



Vermont Stormwater Management Programs for Non-Phase 2 Communities



NEIWPC 23rd Annual Nonpoint Source Pollution Conference

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Portsmouth, New Hampshire



Jim Pease, Vermont DEC

Dave Braun, Stone Environmental, Inc.

Milly Archer, Vermont League of Cities and Towns

Overview

- 1. Infrastructure Mapping (Jim Pease)**
- 2. Illicit Discharge Detection and Elimination (Dave Braun)**
- 3. Regulatory/Planning Assistance (Milly Archer)**

Vermont's Stormwater Management Statute, § 1264 (b)

Year 2000 amendments

The secretary's stormwater management program shall include, at a minimum, provisions that:

(9) Promote detection and elimination of improper or illegal connections and discharges. (MS4-MM#3)

(10) Promote implementation of pollution prevention during the conduct of municipal operations. (MS4-MM#6)

(12) Encourage municipal governments to utilize existing regulatory and planning authority to implement improved stormwater management by providing technical assistance, training, research and coordination with respect to stormwater management technology, and by preparing and distributing a model local stormwater management ordinance. (MS4-MM#4-5)

(13) Promote public education and participation among citizens and municipalities about cost-effective and innovative measures to reduce stormwater discharges to the waters of the state. (MS4-MM#1-2)

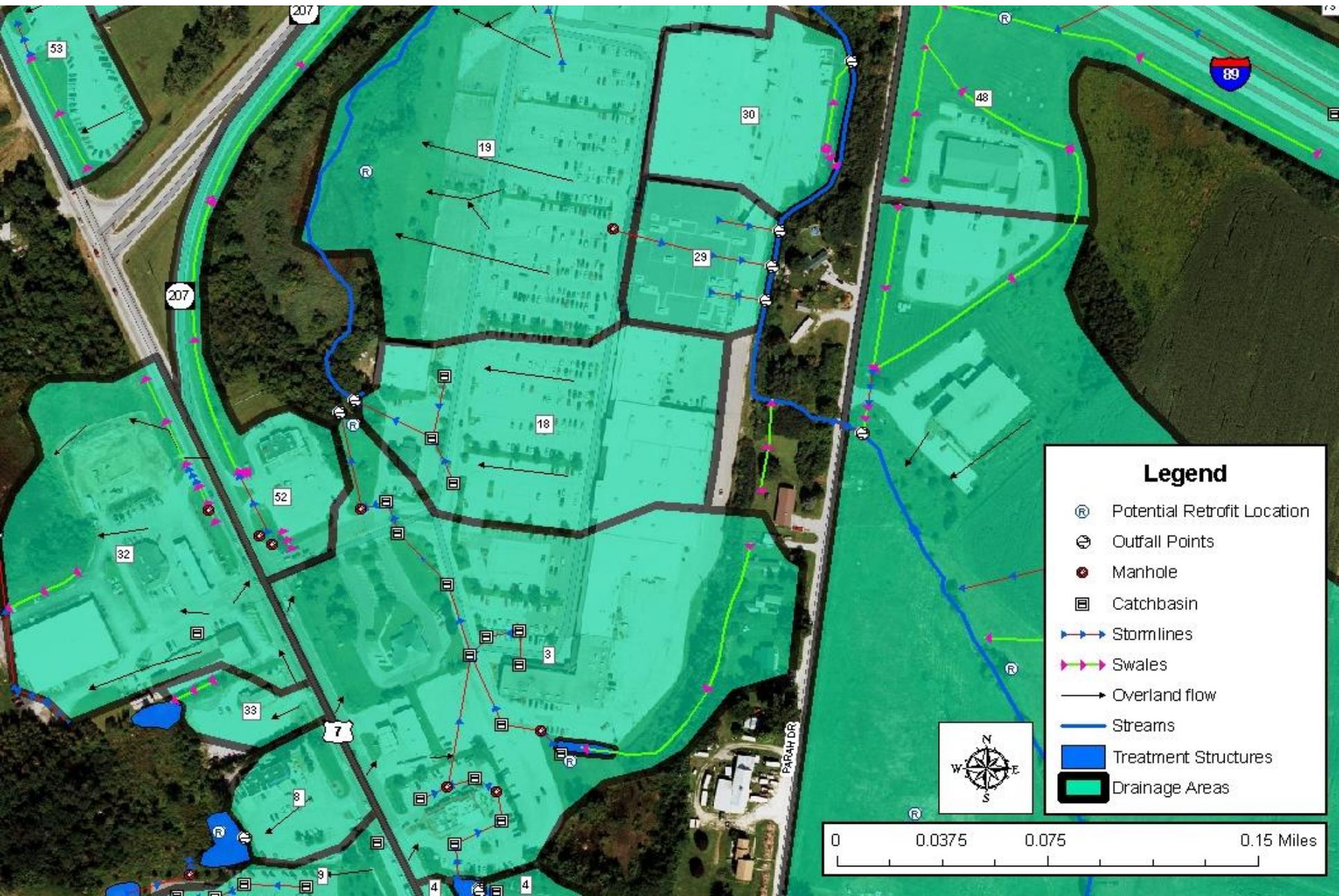
How do we get municipalities to build sustainable stormwater management plans without mandating them?

- Raise awareness through the basin planning process, planning workshops, local roads programs, other education outreach.
- Set a good example: VTrans has adopted MS4 MM#4-6 statewide.
- Complete stormwater drainage asset inventories.
- Conduct IDDE work which is practical, cost-effective pollution control and can save municipalities money.
- Encourage water quality zoning for new development / redevelopment which sets a path for future growth. Large projects get state review.
- Use grants to encourage program building blocks but also require blocks as a prerequisite to future funding

STEP 1: Drainage infrastructure added to base map images from GPS, field work, record drawings and permit plans.

