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Surface Water Conditions & Project Improvement List

LaPlatte River & Direct Drainage Watersheds Hinesburg, Shelburne, & Charlotte, Vermont

Introduction

Data collection over the past 10 years in the watersheds of the LaPlatte River, Thorp Brook, Kimball Brook, and Holmes Brook has improved understanding of water resource conditions and led to the identification of water quality, stream channel stability, and habitat improvement projects. This project summarizes the data on a map and prioritizes the projects in a list for each Town – Charlotte, Hinesburg, and Shelburne. An annotated bibliography has been provided to connect each recommendation to the data and report from which it originated.

Legend

Water Quality

- Poor
- Moderate
- Good

P	Solids
Cl	E.Coli

Baseline conditions at South Chittenden River Watch sampling stations (2004 to 2015) compared to VT Water Quality Standards (2014). Poor Water Quality can degrade local habitat and downstream receiving waters such as Lake Champlain.

P = Total Phosphorus
Solids = Turbidity
Cl = Chloride
E. Coli = Indicator of coliform bacteria

Likelihood of excessive channel change, such as erosion, deposition, or suddenly changing paths, during a flood.

Stream Channel Stability

- Poor
- Moderate
- Good

Landcover

- Developed- Medium to High Density
- Rural Development- Low Density
- Agriculture
- Shrubs and Grasses
- Forest
- National Wetland Inventory
- Lakes and Ponds

The type of landcover influences stormwater runoff, with more runoff from urban and agricultural areas than from forested and naturally vegetated landcovers. Data from 2006 NLCD, corrected by MMI based on field observations 2013.

Streams (By Order)

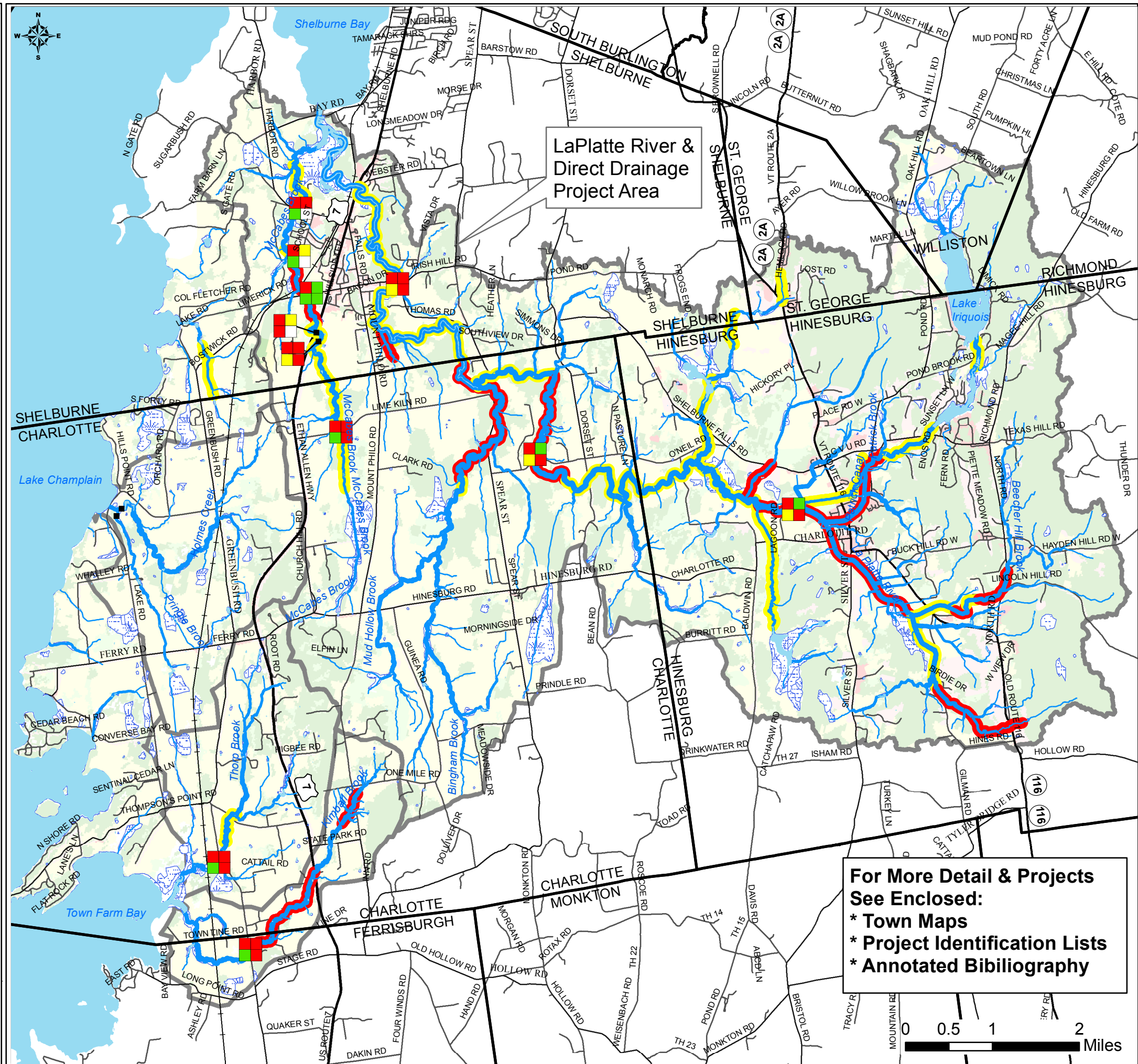
- Stream
- Railroad
- Roads
- Town Boundary
- Watershed Boundary

For More Information:

