 Where are off-street freight loading areas required? Safe off-street freight loading areas must be provided for commercial and industrial development buildings that include more than 10,000 SF GFA. At least one off-street freight loading area of at least 600 square feet shall be provided, along with one additional off-street freight loading area for each additional 20,000 square feet of GFA.

14.6 Access to Off-Street Parking and Loading Areas. Chapter 13 of this bylaw establishes standards for all points of access, including those to parking and loading areas.

14.7 Circulation within Off-Street Parking Areas. The pattern of circulation in off-street parking areas shall provide safe and efficient access to individual parking spaces, protect pedestrians moving through the parking area, and facilitate safe access to adjoining roads.

14.7.1 Are there minimum aisle widths for parking areas? Yes. The minimum aisle widths are included in Table 14.C, which also provides dimensional standards for parking spaces.

14.7.2 Must directional signs and/or pavement markings be provided in parking areas? Yes. Directional signs and pavement markings shall be used to guide traffic through parking areas and structures.

14.7.3 How must pedestrian access around, through, and to parking areas be provided?

14.7.3.1 Around. There shall be safe pedestrian access in the form of sidewalks around all parking and loading areas. The DRB may permit the use of a recreation path or other pedestrian way as an alternative to a sidewalk.

14.7.3.2 To. Accessible routes must be provided from parking areas to the building/s of other destinations they serve. WDB 14.3 provides standards for accessible routes.

14.7.3.3 Through. The DRB will require that safe pedestrian access be provided through large parking areas.

14.8 Bicycle Parking. Proposed bicycle parking must be shown on the plans submitted with an application for a permit.

14.8.1 How many bicycle parking spaces are required? Columns B and C of Table 14.A give the minimum number of required total and long term bicycle parking spaces for typical uses. There is

no maximum. Column B provides the basis for calculating the total number of bicycle parking spaces that will be required. To express it as a formula:

> Total Required Bicycle Parking Spaces = Total Vehicular Parking Spaces Required (based on Column A) **X** the Percentage from Column B.

> **For example**, a 40,000 SF industrial building will require 40 vehicular parking spaces (Column A requires 1 per 1,000 GFA) and 2 bicycle parking spaces (Column B requires 5% of the vehicular total).

14.8.2 What is a short-term bicycle parking space? A short term bicycle parking space is a space in a bicycle rack that is large enough to accommodate a bicycle (approximately two by six feet), permits the locking of the bicycle frame and one wheel to the rack, and supports the bicycle in a stable position without damage. The number of short-term bicycle parking spaces that is required is calculated by subtracting the number of long term bicycle parking space required by Column C of Table 14.A from the total calculated using Column B. To express it as a formula:

> Required Short-Term Bicycle Parking Spaces = Total Required Bicycle Parking Spaces – Required Long-Term Bicycle Parking Spaces from Column C

> **For example**, a 100,000 SF GFA retail building needs 400 vehicular parking spaces (Column A requires 1 per 1,000 SF GFA), 28 total parking bicycle parking spaces, 6 long-term bicycle parking spaces (Column C says that 20% of all bicycle parking spaces must be long-term), and 22 short-term bicycle parking spaces.

14.8.3 Are there design standards for short-term bicycle parking? Yes. Short term bicycle parking must be as visible, as well lit, and as convenient for cyclists as the vehicular parking on the site is for drivers.

14.8.3.1 Visibility. Short-term bicycle parking or a directional sign leading to it shall be visible from the principal entrance of the building it serves. Short term bicycle parking serving buildings with multiple entrances shall be dispersed so that it serves every principal entrance. Short term bicycle parking will ideally be within 50 feet of the building entrance.

14.8.3.2 Security. Bicycle racks shall be securely anchored to the ground, allow the bicycle wheel and frame to be locked to the rack with a U-lock, and be in a well-lit, highly visible location.

14.8.3.3 Paving. Short-term bicycle parking shall be on a paved surface.

14.8.4 What is a long-term bicycle parking space? A long-term bicycle parking space provides secure storage in a bicycle locker or a bicycle storage room or enclosure. These facilities must protect the entire bicycle, including its components and accessories against theft and the weather. They must also include a clothes storage locker that has a minimum size of 12" wide, 18" deep, and 36" high. Lockers do not need to be in the same location as the long term bicycle parking space. The required number of long-term bicycle parking spaces is given as a percent of the required number of total bicycle parking spaces and is listed in Column C of Table 17.A.