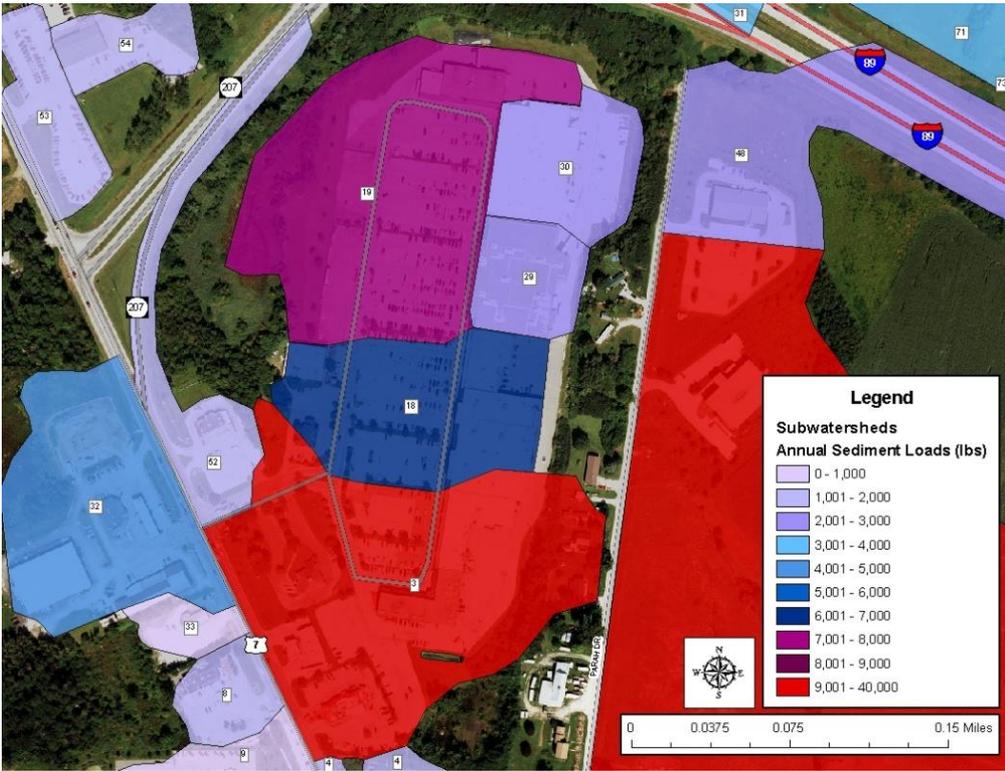


STEP 2: Sub-watershed polygons were drawn around stormwater infrastructure using digitized data, topographic maps, and Digital Elevation Models.