Lewis Creek Watershed Association
www.lewis-creek.org



This project was funded by an agreement awarded by the Great Lakes Fishery Commission to the New England Interstate Water Pollution Control Commission in partnership with the Lake Champlain Basin Program. NEIWPCC manages LCBP's personnel, contract, grant, and budget tasks and provides input on the program's activities through a partnership with the LCBP Steering Committee



ANNOTATED BIBLIOGRAPHY

Stormwater Education for Citizens and Towns in the LaPlatte River Watershed Region

March 14, 2016

GEOMORPHIC ASSESSMENT AND RIVER CORRIDOR PLANNING: The six references below contain Vermont stream geomorphic assessment data that describes channel characteristics and sensitivity to change – how likely excessive channel erosion or deposition, or a sudden change in flow path, will take place during a flood. River corridor plans have also been prepared that interpret the geomorphic data and identify priority projects.

LCA, 2008. Phase 1 & 2 Geomorphic Assessment Report: Direct Drain to Lake Champlain in Shelburne and Charlotte. Prepared for Lewis Creek Association by Lisa Godfrey and funded by VT Agency of Natural Resources Clean and Clear Grant, Shelburne and Charlotte, VT.

LWP, 2006. Phase II Geomorphic Assessment of the Laplatte River: Hinesburg Reaches. LaPlatte Watershed Partnership, funded by the Vermont Agency of Natural Resources through a Vermont Watershed Grant 2004, Hinesburg, Vermont.

LWP, 2007a. Phase 2 Stream Geomorphic Assessments of the Lower Laplatte River & McCabe's Brook. LaPlatte Watershed Partnership, with Town of Shelburne Special Environmental Project funding, Shelburne and Charlotte, Vermont.

LWP, 2007b. Stream Corridor Plan, Laplatte River and Tributaries, Town of Hinesburg, Vermont. LaPlatte Watershed Partnership, funded by the Vermont Agency of Natural Resources through a Clean and Clear grant, Hinesburg, Vermont.

LWP, 2008. Laplatte River Corridor Plan, Reaches M6 – M11, Towns of Charlotte and Shelburne, Vermont. LaPlatte Watershed Partnership, funded by the Vermont Agency of Natural Resources through a Clean and Clear grant, Charlotte and Shelburne, Vermont.

MMI, 2012b. Phase 2 Geomorphic Assessment and Corridor Planning - Maccabe's Brook Watershed. Prepared for the LaPlatte Watershed Partnership/Lewis Creek Association by Milone & MacBroom, Inc., Charlotte and Shelburne, VT.

WATER QUALITY: The following four references contain water quality data from a volunteer program that took place in the LaPlatte River watershed and direct drainages that illustrates changes in the concentration of nutrients, sediment, and other water quality parameters between sites and over time.

SCRW, 2016a. Water Quality in McCabe's Brook Summary Report 2014-2015 (2004 to 2015 Data). Prepared by South Chittenden Riverwatch, Shelburne and Charlotte, VT.

SCRW, 2016b. Water Quality in the Laplatte River 2014-2015 Summary Report (2006 to 2015 Data). Prepared by South Chittenden Riverwatch, Shelburne, Charlotte, and Hinesburg, VT.

SCRW, 2016c. Water Quality in Thorp & Kimball Brooks 2013-2014 Summary Report (2008 to 2014 Data). Prepared by South Chittenden Riverwatch, Charlotte, VT.

SCRW, 2016d. Water Quality in Thorpe, Kimball, & Holmes Brooks 2013 Summary Report (2013 Data). Prepared by South Chittenden Riverwatch, Charlotte, VT.

LIA, 2013. ANR Larosa Water Quality Monitoring Report for Lake Iroquois. Lake Iroquois Association, Hinesburg, VT.

WATER QUALITY: Flow monitoring and hotspot identification to create a template for reducing water quality impacts associated with direct drainages to Lake Champlain. Past water quality data were analyzed and a monitoring plan was created.

MMI, 2010d. Water Quality Planning on Thorp and Kimball Brooks. Prepared for the Lewis Creek Association by Milone & MacBroom, Inc., Charlotte and Ferrisburg, VT.

STORMWATER: An initial alternatives analysis to identify possible stormwater treatment actions in Hinesburg Village to minimize impacts to receiving waters.

MMI, 2010a. Hinesburg Village, Vermont Management Alternatives. Prepared for the LaPlatte Watershed Partnership/Lewis Creek Association by Milone & MacBroom, Inc., Hinesburg, VT.

STORMWATER: Mapping of stormwater infrastructure and computation of approximate stormwater runoff volumes in Shelburne, Charlotte, and Hinesburg. The results were considered in conjunction with past geomorphic and water quality data. Possible stormwater treatment areas were identified to proactively treat runoff and try and prevent impairment of receiving waters.

MMI, 2010c. Laplatte River Watershed Stormwater Infrastructure Study. Prepared for the LaPlatte Watershed Partnership/Lewis Creek Association by Milone & MacBroom, Inc., Chittenden County, VT.

STORMWATER: Baseline hydrologic modeling of existing conditions in the Village Growth Area and potential full buildout scenario to identify runoff rates and volumes, and support implementation of future low-impact design. A conceptual design for a rain garden at Silver Street was prepared as part of this project that has since been implemented.

MMI, 2012a. Growth Area Existing Conditions Hydrology Study. Prepared for the Town of Hinesburg by Milone & MacBroom, Inc., Hinesburg, VT.

STORMWATER: Created an assessment to assist with decision-making for maintaining grass swales or for converting to storm drain pipes. Prepared a concept design for a runoff mitigation project on Brooke Lane, as well as standard details for runoff treatment practices associated with stormwater swales.