14.8.5 Can the number of required bicycle parking spaces be reduced? The DRB may reduce the bicycle parking requirements adopted in this chapter where the location and/or nature of the proposed development make the use of bicycles highly unlikely.

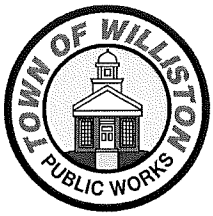
14.9 End-of-Trip Facilities

14.9.1 Why are end-of-trip facilities required? End-of-trip facilities are an important element in long range strategies to reduce energy consumption and dependence on nonrenewable energy resources. Few people can ride a bicycle even a modest distance to work if there is not a place to shower and change.

14.9.2 What end-of-trip facilities are required for developments? End-of-trip facilities include showers and a changing area. Facilities must be provided on-site or via an agreement with a nearby (within 600 feet) use. Table 14.D outlines the minimum number of required end-of-trip facilities based on the number of long-term bicycle parking spaces required.

Table 14.D - Shower and Changing Facilities

Required Long Term Bike Parking Spaces	Minimum Number of Required Shower and Changing Facilities
1-3	1
4-18	1 per gender
17-30	2 per gender
30+	3 per gender



Town of Williston

Stormwater Management Program 2013

Appendix 11

Chapter 7 - Enforcement, Including Guarantees that Improvements will be Made

This chapter provides for the enforcement of this bylaw. It requires developers to provide adequate guarantees that required improvements will be installed as proposed and requires that a certificate of compliance be issued before most developments or phases of developments may be occupied or used. This chapter also establishes the procedures by which violations of this bylaw may be addressed, including civil penalties.

7.1 Required Improvements

7.1.1 What is a required improvement? A required improvement is any improvement, public or private, required for compliance with this bylaw. Required improvements – not all of which are required in every development - include the following, as shown on the final plans approved by the DRB:

7.1.1.1 ... roads, public or private, including bridges, culverts, curbs, gutters, sidewalks, street lights, signs, signals, street trees, and other associated improvements;

7.1.1.2 ... access driveways, off-street parking and loading areas, and associated improvements;

7.1.1.3 ... paths, trails, urban parks, neighborhood parks and other open spaces, and associated improvements;

7.1.1.4 ... water and sewer mains, community sewerage systems, storage reservoirs, pump stations, and associated improvements;

7.1.1.5 ... runoff, erosion control, and stormwater management measures, including plantings;

7.1.1.6 ... landscaping, including landscaped buffers, landscaping in required setbacks, parking area landscaping, and all other required and/or approved landscaping, screening or buffering; and

7.1.1.7 ... all other improvements required by this bylaw to protect public safety or mitigate the potential impacts of the development.

7.1.2 Who pays for the installation of required improvements? Installation of required improvements shall be at the developer's expense. An exception may be made where it is prudent for the town to participate in the installation of improvements in order to correct existing deficiencies in service to other properties or to anticipate future needs. The town's participation shall be negotiated by the DPW before final plans are reviewed and included in the signed development agreement.

7.1.3 Are there standards for required improvements? Yes. Required improvements shall be installed in compliance with this bylaw and the *Public Works Standards.*

7.1.4 When must required improvements be installed? All required improvements must be in place and accepted before a certificate of compliance - which permits a development, or a phase of a development, to be occupied - can be issued by the town, as provided by WDB 7.3. Certificates of compliance may be issued for all improvements at once or by phase. Either way, the installation,

inspection, acceptance, and warranty of required improvement shall proceed as provided by a development agreement.

7.1.5 What is a development agreement? A development agreement is a contract between the applicant and the town, signed by both. A development agreement is required for all developments that include required improvements. It:

7.1.5.1 ... incorporates by reference the approved final plans of the entire development or, where phased development of required improvements has been approved, detailed plans of the initial phase;

7.1.5.2 ... sets a schedule for the completion of the required improvements in the entire project or the initial phase, and, where applicable, provides an anticipated schedule for the submission of final plans, cost estimates, and guarantees of improvements in future phases;

7.1.5.3 ... lists all required improvements, either for the entire project or the initial phase, and their estimated cost;

7.1.5.4 ... guarantees completion of all required improvements using one of the methods listed at WDB 7.1.6;

7.1.5.5 ... establishes a schedule for the inspection of required improvements as work progresses;

7.1.5.6 ... provides a process by which the town may, if necessary, complete required improvements using the guarantees provided;

7.1.5.7 ... provides a process by which either party may request renegotiation of the development agreement,

7.1.5.8 ... provides a process by which the development agreement may be transferred, with notice to the town, to the developer's successors; and

7.1.5.9 ... provides that the development agreement and any vested rights created by approval of the final plan become void if the town is required to use a guarantee to complete required improvements or if the anticipated schedule of improvements required above is not met or renegotiated. The anticipated schedule may be renegotiated without losing vested rights, provided that such negotiations are initiated within 180 days after failure to initiate or complete a phase as scheduled.