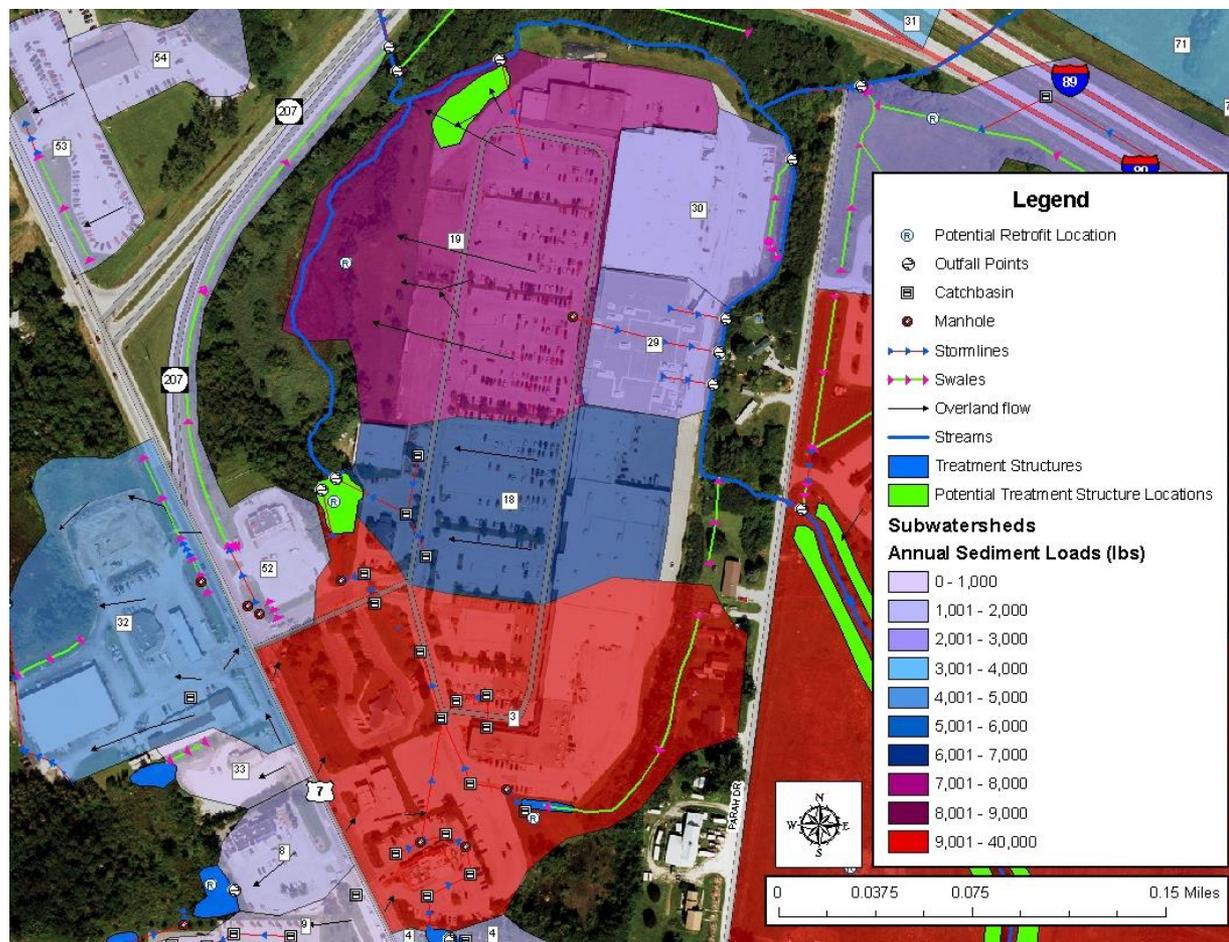


STEP 3: Annual sediment and phosphorus loads were calculated using the SIMPLE method. This enabled the ranking of the sub-watersheds by projected TSS and TP or TN loads showing the potentially most problematic sub-watersheds

Watershed Number	Projected Sediment Load (lbs)	Projected Phosphorus Load (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection Volume (Acre-Feet)
3	9,417	26.2	0.53	0.82
19	7,606	21.1	0.43	0.67
18	6,107	17.0	0.35	0.51
30	2,872	8.0	0.16	0.24
29	2,031	5.6	0.12	0.17

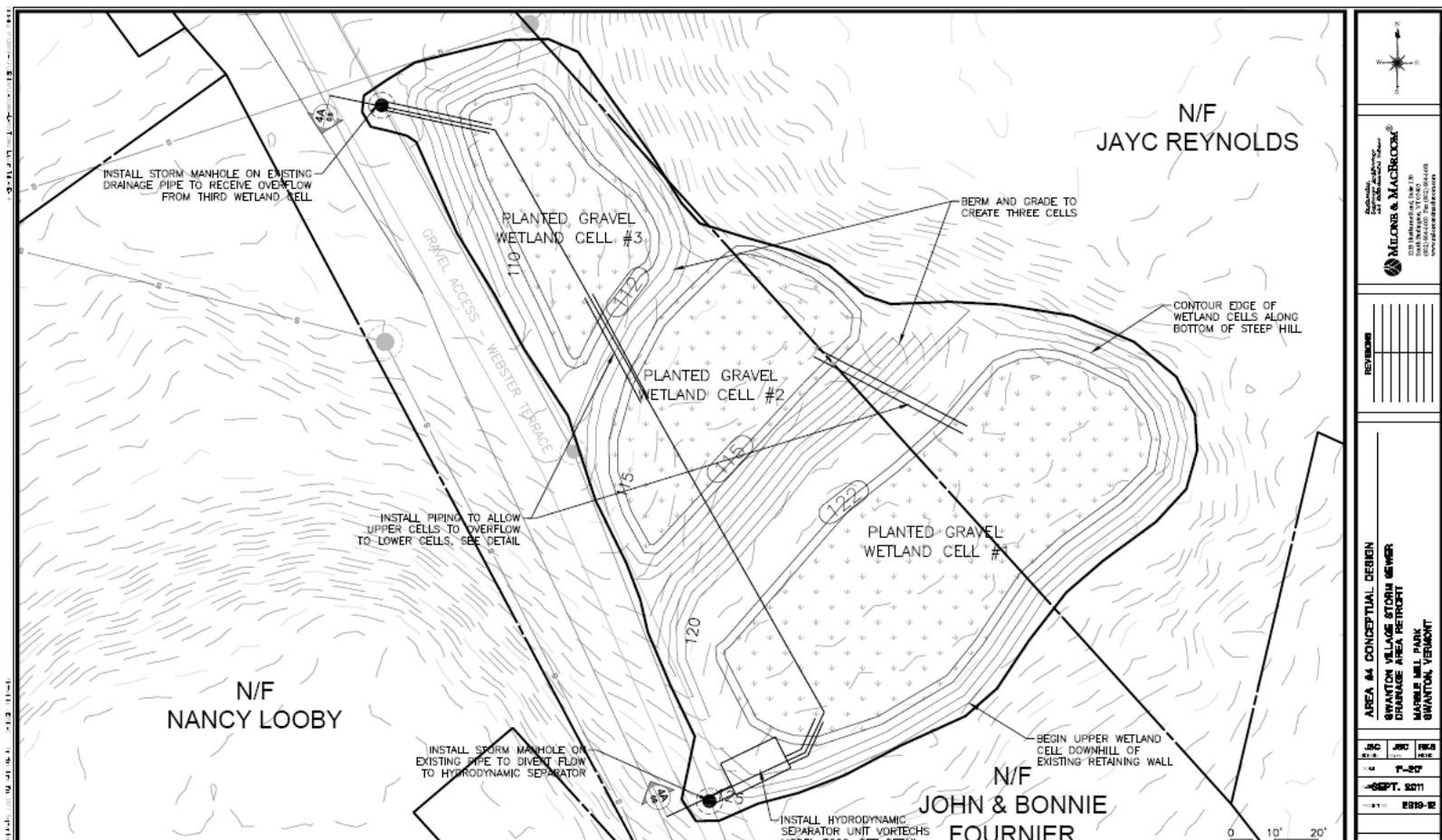


STEP 4: The highest priority sub-watersheds were looked at in more detail and potential treatment practices and funding options were suggested for each. Recommendations vary from retrofits to erosion control repair.



Watershed Number	Action List	Proposed or Existing Stormwater Treatment Practice	Estimated Basin Construction Cost	Estimated Other BMP Construction Cost	Cost of Sediment Removal per pound	Cost of Phosphorus Removal per pound	Assistance Program
3	1/2	Upgrade permitted basin to ext. det. micro pool / combine with outfall # 18		\$15,000	\$3	\$1,529	ANR-CWSRF DEC-ERP, 319
18	2	Ext. Det. Wet Pond	\$186,300		\$38	\$21,966	ANR-CWSRF DEC-ERP,

STEP 5: Potential projects are further developed with interested towns. Funding can come through state or federal grants. Towns must assume maintenance responsibility.