MMI, 2013. Shelburne Stormwater Mitigation Best Management Practice (BMP). Prepared for the LaPlatte Watershed Partnership/Lewis Creek Association by Milone & MacBroom, Inc., Shelburne, VT.

STORMWATER: An alternatives analysis to identify stormwater treatment alternatives in Hinesburg to support growth and collect runoff from the road network. A concept design was prepared at the Hinesburg Community School to condition runoff prior to entering the LaPlatte River.

VHB and MMI, 2015. Feasibility Study: Opportunities to Manage Transportation-Related Stormwater Runoff. Prepared for the Town of Hinesburg by VHB and Milone & MacBroom, Inc., Hinesburg, VT.

CULVERT ASSESSMENTS: The following two references gathered existing or new culvert data to evaluate geomorphic compatibility (i.e., how well a culvert matches the stream), aquatic organism passage (i.e., can fish and other species get through the culvert), capacity, and safety. Lists of culvert improvement projects were created for the watershed and along Vermont Route 116.

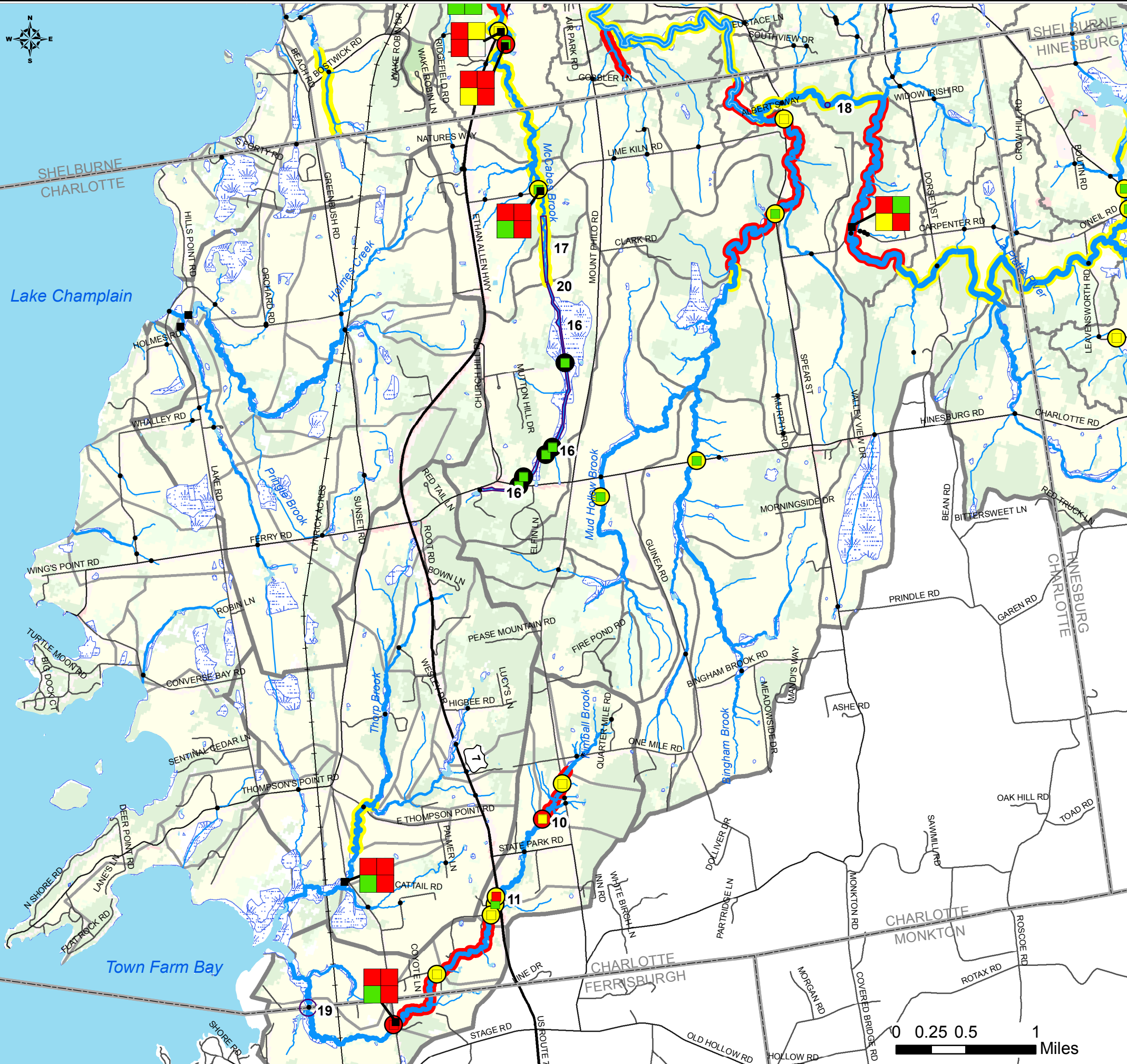
MMI, 2010b. Laplatte River Watershed Culvert Study. Prepared for the LaPlatte Watershed Partnership/Lewis Creek Association by Milone & MacBroom, Inc., Chittenden County, VT.

MMI, 2012c. Vermont 116 Culvert AOP Project in Starksboro and Hinesburg, Vt. Prepared for the Chittenden and Addison County Regional Planning Commissions by Milone & MacBroom, Inc., Hinesburg, VT.

VERMONT TACTICAL BASIN PLAN: A compilation of data and project recommendations that summarizes the conditions in the area, what is important to watershed stakeholders, and what projects could be implemented to meet water quality goals. Note that this plan includes many of the project recommendations identified in the other reports presented in this list.