7.1.5.10 Maintenance. A development agreement may also include a contract for town plowing of roads or other routine maintenance to be performed by the town during the warranty period required by WDB 7.2.1.

A draft development agreement must be submitted with the preliminary plans, as required by the Discretionary Permit Application Checklist.

Model Development Agreement. Development agreements can be complex. The town provides a model, which is attached as Appendix C, but each agreement will require careful thought and drafting.

7.1.6 How will the installation of required improvements be guaranteed? Completion of the improvements identified in a development agreement must be guaranteed by one of the following methods:

7.1.6.1 For Required Improvements that Will Come Into Public Ownership. This may include arterial and collector roads, and associated improvements; local roads that will become town toads, and associated improvements; water and sewer mains and associated improvements; certain paths and trails and associated improvements; and other required improvements specified as public in the approved final plans and the development agreement. The applicant must place an amount equal to 110% of the estimated cost of installing the required improvements in escrow for the town before an administrative permit for work on the required improvements will be approved. The development agreement will specify the location and terms of the escrow account, including the phased return of portions of the funds taken in escrow as work proceeds, provided that at least one-third (33%) of the funds taken shall be retained until a certificate of compliance has been issued.

7.1.6.2 For Required Improvements that Will Not Come Into Public Ownership. Many required improvements, parking areas and landscaping, for example, will remain in private ownership, maintained by the applicant, the applicant's successors, or an owner's association. These improvements are still necessary for compliance with this bylaw and must be in place before a certificate of compliance is issued. The town will seek to ensure timely completion of these improvements by requiring the applicant to provide an irrevocable letter of credit or place money in escrow, in the amount of 10% of the estimated cost of the required private improvements before any administrative permit for work on the project is approved. The letter of credit will be surrendered or the amount taken in escrow returned when a certificate of compliance has been issued. The development agreement will specify the terms of the letter or credit or escrow account, including the phased return of portions of the funds taken in escrow as work proceeds, provided that at least one-third (33%) of the credit offered shall be retained until a certificate of compliance has been issued.

7.1.6.3 In Case of Default. If any of the required improvements are not completed as provided by the development agreement, the town shall use as much as necessary of the money held in escrow or the credit offered to complete those improvements. Any balance remaining in the escrow account will be returned to the applicant.

7.1.6.4 Disposition of Interest. Interest earned on escrow accounts established to comply with WDB 7.1.6.1 and 7.1.6.2 shall be added to the account to reflect the inflating cost of making the improvements in the event of default.

7.1.7 Will required improvements be inspected? Yes.

7.1.7.1 By the Town. Required improvements must be inspected by the Administrator and/or the DPW or their designees before a certificate of compliance is issued and the guarantees required by WDB 7.1.6 are returned. As provided by WDB 7.1.5.5, a proposed schedule of inspections must be included in the draft development agreement. A final schedule will be included in the approved development agreement.

7.1.7.2 By the Applicant. Applicants may be required to provide reports of inspections made by their own architects, engineers, landscape architects, or other appropriate professionals during the construction or installation of required improvements. The frequency of these

reports may vary with complexity and extent of the work. A schedule will be determined by the Administrator, with the advice of the DPW and included in the development agreement.

7.1.8 Are there inspection fees? Yes. Fees for the inspection of required improvements are established in the *Public Works Standards*. Inspection fees must be paid at the pre-construction meeting.

7.1.9 Are as-built drawings of required improvements required? Yes. Reproducible as-built drawings of all required improvements must be provided to the town in the format specified by the DPW, at the applicant's expense.

7.2 Maintenance of Required Improvements

7.2.1 Is continuing maintenance of required improvements required? Yes. Continuing maintenance of required improvements that will not come into ownership of the town or another public agency is required. Failure to maintain a required improvement is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6.

