Memorandum

TO: **Marty Illick, Lewis Creek Association**

FROM: **Jessica Louisos, Milone & MacBroom**

DATE: **May 28, 2016**

RE: **Stormwater Education for Citizens and Towns in the LaPlatte River Watershed Region**
Education Outreach Map Data Sources
MMI # 3452-22

Project Overview

Milone & MacBroom, Inc. (MMI) assisted the Lewis Creek Association (LCA) with stormwater education in Hinesburg, Charlotte, and Shelburne, Vermont. This project synthesized existing technical report data by Town into a more user friendly format that can more easily be used by individuals, local government, and state government. LCA has completed a significant body of knowledge over 10 years detailing conditions within the LaPlatte River, Thorp Brook, Kimball Brook, and Holmes Brook watersheds. These previous projects have improved understanding of water resource conditions and led to the identification of water quality, stream channel stability, and habitat improvement projects. This project compiled and summarized existing data into user friendly products including:

- annotated bibliography of data sources to connect recommendations to the data and report from which it originated
- surface water condition maps of the LaPlatte River and Direct Drainage watersheds at both the watershed scale and by Town
- project improvement lists for each Town

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.

This memo describes the data sources and classifications used in the mapping portion of the project.

Water Quality

Water Quality data have been collected by South Chittenden River Watch from 2004 to 2015 (SCRW, 2016a, 2016b, 2016c, 2016d). Data have been compiled, aggregated, and displayed on maps for the LaPlatte River & Direct Drainage Watersheds for Charlotte, Hinesburg, and Shelburne, VT. The goal of this work is to make a simple summary of existing data.

Displayed parameters include:

- Total Phosphorus
- Turbidity
- Chloride
- E.Coli

The median, maximum, and minimum values were evaluated for total phosphorus, turbidity, and chloride over the full data record. Data were compared to criteria in the Vermont Water Quality Standards (2014). Total phosphorus median values were compared to criteria for warm water medium-gradient streams. Turbidity median values were compared to criteria for Class B waters either warm or cold water fish habitat classification. Chloride maximum values were compared to the average allowable concentration.

A good value was assigned if the data was below the water quality criteria. A moderate value was assigned if the data was close to, but meeting, the criteria. A poor value was assigned if the data was above the water quality criteria.

For E. Coli, the data were compared to modified criteria from the Standards. The station was assigned poor if either 10% of the samples were above 235 organisms / 100 mL or if the geometric mean was above 126 organisms / 100 mL. No moderate values were assigned.

Designations do not indicate if a stream has impaired status as designated by the State, yet provides a general sense of water quality.

Stream Channel Stability

Stream channel stability is available in areas where a Phase 2 Stream Geomorphic Assessment (SGA) has been completed (LCA 2008, LWP 2007a, 2006, MMI 2012b). The SGA sensitivity has been used to give a general indication of the stability of the reaches (Table 1).

Table 1: Stream Channel Stability Classifications

Map Classification	**SGA Sensitivity**
Poor	Extreme
Poor	Very High
Moderate	High
Moderate	Moderate
Good	Low
Good	Very Low

Culvert Geomorphic Compatibility and Culvert Aquatic Organism Passage (AOP)

Culvert assessments have been completed as part of various projects including the SGA geomorphic and habitat assessments and some focused specifically on culverts in the project watersheds (MMI 2010b, 2012b, 2012c). Culvert screening tools have been developed by Milone & MacBroom to assist the State of Vermont in prioritizing these culverts at the state and watershed levels according to both geomorphic compatibility (MMI 2008) and aquatic organism passage (MMI 2009). The screen results have been used classify culverts (Tables 2 & 3).

Table 2: Culvert Geomorphic Compatibility Classifications

Map Classification	Geomorphic Compatibility Screen
Poor	Fully incompatible
Poor	Mostly incompatible
Moderate	Partially compatible
Good	Mostly compatible
Good	Fully compatible

Table 3: Culvert AOP Classifications

Map Classification	AOP Screen
Poor	No AOP
Poor	No AOP, except adult salmonids
Moderate	Reduced AOP
Good	Full AOP
Missing Data	Missing Data

Landcover

Landcover data was based on the 2006 National Land Cover Dataset (NLCD) obtained from VCGI (VCGI, various). Potions of the landcover were corrected by Milone & MacBroom based on field observations (MMI 2012a). Landcover classes were combined to simplify the map (Table 4). National Wetland Inventory and Lakes and Ponds data were obtained by VCGI.

Table 4: Landcover Classifications

Map Classification	**NLCD Class**
Developed - Medium to High Density	Developed, Medium Intensity
Developed - Medium to High Density	Developed High Intensity
Rural Development - Low Density	Developed, Open Space
Rural Development - Low Density	Developed, Low Intensity
Agriculture	Pasture / Hay
Agriculture	Cultivated Crops
Shrubs and Grasses	Barren Land
Shrubs and Grasses	Shrub / Scrub
Shrubs and Grasses	Grassland / Herbaceous
Forest	Deciduous Forest
Forest	Evergreen Forest
Forest	Mixed Forest

Locational Data

Streams, railroads, roads, and Town boundaries were obtained from VCGI.

The source of watershed and subwatershed boundaries varies by location. The LaPlatte River watershed delineations was completed by Milone & MacBroom as part of the watershed wide infrastructure study and refined in the Hinesburg Village during a detailed hydrology study of the village growth area (MMI 2010c, 2112a). Thorp and Kimball Brook watershed delineations were completed during the Phase 1 and 2 assessments and refined during a study of water quality (LCA 2008, MMI 2010d). Holmes Creek watershed delineations were completed by South Chittenden River Watch (SCRW 2016d).

Bridges and culverts that were not assessed were created by Milone & MacBroom in 2013 for statewide project to assess river vulnerability. All river and road intersections are included in this layer.

Hinesburg has designated a Village Growth Area. A delineation of this area was obtained by the Town of Hinesburg (September 2011).

References:

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.

MMI, 2008. The Vermont Culvert Geomorphic Compatibility Screening Tool. Prepared for the Vermont Agency of Natural Resources Department of Environmental Conservation River Management Program by Milone & MacBroom, Inc.

MMI, 2009. The Vermont Culvert Aquatic Organism Passage Screening Tool. Prepared for the Vermont Agency of Natural Resources Department of Fish and Wildlife by Milone & MacBroom, Inc.

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

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

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

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

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.

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.

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.

VCGI, various. Vermont Center for Geographic Information provides an online clearing house for digital data. vcgi.vermont.gov.

VTANR, 2014. Vermont Water Quality Standards, Environmental Protection Rule Chapter 29(a). Effective October 30, 2014.