VTANR, 2015. Northern Lake Champlain Direct Drainages Tactical Basin Plan. Prepared by the Vermont Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division, Hinesburg, VT.

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Surface Water Conditions & Project Improvement List

LaPlatte River & Direct Drainage Watersheds Charlotte, Vermont

Legend

- Water Quality**
- Poor
 - Moderate
 - Good

P	Solids
Cl	E.Coli

Baseline conditions at South Chittenden River Watch sampling stations (2004 to 2015) compared to VT Water Quality Standards (2014). Poor Water Quality can degrade local habitat and downstream receiving waters such as Lake Champlain.
 P = Total Phosphorus
 Solids = Turbidity
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 E. Coli = Indicator of coliform bacteria

Stream Channel Stability

- Poor
- Moderate
- Good

Likelihood of excessive channel change, such as erosion, deposition, or suddenly changing paths, during a flood.

Culvert Geomorphic Compatibility

- Poor
- Moderate
- Good

Measure of how well a culvert matches a channel. A poor culvert is more likely to be damaged during a flood.

Culvert Aquatic Organism Passage (AOP)

- Poor
- Moderate
- Good
- Missing Data

How a culvert impacts the movement of fish and other species in the stream. Poor means that organisms are likely unable to move through the culvert.

Landcover

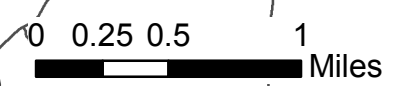
- Developed- Medium to High Density
- Rural Development- Low Density
- Agriculture
- Shrubs and Grasses
- Forest
- National Wetland Inventory
- Lakes and Ponds

The type of landcover influences stormwater runoff, with more runoff from urban and agricultural areas than from forested and naturally vegetated landcovers. Data from 2006 NLCD, corrected by MMI based on field observations 2013.

Streams (By Order)

- Stream
- Bridge or Culvert - Not Assessed
- Railroad
- Roads
- Town Boundary
- Watershed Boundary
- Subwatershed Boundary

**# = Project ID,
See Back for
Project List**



**Surface Water Project Improvement List
Charlotte, Vermont**

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	Shelburne Bay	All Waters	land erosion, nutrients, channel erosion	Identify and implement needed agricultural BMPs for areas identified as significant pollutant sources based on risk for erosion, water quality data and agriculture inspections.	VTANR, 2015; SCRW, 2016b; SCRW, 2016c; MMI, 2010d
2	McCabes Brook	All Waters	land erosion	Develop and implement stormwater management plan for private and public roads. Use Road erosion Risk layer (Fig. 4-8) and map points of stormwater inputs to ditches to assist in project prioritization	VTANR, 2015; MMI, 2010c
3	LaPlatte River and Direct Drainages	All Waters	nutrients, land erosion, channel erosion, pathogens	Monitor and assess surface waters to gain better understanding of condition and potential sources	VTANR, 2015
4	LaPlatte River and Direct Drainages	All Waters	channel erosion, encroachment	Protect river corridors to increase flood resilience and to allow rivers to reach equilibrium by assisting towns to adopt appropriate ordinances	VTANR, 2015
5	LaPlatte River	All Waters	land erosion, channel erosion	Support geomorphic assessments Phase 2 light to identify opportunities for regaining floodplain connection and potential gully remediation.	VTANR, 2015; LCA, 2008; LWP, 2007a; MMI, 2012b
6	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Limit amount of impervious surface and preserve open space	MMI, 2010c
7	LaPlatte River and Direct Drainages	All Waters	nutrients, land erosion, channel erosion	Identify potential wetland restoration sites based on Lake Champlain wetland restoration map	VTANR, 2015
8	Thorp Brook and Kimball Brook	All Waters	pathogens, nutrients, land erosion	Investigate water quality hot spots identified to determine source of inputs.	SCRW, 2016c; MMI, 2010d
9	LaPlatte River and Direct Drainages	All Waters	channel erosion, land erosion, encroachment	During scheduled improvements to roads or following damage or washouts, upgrade culverts to meet aquatic organism passage, geomorphic compatibility, and flood resilience standards.	MMI, 2010b; MMI, 2012c
10	Kimball Brook	All Waters	encroachment, channel erosion	Replace culverts blocking aquatic organism passage: Kimball Brook at agricultural crossing upstream of Route 7	MMI, 2010b
11	Kimball Brook	All Waters	encroachment, channel erosion	Replace geomorphologically incompatible culvert and bridges: Kimball Brook at Route 7	VTANR, 2015; MMI, 2010b
12	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Revise planning and zoning to improve stormwater including required use of LID and conservation of prime areas for infiltration	MMI, 2010c
13	LaPlatte River and Direct Drainages	All Waters	land erosion, nutrients, channel erosion	Discussion w/ agricultural producers about SCRW water quality sampling results	VTANR, 2015; SCRW, 2015
14	LaPlatte River and Direct Drainages	All Waters	land erosion,	Identify and implement needed Better Backroads BMPs for roads identified in Appendix B as at moderate to high risk for erosion	VTANR, 2015
15	Mud Hollow Brook	Headwaters of T2	land erosion, nutrients, channel erosion, pathogens	Wetland restoration or riparian buffer	VTANR, 2015; LCA, 2008
16	McCabes Brook	T1.08	land erosion	Protect wetland and river corridor	VTANR, 2015; MMI, 2012b
17	McCabes Brook	T1.07B/A; T1.06B	land erosion	Work with landowners to secure specific protections for the forested river corridor. VLT has easement	VTANR, 2015; MMI, 2012b
18	LaPlatte River	M9a	land erosion	Riparian plantings near Habitat for Humanity property	VTANR, 2015; LWP, 2008
19	Kimball Brook	T8.s2.01	land erosion, encroachment	Manage stormwater and replace culvert on townline road	VTANR, 2015; SCRW, 2010
20	McCabes Brook	T1.08	flow alteration;	Remove partially breached dam	VTANR, 2015; MMI, 2012b