7.2.2 Must there be a warranty for required improvements? Yes. The applicant is responsible for the maintenance of all required improvements that have been dedicated to the town for three years after the certificate of compliance is issued. This includes correcting defects in materials and workmanship, and repairing damage to required improvements caused by construction. This warranty will be secured by keeping 10% of the funds placed in escrow and/or made available via an irrevocable letter of credit to comply with WDB 7.1.6 available to the town. As provided by WDB 7.1.6.3, the town may use those funds where an applicant fails to make good on the warranty required here.

7.2.3 How will maintenance of required improvements be guaranteed when the developer is gone? Continuing maintenance of improvements that will not come into ownership of the town or another public agency is the responsibility of the owner. Any development that results, or may reasonably be expected to result, in the creation of multiple ownerships, including subdivisions and condominiums, shall create an owner's association or similar mechanism that is responsible for continuing maintenance of required improvements. Drafts of the declaration of covenants, articles of incorporation, and bylaws for that association shall be submitted with the application for a discretionary permit. The final version of these documents must be approved with the final plan, and recorded before an administrative permit is issued for any work on the project.

7.2.4 What does maintenance include? Standards for the maintenance required by WDB 7.2.3 are set in Chapter 16 of this bylaw.

7.3 Certificates of Compliance

7.3.1 When is a certificate of compliance required? A certificate of compliance (CC) is required upon the completion, inspection, and acceptance of required improvements and/or when any new structure is connected to town utilities. CC's are not required for other developments. Failure to obtain a CC where one is required is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6.

7.3.2 How do I get a certificate of compliance The applicant must file a written request for a CC before the final inspection scheduled in the development agreement or as a condition of approval. If all required improvements have been completed in accord with the approved final plans and the

development agreement, a CC will be issued within 15 working days following that final inspection.

7.3.3 Winter is coming! Is it possible to get a temporary certificate of compliance? Yes. The Administrator may, upon written application, and after consulting with the DPW, issue temporary certificates of compliance (TCC) for periods of up to 365 days. TCC's shall expire on a date certain and shall specifically list all work that must be completed before a CC will be issued. Failure to complete work as scheduled when a TCC has been issued is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6.

7.4 Enforcement I. The town has access to two different enforcement procedures. The first is established by the state's planning enabling legislation. It is explained in this section. The second enforcement procedure is the same as for ordinances. It is explained in WDB 7.5. Either procedure may be used to address any violation of this bylaw. Generally the procedure established here, in WDB 7.4, will be used for major violations, while the procedure established in WDB 7.5 will be used for minor violations, like the posting of a temporary sign without a permit.

7.4.1 How is this bylaw enforced? As provided by 24 V.S.A. § 4452, the administrator may, in the name of the town, institute any appropriate action, injunction, or other proceeding to prevent, restrain, correct, or abate a violation of this bylaw.

7.4.2 Must the owner be notified before enforcement? Yes, but only for the first offense. As required by 24 V.S.A § 4451, alleged offenders will be given seven (7) days warning, via certified mail, and an opportunity to correct the violation before the Administrator institutes an action. The seven-day warning and opportunity to correct the violation need not be provided for a second offense that occurs within 12 months of a warning being provided.

7.4.3 What is the penalty for a violation? Any person who violates this bylaw may be fined not more than $100 for each offense. Each day that a violation continues is a separate offense.

7.5 Enforcement II

7.5.1 Can the administrator issue tickets for violations of this bylaw? Yes. As authorized by 24 V.S.A. § 1974a, the Administrator may issue a Vermont Civil Violation Complaint for any violation of this bylaw.

7.5.2 How do I respond to a civil violation complaint? Violations of this bylaw are civil matters, supervised by the Judicial Bureau. You have 20 days to respond to a complaint issued by the Administrator. You may respond by admitting the violation or pleading "no contest" and paying the waiver fee. You may also deny the violation, in which case a hearing will be scheduled before the Judicial Bureau.

What is the Judicial Bureau? See http://www.vermontjudiciary.org/courts/JudicialBureau/FAQmunord.htm

7.5.3 What is the penalty for a civil violation? First, you should understand that each day in which a violation continues is a separate violation, subject to a separate complaint and penalty.

7.5.3.1 First Offense. The penalty for a first offense shall be $250.00, but the waiver fee for those who admit the violation or plead no contest shall be $150.00.

7.5.3.2 Subsequent Offenses. The penalty for each subsequent offense shall be $500.00, but the waiver fee those who admit the violation or plead no contest shall be $400.00.