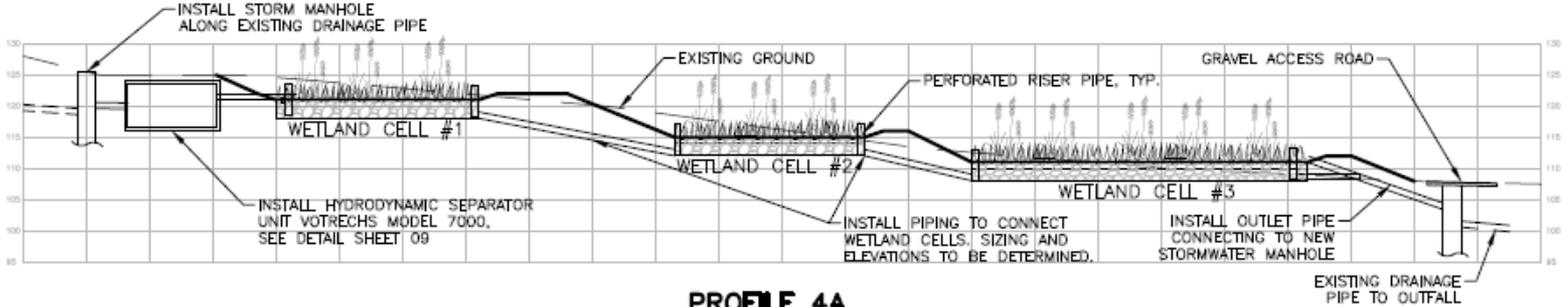


REVISIONS

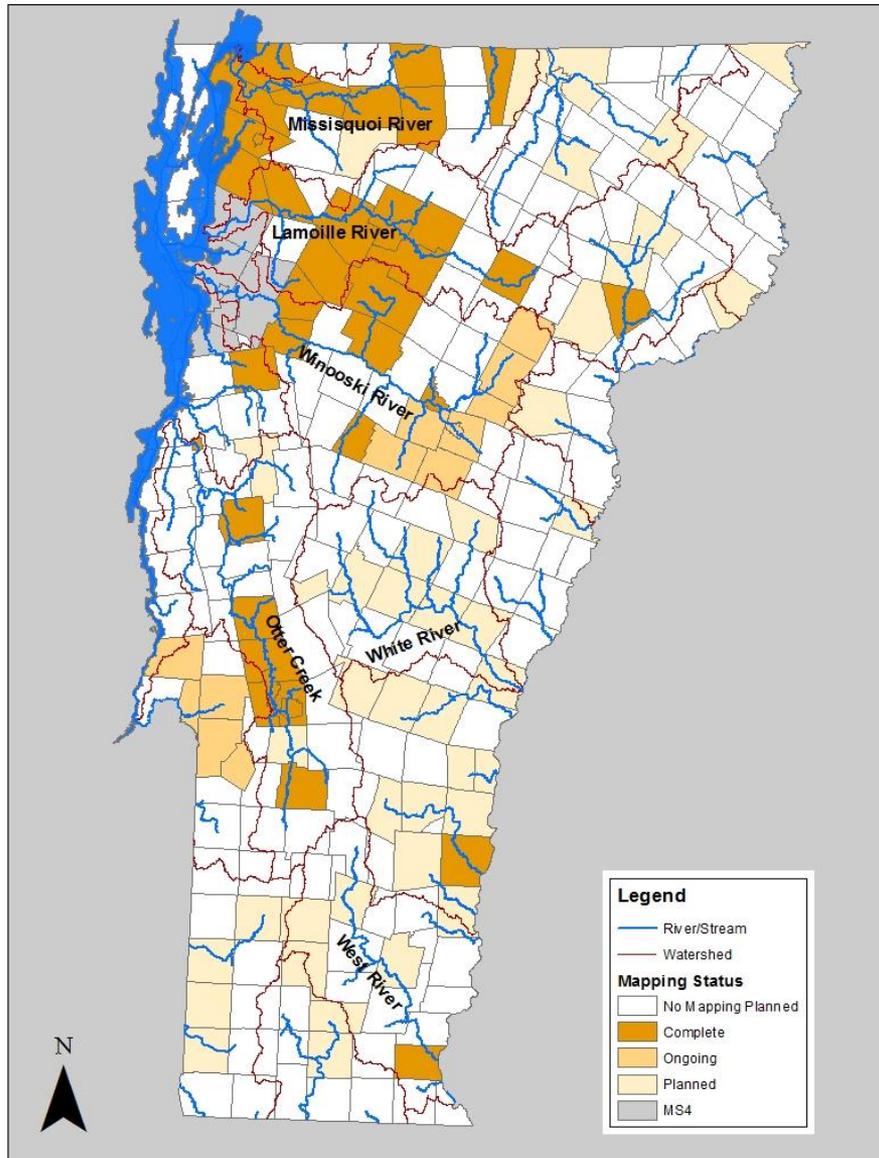
NO.	DATE	DESCRIPTION

AREA #4 CONCEPTUAL DESIGN
 SWANTON VILLAGE STORM SEWER
 DRAINAGE AREA PERIODIC
 MAJOR MILL PARK
 SWANTON, VERMONT

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Infrastructure Mapping Status



- 255 towns/cities in Vermont. Populations from 1 to 39,000
- 9 Phase 2 MS4 municipalities
- 71 non-Phase 2 towns targeted for mapping.
- Mapping completed in 33 of 71 towns.
- Mapping underway in 12 towns.