Notes:

- 1) Project locations are shown on the accompanying map. Projects that apply to All Waters or large areas are not shown on map.
- 2) Projects near the top of the list may have a higher benefit, based on previous project identification and data interpretation where they exist. In other locations, data synthesis was performed and best professional judgement was used to identify additional projects. This list order recognizes that a variety of approaches are important to improving surface water conditions.
- 3) This project was funded by an agreement awarded by the Great Lakes Fishery Commission to the New England Interstate Water Pollution Control Commission in partnership with the Lake Champlain Basin Program. NEIWPCC manages LCBP's personnel, contract, grant, and budget tasks and provides input on the program's activities through a partnership with the LCBP Steering Committee.
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Surface Water Conditions & Project Improvement List

LaPlatte River Watershed Hinesburg, Vermont

Legend

Water Quality

- Poor
- Moderate
- Good

P	Solids
Cl	E.Coli

Baseline conditions at South Chittenden River Watch sampling stations (2004 to 2015) compared to VT Water Quality Standards (2014). Poor Water Quality can degrade local habitat and downstream receiving waters such as Lake Champlain.
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 E. Coli = Indicator of coliform bacteria

Stream Channel Stability

- ▬ Poor
- ▬ Moderate
- ▬ Good

Likelihood of excessive channel change, such as erosion, deposition, or suddenly changing paths, during a flood.

Culvert Geomorphic Compatibility

- Poor
- Moderate
- Good

Measure of how well a culvert matches a channel. A poor culvert is more likely to be damaged during a flood.

Culvert Aquatic Organism Passage (AOP)

- Poor
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- Missing Data

How a culvert impacts the movement of fish and other species in the stream. Poor means that organisms are likely unable to move through the culvert.

Landcover

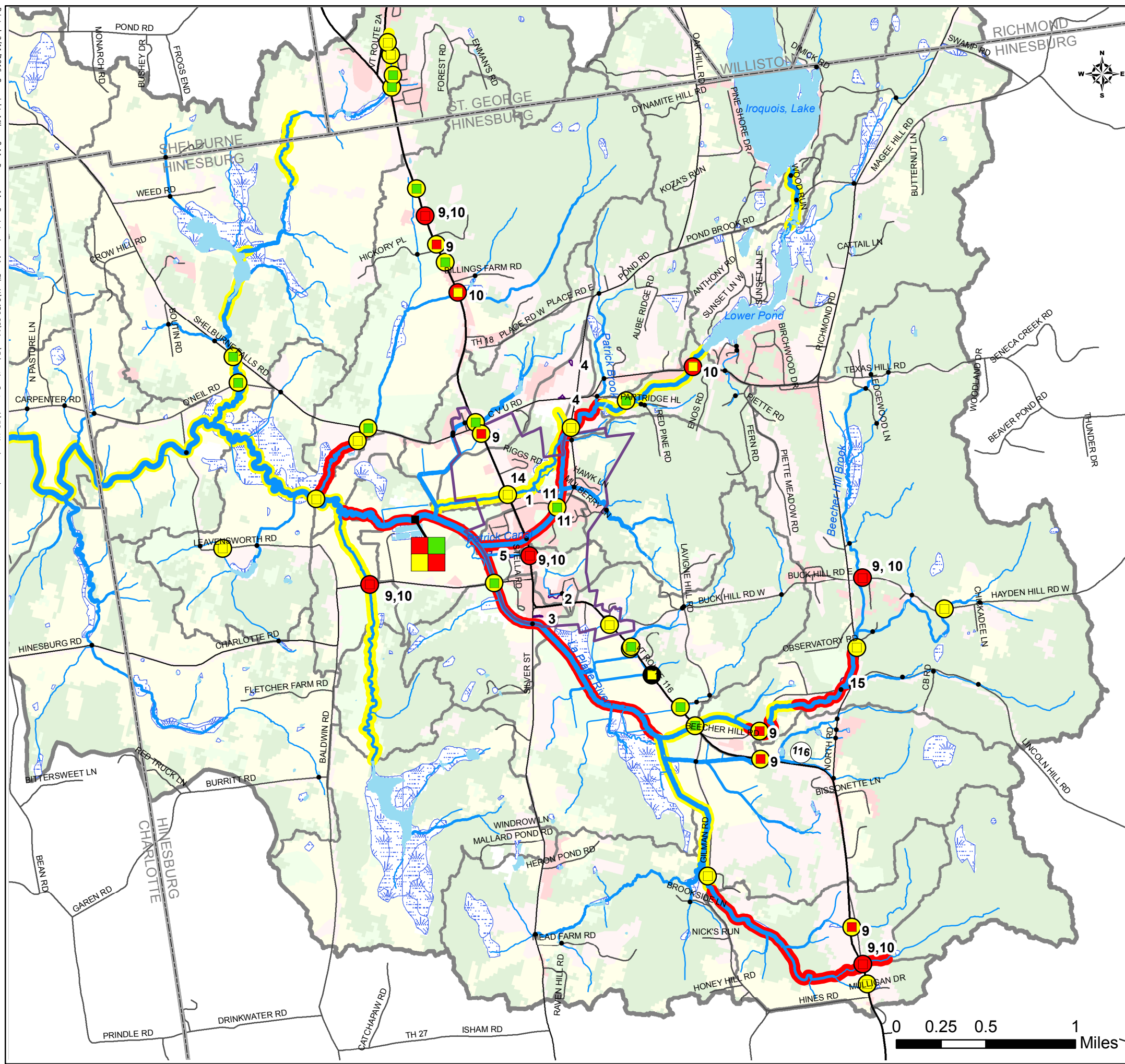
- ▭ Developed- Medium to High Density
- ▭ Rural Development- Low Density
- ▭ Agriculture
- ▭ Shrubs and Grasses
- ▭ Forest
- ▭ National Wetland Inventory
- ▭ Lakes and Ponds