7.6 An Additional Means of Enforcement. No permit, administrative or discretionary, may be approved for development on a parcel on which there is an outstanding violation of this bylaw.

Town of Williston

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Appendix 12

Standard Operating Procedure

Street Sweeping and Catch Basin Cleaning

Introduction

The Town of Williston currently contracts out services to have our streets swept and catch basin sumps cleaned for all paved curb streets twice a year as required by Municipal Separate Storm Sewer System (MS4) permit, which is administered by the State of Vermont Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC).

Materials removed from streets and catch basin sumps are regulated under the Solid Waste Management Rules by Vermont ANR DEC. This procedure provides Williston DPW employees with guidelines for the storage, handling, testing, and disposal of these materials.

Storage

Materials collected during street sweeping and catch basin cleaning activities will be stored separately at the DPW facility at 298 James Brown Drive. Any collected material that shows obvious signs of pollution will be stored in a separate pile so that it does not contaminate the presumably "clean" piles collected during normal maintenance activities. These materials will also be tested separately from the presumably "clean" materials.

The material storage area will be maintained to ensure that collected materials do not become a source of pollution. Piles will be confined using concrete barriers to ensure that sediment does not leave the storage area.

Testing

Materials collected as part of street sweeping activities do not require testing before they can be used as indicated below. Prior to use, these materials must be screened to remove any trash collected as part of street sweeping. After screening, these materials will be moved to a fill pile maintained by the DPW.

Materials collected as part of catch basin cleaning must be tested for Volatile Organic Compounds (VOCs) using either EPA method 8021B or 8260B prior to being used as indicated below. A composite sample will be collected from the pile of collected materials and sent to a lab for analysis. Results will be compared to the Primary Groundwater Quality Standards (enforcement standards) located in Appendix A of the Vermont ANR DEC Groundwater Protection Rule and Strategy. Using the EPA methods described above, the lower detection limits for some of these compounds in soil samples does not reach the levels specified in the Groundwater Rule (e.g. the lower detection limit for benzene in a soil sample is 13 ug/Kg and the Groundwater Standard is 5 ug/L). A sample whose result is at the lower detection limit of the methods specified will be considered a "non-detect".

Procedure for Material Containing VOCs

Materials tested using EPA method 8021B or 8260B that show VOC levels exceeding the Groundwater Quality Standards in the Vermont Groundwater Protection Rule will be moved to a separate location for storage. Compost, manure or another material high in organic matter will be blended into collected materials and they will sit for a minimum of 6 months before being re-

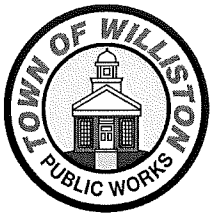
tested. These piles will be "turned" regularly during this time. If these materials fail a second test they will be turned and blended again. A third test will take place at least a year from the second failed test. If the third fails, these materials will be landfilled.

Use of Collected Material

Once screened and tested, all materials can be used as common fill by the DPW or others who receive permission from the DPW. Alternatively, these materials can be blended with other materials (e.g. compost, manure) to create top soil or tree planting material for use by the DPW or others who receive permission from the DPW.

Policy Review and Schedule for Update

This plan will be updated as necessary to comply with State regulation, or to fit changing circumstances at the DPW facility. At a minimum, this policy will be reviewed once every 5 years when the Towns Stormwater Management Program is revised as part of the MS4 permit application.



Town of Williston

Stormwater Management Program 2013

Appendix 13

SECTION 5 STREETS

5.1 GENERAL

It is not intended by the Town of Williston that this "Section" be a complete set of specifications. It is to be used as a basic standard for any person planning work in Williston. All materials listed shall be acceptable to the Public Works Director and any items not listed will require acceptance by the Public Works Director before installation. Failure to receive acceptance of materials and methods prior to their incorporation into the work shall leave the person having the said work done liable for the replacement of those substandard materials with acceptable materials at his/her expense.

The person(s) proposing extensions or alterations to the existing highway system shall be responsible for complying with all applicable rules, regulations, and ordinances (local, state, federal). Said persons shall submit all necessary documentation, including but not limited to, plans, details and drawings, specifications, permits and applications and shall have obtained all acceptances and paid all applicable fees.

All work in a development project shall have the Design/Project Engineer onsite during construction that is hired by the Developer to see that construction is completed according to specifications. The Inspector's costs shall be borne by the Developer.