Illicit Discharges Defined

Anything discharged to a stormwater drainage system that is not composed entirely of stormwater, with certain acknowledged exceptions such as uncontaminated groundwater and air conditioning condensate.

But what a bad word! Connotes drugs and crime. Search for less off-putting synonyms:

- “Illegitimate”...(child)
- “Inappropriate”...(behavior)
- “Illegal” or “Prohibited”—Suggests an intent to pollute that is nearly always lacking. Blue lights, hefty fines, indefinite detention not far behind.
- “Contaminated”—Yes, but so is stormwater...
- “Contaminated non-stormwater”—Close but awkward

In DEC’s cooperative, non-regulatory IDDE program, words matter..

Why IDDE?

Problem:

1. Failing (leaking) infrastructure,
2. plumbing mistakes, and
3. illegal dumping

cause sanitary wastewater and other wastes to enter stormwater drainage systems from numerous locations and discharge to waters of the state.

Contaminant flows are typically small and often diluted but they add up to a significant source of water quality degradation.

Goal: Improve water quality by identifying and eliminating contaminated, non-stormwater discharges entering stormwater drainage systems and ultimately discharging to (pick a river).

Appeal: Identify and fix real problems.

Project Partners and Funding

Project name (towns)	Partner / Sponsor
Barre City	Friends of the Winooski River / Supplemental Environmental Project (city fine)
Central Vermont (Berlin, Montpelier, Northfield)	Friends of the Winooski River / VTANR Section 319 grant
Missisquoi River Basin (Enosburg Falls, Highgate, Montgomery Center, North Troy, Richford, Swanton)	VTDEC Ecosystem Restoration Program
Mid-Winooski River Basin (Waterbury, Richmond, Waitsfield, Moretown)	Friends of the Winooski River / VTDEC Ecosystem Restoration Program
Brattleboro	VTDEC Ecosystem Restoration Program
Otter Creek Basin (Middlebury, Vergennes, Brandon, Pittsford, Rutland City and Town)	VTDEC / Lake Champlain Basin Program
Lamoille River Basin (Hardwick, Morrisville, Hyde Park, Johnson, Jeffersonville, Cambridge, Fairfax, Georgia, Jericho, Underhill, and Wolcott)	VTDEC Ecosystem Restoration Program

Participating towns provide in-kind services

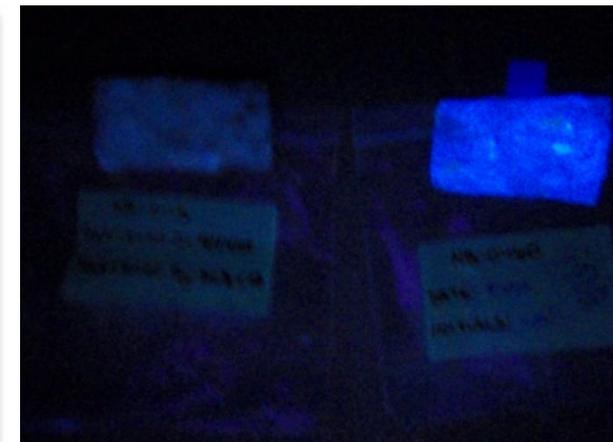
Methods



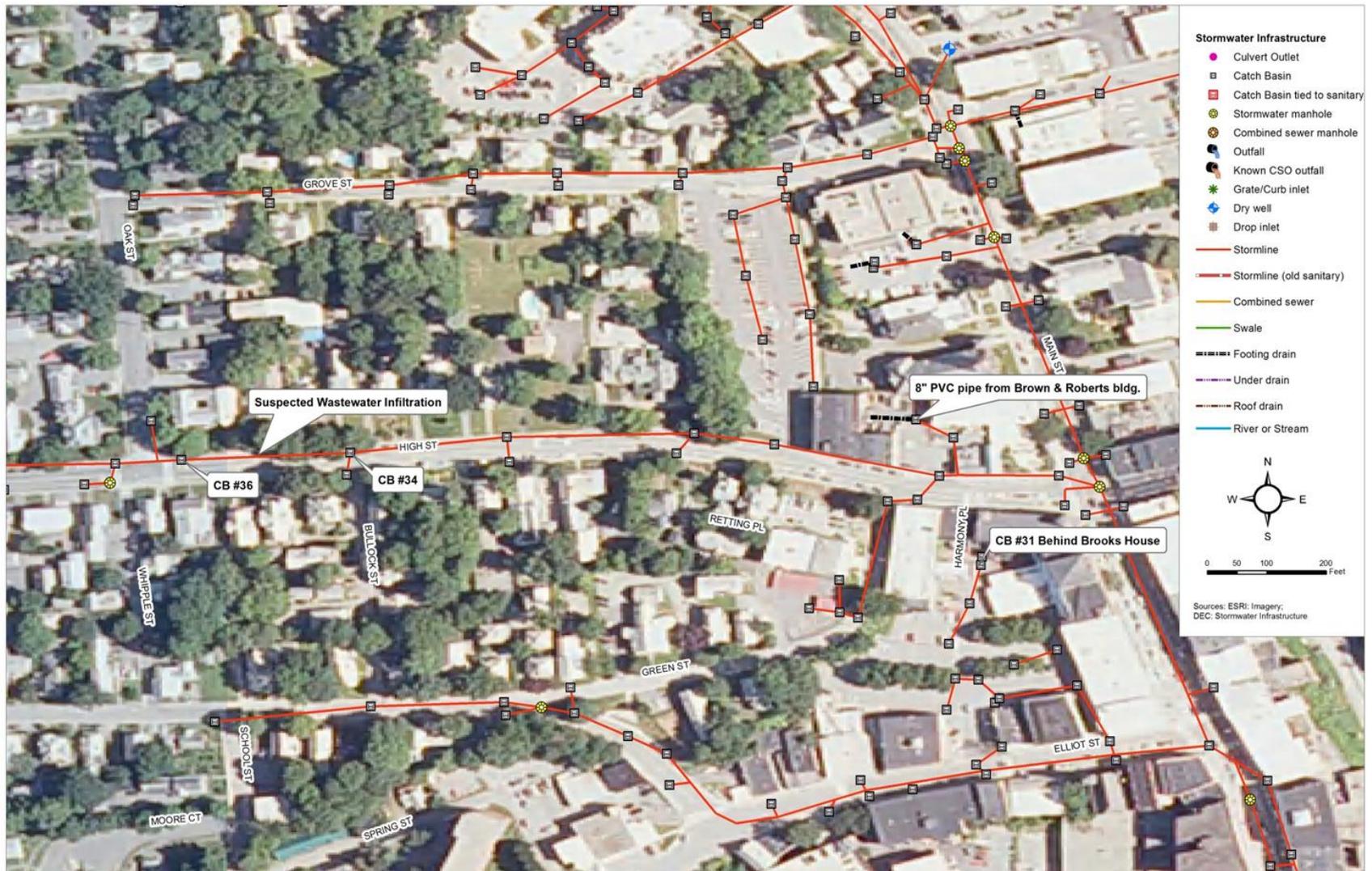
- Map stormwater infrastructure (Jim).
- Record physical characteristics of all outfall locations.
- At all flowing outfalls and selected catchbasins and manholes:
 - Describe the flow (odor, color, turbidity, and floatable matter)
 - Measure specific conductivity and concentrations of chlorine, ammonia, and detergents (methylene blue active substances)
 - Place an optical brightener pad (collected and analyzed later)
- At outfalls where OB or ammonia is detected, collect samples for *E. coli* and nutrient analysis.
- Bracket sources of suspected contaminants within drainage systems by sampling adjacent structures.
- Work with the municipality's public works department to identify specific sources within contaminated stormwater drainage systems, using engineering plans, dye testing, smoke testing and camera inspection.