The type of landcover influences stormwater runoff, with more runoff from urban and agricultural areas than from forested and naturally vegetated landcovers. Data from 2006 NLCD, corrected by MMI based on field observations 2013.

Streams (By Order)

- ▬ Stream
- Bridge or Culvert - Not Assessed
- Railroad
- Roads
- ▭ Town Boundary
- ▭ Watershed Boundary
- ▭ Subwatershed Boundary
- ▭ Hinesburg Village Growth Area

**# = Project ID,
See Back for
Project List**



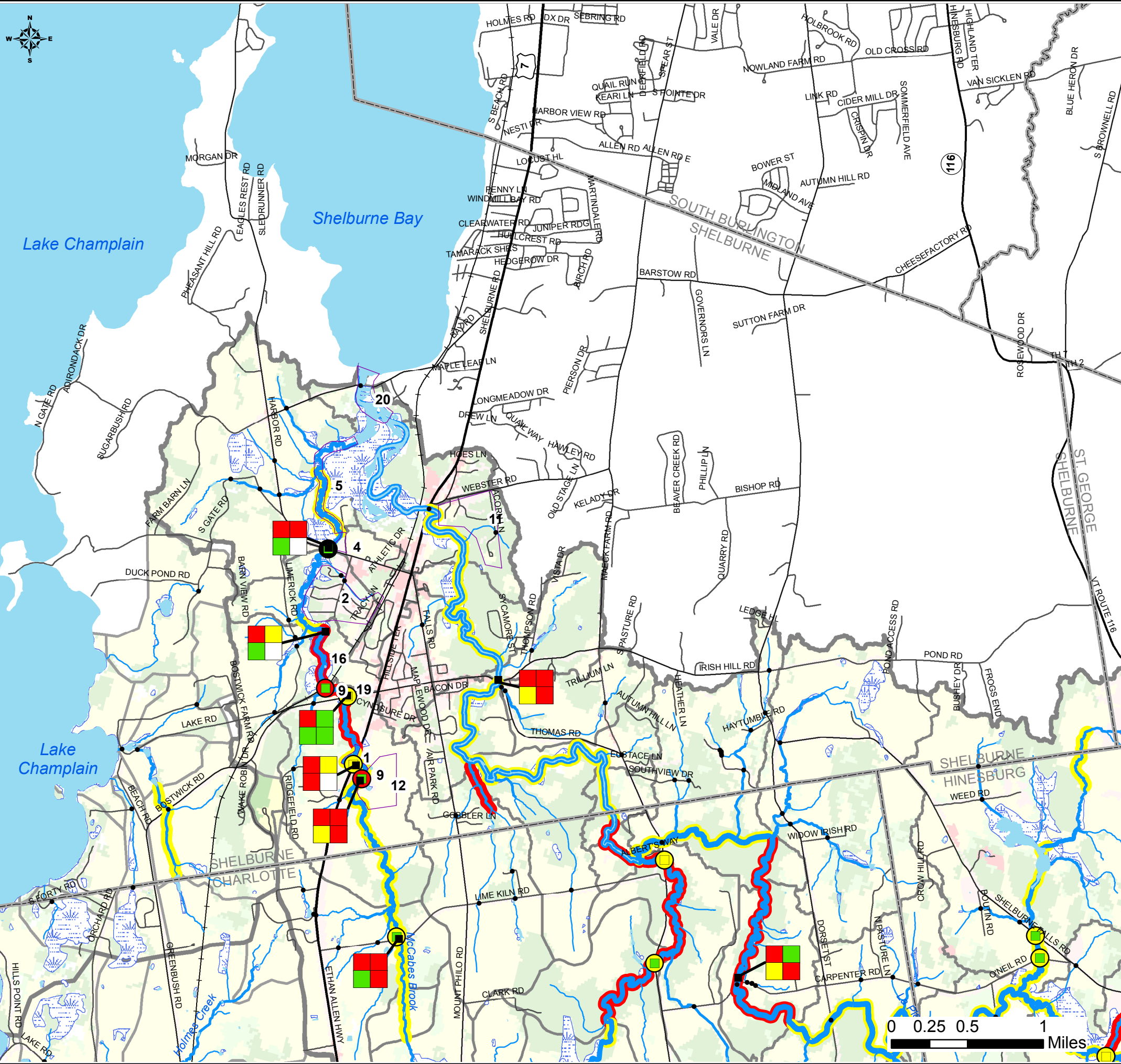
**Surface Water Project Improvement List
Hinesburg, Vermont**