Upon completion of work, the Design Engineer shall submit to the Town a certification report stating that the work has been completed according to accepted design and all required tests have been passed. Copies of all tests and test results shall be submitted to the Town along with corrective procedures as directed by the municipality and Design Engineer.

Roadways shall be deeded to the Town three (3) years after a final inspection by the Town has indicated the roadways are complete. During this three (3) year "warranty period", the Developer is responsible for all maintenance and repairs of work. The Town may elect to perform winter maintenance on the roads during the warranty period if so requested by the Developer to the Public Works Director and as long as the base course of asphalt has been constructed and a winter plow agreement has been executed.

Decisions as to when the specified typical street details apply shall be made in accordance with the Unified Development Bylaws and through a determination by the Public Works Director.

All Town roadways shall have a maximum speed limit of 25 mph, and shall comply with the requirements in Chapter 15 of the Unified Development Bylaw. New streets shall be designed in accordance with the American Association of State Highways and Transportation Official's (AASHTO) Policy on the Geometric Design of Highways and

Streets.

The highway related construction and materials are intended to conform with the appropriate standards of the State of Vermont Agency of Transportation (V.A.O.T.) "Standard Specifications for Construction", latest edition, and the V.A.O.T. "Design Standards for Road and Bridge Construction", latest edition. Some standards contained in "The Town of Williston Public Works Standards" may differ with the V.A.O.T. Standards. In such cases, the more stringent shall apply.

5.2 DEFINITION OF TYPE

5.2.1 Dense Residential

Streets which service this type of development are generally found in all residential districts other than the Agricultural/Rural Residential (ARZD) District. Lot sizes typically are ½ acre or less and road frontages typically are 150 feet or less. Dense residential street standards may also apply to clustered development in the ARZD District. Streets serving single-family developments and collector streets serving multi-family developments shall be public unless conditions for private streets or private driveways are met. Construction standards are set at the highest level for residential streets in the Town. Some exceptions may be considered by the Public Works Department, upon recommendation by the Development Review Board (DRB), for "affordable" housing projects.

- Minor: Minor streets within the Dense Residential category are those that serve a small number of dwelling units and are designed to carry local traffic only.

- Collector: Collector streets are those that carry higher traffic volumes, including major entrances to a development and connecting roads between developments.

Streets serving moderate density development, with lot sizes typically between ½ and 1/3 acre and road frontages typically between 100 and 150 feet are required to have a sidewalk or recreation path on one side of the street. The right-of-way width and recreation path location, as depicted on the Dense Residential (Collector)/Recreation Path Typical Street Section may also be used for a Dense Residential (Minor) street. Streets serving higher density development, with lot sizes typically ¼ acre or less and road frontages typically 90 feet or less, may be required to have sidewalks or recreation paths (or one of each) on both sides of the street. Sidewalks/paths 6 feet wide or less shall be concrete and paths more than 6 feet wide shall be bituminous concrete.

5.2.2 Rural Residential

Streets which serve this type of development are generally found in the Agricultural/Rural Residential (ARZD) District. Lot sizes typically are one (1) acre or more and road frontages typically are 200 feet or more. Streets serving rural residential development shall be public unless conditions for private driveways are met. Streets serving moderate development density generally are required to have a sidewalk or recreation path on one side of the street.

5.2.3 Commercial/Industrial

Streets which serve this type of development are generally found in the Industrial Zoning District East (IZDE), the Industrial Zoning District West (IZDW), the Mixed-Use Commercial (MUCZD) District and the Taft Corners (TCZD) District. Construction standards and specifications reflect potential truck use and are set at the highest level for streets in the Town.

5.2.4 Urban/Grid Streets

All dense mixed-use development in the Taft Corners (TCZD) District is intended to be serviced by urban and grid streets. These streets are designed to accommodate low-speed traffic, on-street parking and high numbers of pedestrians. Landscaping is incorporated in the urban street design. Buildings may front directly on the right-of-way as depicted on the Urban Typical Street Section.

5.2.5 Private Street

The Development Review Board may allow minor streets within multi-family developments to become private upon submission of legal documents waiving future public maintenance and proof of adequate maintenance capability by a homeowner's association. Construction standards for private streets shall be the same as for dense or rural residential streets and space shall be provided for a minimum 64' wide right-of-way. Roadway subbase requirements will not be reduced but standards for curbs, sidewalks, road width, and pavement thickness may be influenced by numbers of units served and other site layout issues. Determination will be made on a case by case basis by the Developer and the Director of Public Works. All private streets shall execute a Private Roadway document.