Optical Brightener Test

- Fluorescent dyes used in nearly all laundry detergents.
- Cotton pads are exposed for 4-8 days, then rinsed, dried, and viewed under a UV lamp.
- Fluorescence indicates presence of a wastewater or washwater source.
- Inexpensive and sensitive method to screen for wastewater flows.
- When positive, best way to trace contaminants.
- Oil can cause a false positive OB detection (but is also of interest...)



Bracket Sampling Using OB: BR1160 System Example



We believe these methods work well in Vermont, striking an appropriate balance between efficiency, expense, and capability to detect and isolate problems.

The major departures from EPA guidance:

- OB monitoring
- No bacteriological testing in initial dry-weather survey
- No convoluted outfall prioritization scheme

In Vermont, we're looking at *everything*.



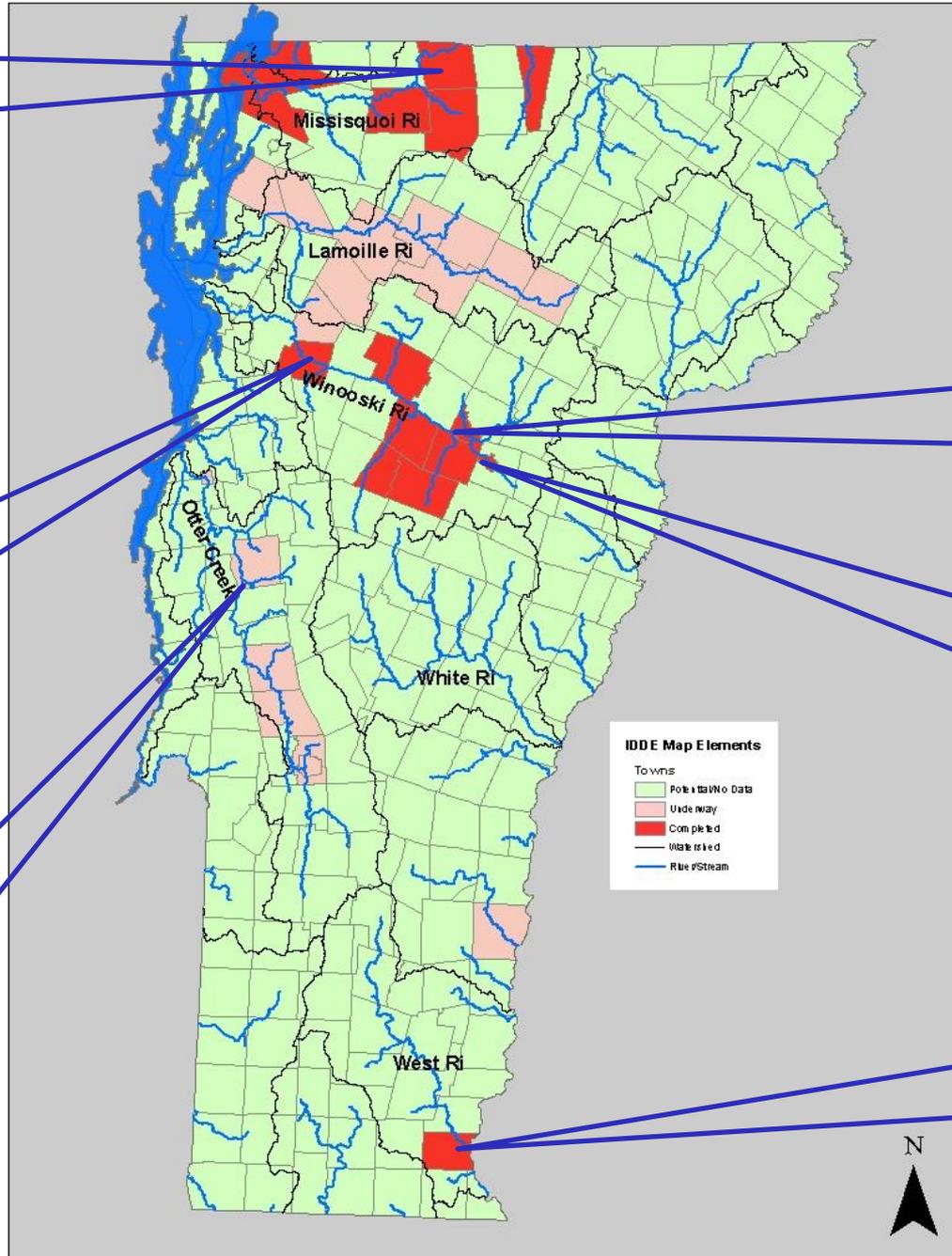
Richford



Richmond



Middlebury



Montpelier

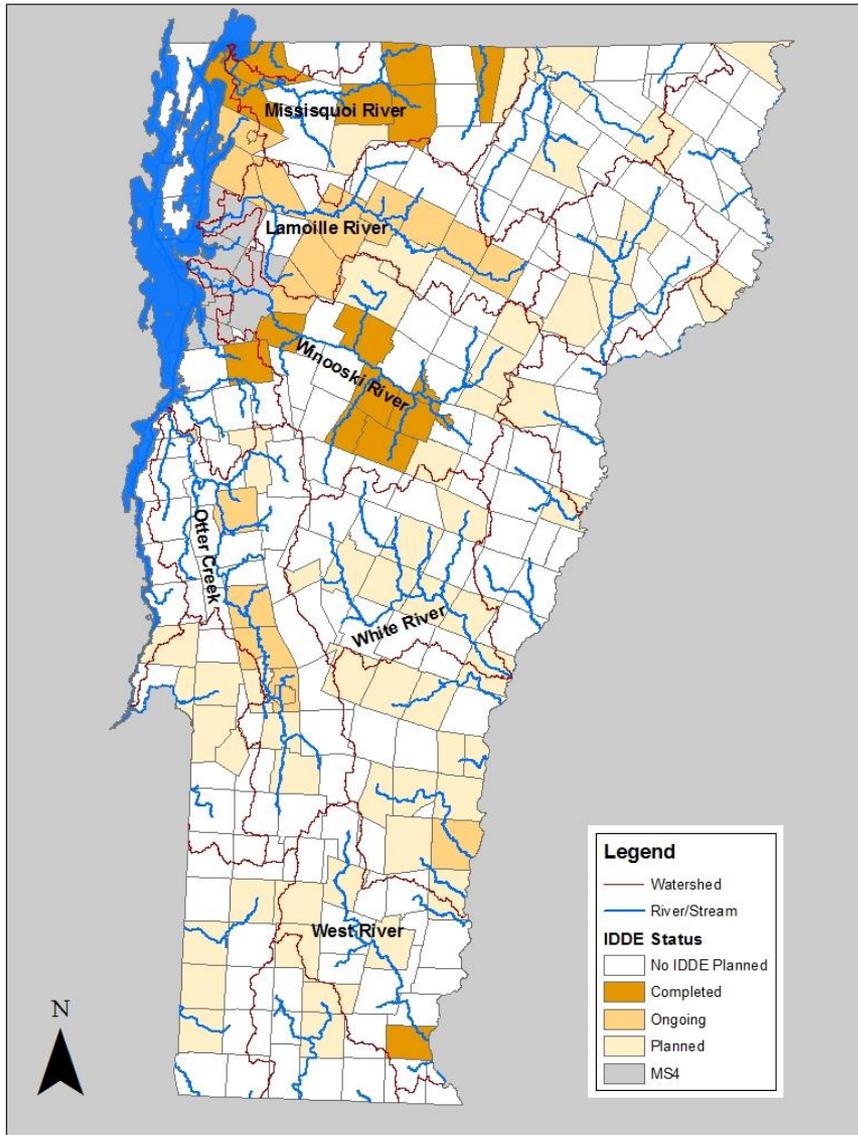


Barre City



Brattleboro

IDDE Status



- 9 Phase 2 MS4 municipalities
- 71 non-Phase 2 towns targeted for IDDE.
- IDDE projects completed in 17 of 71 towns.
- Projects underway or under contract in 16 towns.

Results Summary

About 1000 outfalls assessed, 40-50% flowing when observed.

- Contaminants indicated:

- Sanitary wastewater or washwater: 42
- Tapwater: 20
- Petroleum: 15
- Industrial discharge: 3
- Other: Pet waste, car washing, heated water...

- Grossly contaminated discharges nearly always corrected—easier to identify source of discharge and more pressing to fix them.

- Diluted discharges and partially renovated wastewater much more difficult. Need to convince public works directors there really is a problem they can neither see nor smell. Finding these often much more difficult and less pressing for the municipality.

State vs. Local Stormwater Management Control

State of Vermont

- Stormwater runoff from construction sites that disturb more than 1 acre
- Discharges from new impervious surfaces of 1 or more acres and expansions >5,000 square feet
- Subdivisions of 10 lots or more
- Commercial projects on 10 or more acres
- Development above 2,500 feet

Cities and Towns

Everything else!!!