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	Patrick Brook	M15.S2.01	land erosion, channel erosion	Detain stormwater on southeast side of Route 116	VTANR, 2015; MMI, 2010a; MMI, 2010c; VHB and MMI, 2015
2	LaPlatte River	M16	land erosion, channel erosion	Swale improvement at gas station/Lyman Meadows	VTANR 2015; MMI, 2010a; MMI, 2010c; VHB and MMI, 2015
3	LaPlatte River	M16	land erosion, channel erosion	Install stormwater treatment at Hinesburg Community School.	MMI, 2010a; VHB and MMI, 2015
4	LaPlatte River	M15S2.02 and upstream	channel erosion, nutrients	Assess adequacy of CVU field drainage practices to protect stream	VTANR, 2015; LWP, 2007a; MMI, 2010c; VHB and MMI, 2015
5	LaPlatte River	M16	land erosion, channel erosion	Install stormwater treatment at or near former cheese factory site.	MMI, 2010a; VHB and MMI, 2015
6	LaPlatte River and Patrick Brook	All Waters	nutrients, land erosion, channel erosion, pathogens	Monitor and assess surface waters to gain better understanding of condition and potential sources	VTANR, 2015
7	LaPlatte River	All Waters	channel erosion, land erosion, encroachment	During scheduled improvements to roads or following damage or washouts, upgrade culverts to meet aquatic organism passage, geomorphic compatibility, and flood resilience standards.	MMI 2010b; MMI 2012c
8	LaPlatte River	All Waters	channel erosion, encroachment	Protect river corridors to increase flood resilience and to allow rivers to reach equilibrium by assisting towns to adopt appropriate ordinances	VTANR, 2015
9	LaPlatte River	All Waters	encroachment, channel erosion	Replace ten geomorphologically incompatible culvert and bridges: Charlotte Road over tributary, seven culverts under Route 116 including the LaPlatte River and its unnamed tributaries, Beecher Hill Brook under Hayden Hill Road, and Beecher Hill Brook under Beecher Hill Road.	VTANR, 2015; MMI, 2010b; MMI, 2012c
10	LaPlatte River	All Waters	encroachment, channel erosion	Replace seven culverts blocking aquatic organism passage: Charlotte Road over tributary, four culverts under Route 116 including the LaPlatte River and its unnamed tributaries, Beecher Hill Brook under Hayden Hill Road, and Patrick Brook tributary under Richmond Road.	VTANR, 2015; MMI, 2010b; MMI, 2012c
11	LaPlatte River and Patrick Brook	T4.01; M15.S2.01	flow alteration	Support a collaborative town led process in developing a management plan for Patrick Canal, incorporating local knowledge and river science.	VTANR, 2015; LWP, 2007a; MMI, 2010a
12	LaPlatte River	M16-M12	channel erosion, land erosion	Work with town to review flood resiliency status and improve stormwater infrastructure planning and regulation	VTANR, 2015; LWP, 2007a; MMI 2010c
13	LaPlatte River and Patrick Brook	M15; M15.S2.01	channel erosion, land erosion, nutrient loading	Continue to identify and implement GSI stormwater management projects for village. Encourage centralized stormwater treatment system where dense development exists. Also choose treatment areas based on locations of soils with high infiltration potential	VTANR, 2015; MMI, 2012a; MMI, 2010c
14	Patrick Brook	M15.S2.01	land erosion, channel erosion	Replace Route 116 Culvert to improve geomorphic compatibility and AOP.	MMI, 2010a; MMI, 2012c
15	Beecher Brook	T5.01D	land erosion, channel erosion, encroachment	Relocating town garage, old access road and sand pile to divert runoff away from town gravel pit, reducing stormwater runoff to river	VTANR, 2015; LWP, 2007b
16	LaPlatte River	All Waters	pathogens, nutrients, land erosion	Revise planning and zoning to improve stormwater including required use of LID and conservation of prime areas for infiltration	MMI, 2010c
17	LaPlatte River	All Waters	land erosion, nutrients, channel erosion	Discussion w/ agricultural producers about SCRW water quality sampling results	VTANR, 2015; SCRW, 2015
18	LaPlatte River	All Waters	land erosion,	Identify and implement needed Better Backroads BMPs for roads identified in Appendix B as at moderate to high risk for erosion	VTANR, 2015
19	LaPlatte River	All Waters	nutrients, land erosion, channel erosion	Identify potential wetland restoration sites based on Lake Champlain wetland restoration map	VTANR, 2015
20	LaPlatte River	All Waters	pathogens, nutrients, land erosion	Limit amount of impervious surface and preserve open space	VTANR, 2015; MMI, 2010c

Notes:

- 1) Project locations are shown on the accompanying map. Projects that apply to All Waters or large areas are not shown on map.
- 2) Projects near the top of the list may have a higher benefit, based on previous project identification and data interpretation where they exist. In other locations, data synthesis was performed and best professional judgement was used to identify additional projects. This list order recognizes that a variety of approaches are important to improving surface water conditions.
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Surface Water Conditions & Project Improvement List

LaPlatte River & Direct Drainage Watersheds Shelburne, Vermont

Legend

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- Poor
 - Moderate
 - Good

P	Solids
Cl	E.coli

Baseline conditions at South Chittenden River Watch sampling stations (2004 to 2015) compared to VT Water Quality Standards (2014). Poor Water Quality can degrade local habitat and downstream receiving waters such as Lake Champlain.
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- Stream Channel Stability**
- ▬ Poor
 - ▬ Moderate
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Likelihood of excessive channel change, such as erosion, deposition, or suddenly changing paths, during a flood.

- Culvert Geomorphic Compatibility**
- Poor
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 - Good

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- Culvert Aquatic Organism Passage (AOP)**
- Poor
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 - Missing Data

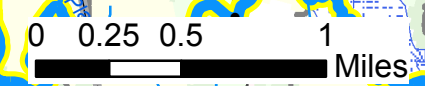
How a culvert impacts the movement of fish and other species in the stream. Poor means that organisms are likely unable to move through the culvert.