5.2.6 Private Driveway

A maximum of two (2) rear lots without public road frontage may be served by a private driveway. Additionally, a private driveway may replace direct road access

for two (2) abutting lots with existing public road frontage (60 foot minimum frontage).

Driveways shall comply with the requirements on the Typical Residential Drive Detail and Profile, and sight distances for a private driveway shall comply with the most recent V.A.O.T. Standard B-71.

5.3 MATERIALS

5.3.1 Geotextile Fabrics

Soil stabilization fabric shall be a woven geotextile Type 600X as manufactured by Mirafi or acceptable equal, and shall be in accordance with V.A.O.T. Section 720. The fabric shall comply with the following specifications; a minimum grab tensile strength of 345 lbs., a maximum grab tensile elongation of 30%, a minimum burst strength of 650 psi, and minimum puncture resistance of 170 lbs.

The stabilization fabric shall be installed in accordance with the manufacturer's instruction with a minimum 24" overlap at any joints or seams.

Drainage fabric for wrapping underdrain trenches shall be a non-woven geotextile Type 140NS as manufactured by Mirafi or acceptable equal, and shall be in accordance with V.A.O.T. Section 720. The fabric shall comply with the following specifications; a minimum grab tensile strength of 130 lbs, a maximum grab tensile elongation of 50%, a minimum burst strength of 160 lbs., and a minimum puncture resistance of 40 lbs.

5.3.2 Subbase

Subbase materials for roadways and sidewalks shall meet the requirements of V.A.O.T. Section 703 and 704. Refer to the Typical Street Sections in Appendix E for the specific types and depths of subbase materials.

5.3.3 Concrete

Minimum compression strength of concrete used for curbs and sidewalks shall be V.A.O.T. Class B, 3500 psi. All concrete shall be in accordance with V.A.O.T. Section 501.

Handicapped sidewalk ramps shall be provided in accordance with V.A.O.T. Standard C-3 and ADA requirements.

5.3.4 Bituminous Pavement

Bituminous pavement for roadways shall meet the requirements of V.A.O.T. Section 406. Refer to the Typical Street Section Details in Appendix E for the specific types and depths of bituminous pavement.

5.3.5 Street Signs

Street signs shall be provided and installed by the Developer at all intersections of the project in accordance with these standards and the MUTCD, latest edition.

Street signs shall be the extruded type green with white letters, ASTM Type III or higher, both sides. All street signs shall be retroreflective.

The sign post shall be located in the area between the curb and sidewalk at a point which will not interfere with pedestrian or vehicular travel.

5.3.6 Traffic Signals

Traffic signals shall include the following minimum requirements:

- Minimum 9 phase controller in-ground mounted box.
- Exclusive left turn signals for each approach (or per Design Engineer recommendation).
- LED traffic lights;
- An exclusive pedestrian phase.
- Pedestrian buttons and poles on each corner with audible alarm and ADA compliant pedestrian signal call ("bird call" type).
- Video Detection.
- Programmable fire pre-emption device mounted on arm (i.e. Opticom/or equal).
- Metal pole and arm (design to be accepted by Public Works Director).
- All visible items: Color gloss black.
- Signal heads (light weight plastic with flat black glare reduction shields).
- Proper signage (all signage to use symbols rather than letters).
- Street lights mounted on metal poles.
- Where conditions warrant, these specifications can be either made less or more stringent by the Public Works Director.
- All other aspects shall be in conformance to the latest standards of V.A.O.T.

5.3.7 Pavement Painting

Pavement painting shall be of the "durable" reflectorized pavement marking according to V.A.O.T. Section 646 and 708.08. Thermoplastic and 3M tape are the desired material.

5.3.8 Guardrail

Steel beam guardrail is the only acceptable guardrail material and shall be provided in accordance with V.A.O.T. standard details. Posts shall be pressure treated (40 years) 8"x12"x6'.

Guardrail shall be built in accordance with V.A.O.T. Standards G-1 series "Steel Beam" guardrail, and V.A.O.T. Section 621. If design speed is greater than 40 mph, utilize G-14 or G-15 series.

Guardrails shall be installed when the height at the edge of shoulder is greater than five (5) feet and/or the embankment slope is steeper than a 3:1 as a minimum. At locations of guardrails, the shoulder shall be widened a minimum of three (3) feet. Guardrails can also be required at other appropriate locations as requested by the Town.

Where slopes are 3:1 or flatter, guardrail may not be needed if the area at the bottom of the slope is free of hazards. Where slopes are 4:1 or flatter, guardrail is not normally required.

5.3.9 Monuments

Right-of-way monuments shall be installed at all street corners, property corners, and all points of curve and/or tangency as shown on the accepted plans.

Concrete monuments shall be cast in one piece 4"x4"x48" of class B concrete with four (4) reinforcing steel rods. The top shall have a marked center which shall be the point of reference. Four (4) inch maximum above grade.

Marble monuments shall be good quality white marble 4"x4"x48" and have a marked center on top to be used as a point of reference.

The monument shall be erected at locations indicated on the plans or as directed by the Design/Project Engineer. They shall be set vertically and as to depth so that the top of the monument is at an established grade not to exceed four (4) inches. The monuments are to be set in place after all other street development is completed.

5.4 INSTALLATION

5.4.1 Concrete

Concrete shall be placed in accordance with V.A.O.T. Section 501 for structural concrete and Section 700.

Minimum compressive strength, at 28 days, shall be:

- Class A: Not less than 4000 psi
- Class B: Not less than 3500 psi

All testing of structural concrete shall be paid for by the Developer.

All concrete shall be treated with a curing/preservation treatment within 15 minutes of the completion of the finishing process and again prior to November 1. Refer to V.A.O.T. Section 501 for the curing period for various concrete components.

No concrete will be placed when ambient temperature is less than 40°F without specific acceptance of the Public Works Director; follow procedures outlined in Recommended Practice for Cold Weather Concreting (ACI 306); or Hot Weather Concreting (ACI 305).

No concrete will be placed in standing water.

5.4.2 Bituminous Pavement

- Material and testing requirements for bituminous concrete shall conform to V.A.O.T. Standards for construction (latest edition).
- Base Courses – in accordance with V.A.O.T. Section 303, plant mixed material shall not be placed between **November 1 and May 1**. The material shall not be placed when the air temperature at the paving site in the shade and away from artificial heat is 32°F or lower. When it is in the public interest, the Public Works Director may extend the dates of the paving season.
- Wear/Surface Courses – In accordance with V.A.O.T. Section 404 material shall be applied only when the following conditions prevail:
  - The atmosphere temperature is at least 45°F in the shade and rising.
  - The road surface and aggregate are sufficiently dry.
  - Weather conditions or other conditions are favorable and are expected to remain so for the performance of satisfactory work.
- Bituminous wear/surface courses shall not be applied between **October 15 and May 15** unless authorized in writing by the Public Works Director.

5.4.3 Lawns and Grassed Areas

All areas of excavation and/or surface work which are on existing grassed lawn areas shall be restored to acceptable lawn area.

General procedure to be used in lawn restoration is:

- $ Apply a minimum of 4" of good topsoil over area to be seeded.
- $ Grade topsoil to blend with existing lawn areas.
- $ Fertilize with a non-phosphorus commercial fertilizer.
- $ Seed with a permanent high quality lawn grass seed at the rates shown in the following table.
- $ Mulch seeded area.

Table 5.1
Seeding Rates for Final Stabilization

Choose from:	Variety	lbs./acre	lbs./1000 sq.ft.
Birdsfoot trefoil	Empire/Pardee	5[1]	0.10
or			
Common white clover	Common	8	0.20
plus			
Tall fescue	KY-31/Rebel	10	0.25
plus			
Redtop	Common	2	0.05
or			
Ryegrass (perennial)	Pennfine/Linn	5	0.10

Notes:
1. Mix 2.5 each of Empire and Pardee or 2.5 lbs. of Birdsfoot and 2.5 lbs. white clover per acre.
2. Further information provided in Rule 8 of the State of Vermont Low Risk Site Handbook for Erosion Prevention and Sediment Control, latest edition.

All areas of excavation and/or surface work which are grassed areas shall be restored to acceptable grass growth. Generally, grading, fertilizing, seeding, and mulching with acceptable materials will provide sufficient grass growth. An urban mix grass seed shall be used.

5.5 TESTING

5.5.1 General

All testing shall be paid for by the Developer. If tests show that the materials do not meet the standards specified, the Developer shall make whatever corrections necessary to remedy the incorrect work and all additional testing required due to