- Landcover**
- ▭ Developed- Medium to High Density
 - ▭ Rural Development- Low Density
 - ▭ Agriculture
 - ▭ Shrubs and Grasses
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The type of landcover influences stormwater runoff, with more runoff from urban and agricultural areas than from forested and naturally vegetated landcovers. Data from 2006 NLCD, corrected by MMI based on field observations 2013.

- Streams (By Order)**
- ▬ Stream
 - Bridge or Culvert - Not Assessed
 - + Railroad
 - ▬ Roads
 - ▭ Town Boundary
 - ▭ Watershed Boundary
 - ▭ Subwatershed Boundary

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**Surface Water Project Improvement List
Shelburne, Vermont**

Priority	Watershed	Stream Segment	Stressor	Project Description	Source
1	McCabes Brook	T1.05B/A	channel erosion, land erosion	Determine benefit of increasing floodplain and stabilizing mass failure for benefit of protecting Route 7 and replacement of Route 7 culvert	VTANR, 2015; MMI, 2012b
2	McCabes Brook	T1	land erosion, channel erosion	Address stormwater related issues at School Street neighborhood, include work with residential home owners to implement GSI	VTANR, 2015; MMI, 2010c
3	Entire Basin	All Waters	land erosion, channel erosion	Identify stormwater conveyance swales with problems and improve using stormwater treatment BMPs and swale screen results.	MMI, 2013
4	McCabes Brook	T1.03	land erosion, channel erosion	Plant stream buffer/restore flood plain at the Shelburne Town Garage and Wastewater Treatment Facility on Turtle Lane	VTANR, 2015; MMI, 2012b
5	McCabes Brook	T1.02	land erosion	Work with landowners to secure specific protections for the forested river corridor and manage for compatibility with the lake.	MMI, 2012b
6	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Revise planning and zoning to improve stormwater including required use of LID and conservation of prime areas for infiltration	MMI, 2010c
7	LaPlatte River and McCabes Brook	M04-M06; T1.03	land erosion, channel erosion	Restore incised reach and address stormwater inputs with GSI practices. Review LWP stormwater study projects and identify treatment options. Expand village stormwater management plan/hydrologic study.	VTANR, 2015; LWP, 2008; SCRW, 2016a; MMI, 2010c
8	LaPlatte River	All Waters	nutrients, land erosion, channel erosion, pathogens	Monitor and assess surface waters to gain better understanding of condition and potential sources	VTANR, 2015
9	McCabes Brook	All Waters	encroachment, channel erosion	Replace culverts blocking aquatic organism passage: McCabes Brook under the Railroad and Teddy Bear Access Road	VTANR, 2015; MMI, 2010b; MMI, 2012b; MMI, 2012c
10	LaPlatte River and Direct Drainages	All Waters	channel erosion, land erosion, encroachment	During scheduled improvements to roads or following damage or washouts, upgrade culverts to meet aquatic organism passage, geomorphic compatibility, and flood resilience standards.	MMI, 2010b; MMI, 2012c
11	LaPlatte River	M01 -M06	land erosion, nutrients, channel erosion	Complete stormwater management planning, including Gardenside Condo area	VTANR, 2015
12	McCabes Brook	T1.05	land erosion, channel erosion	Investigate runoff near Teddy Bear Factory and improve stormwater treatment.	SCRW, 2016a; MMI, 2010c
13	LaPlatte River and Direct Drainages	All Waters	land erosion, nutrients, channel erosion	Discussion w/ agricultural producers about SCRW water quality sampling results	VTANR, 2015; SCRW, 2015
14	LaPlatte River and Direct Drainages	All Waters	land erosion	Identify and implement needed Better Backroads BMPs for roads identified in Appendix B as at moderate to high risk for erosion	VTANR, 2015
15	LaPlatte River and Direct Drainages	All Waters	channel erosion, encroachment	Protect river corridors to increase flood resilience and to allow rivers to reach equilibrium by assisting towns to adopt appropriate ordinances	VTANR, 2015
16	McCabes Brook	T1.04B	land erosion, channel erosion	Protect corridor to allow the river to reach equilibrium and become attenuation asset.	VTANR, 2015; MMI, 2012b
17	LaPlatte River and Direct Drainages	All Waters	nutrients, land erosion, channel erosion	Identify potential wetland restoration sites based on Lake Champlain wetland restoration map	VTANR, 2015
18	LaPlatte River and Direct Drainages	All Waters	pathogens, nutrients, land erosion	Limit amount of impervious surface and preserve open space	VTANR, 2015; MMI, 2010c
19	McCabes Brook	T1.05/A	channel erosion, land erosion	Replace Bostwick Road culvert with larger structure to increase geomorphic and AOP compatibility.	VTANR, 2015; MMI, 2012b
20	LaPlatte River	M01	aquatic Invasive species	Support community efforts to control aquatic invasive plants (e.g., European frogbit)	VTANR, 2015

Notes:

- 1) Project locations are shown on the accompanying map. Projects that apply to All Waters or large areas are not shown on map.
- 2) Projects near the top of the list may have a higher benefit, based on previous project identification and data interpretation where they exist. In other locations, data synthesis was performed and best professional judgement was used to identify additional projects. This list order recognizes that a variety of approaches are important to improving surface water conditions.
- 3) This project was funded by an agreement awarded by the Great Lakes Fishery Commission to the New England Interstate Water Pollution Control Commission in partnership with the Lake Champlain Basin Program. NEIWPCC manages LCBP's personnel, contract, grant, and budget tasks and provides input on the program's activities through a partnership with the LCBP Steering Committee.
- 4) For More Information Contact: Lewis Creek Association, www.lewiscreek.org