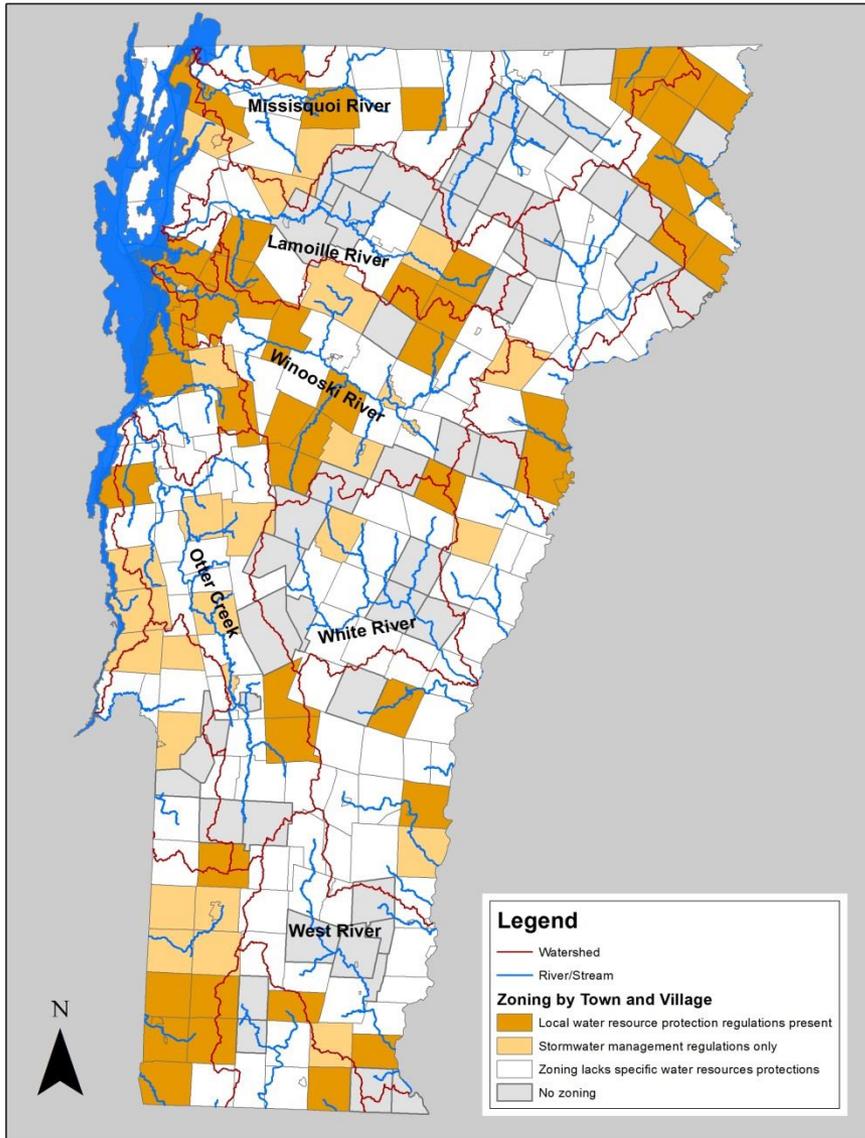
**Referred to as
“sub-jurisdictional”**

Some Vermont Statistics

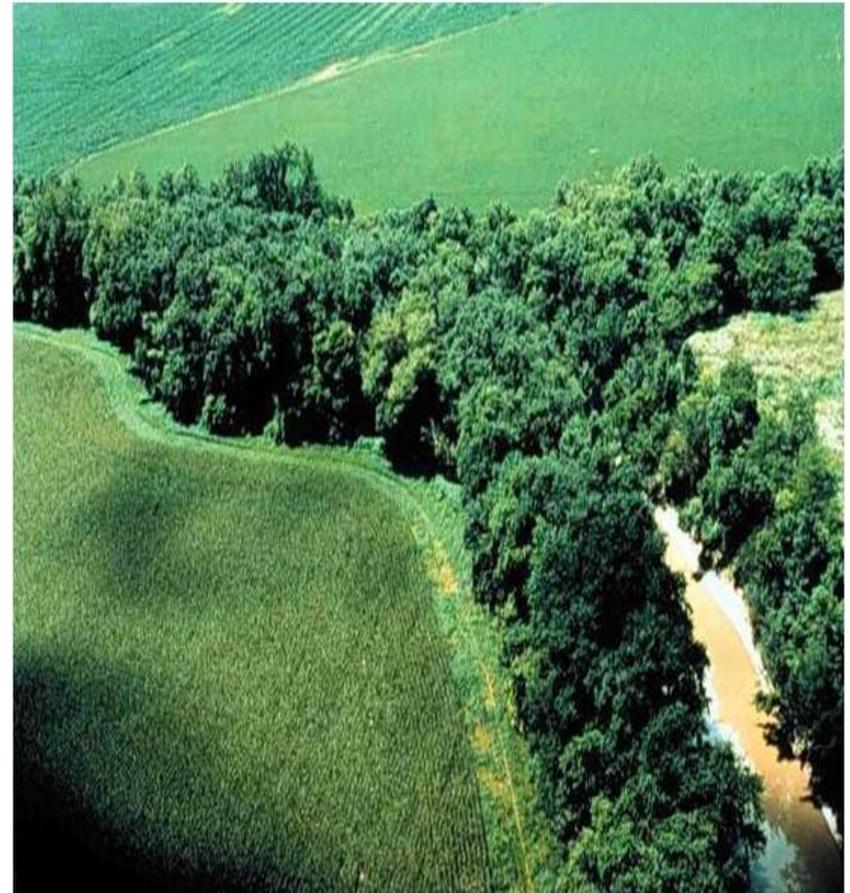
- 255 cities and towns
- 51 have “good” water quality provisions in zoning (lake, stream and wetland buffers)
- 30 more have some stormwater provisions for erosion prevention and sediment control and runoff from impervious surfaces in zoning
- 124 with no water quality provisions in zoning
- 50 with no zoning

Regulatory and Planning Assistance:

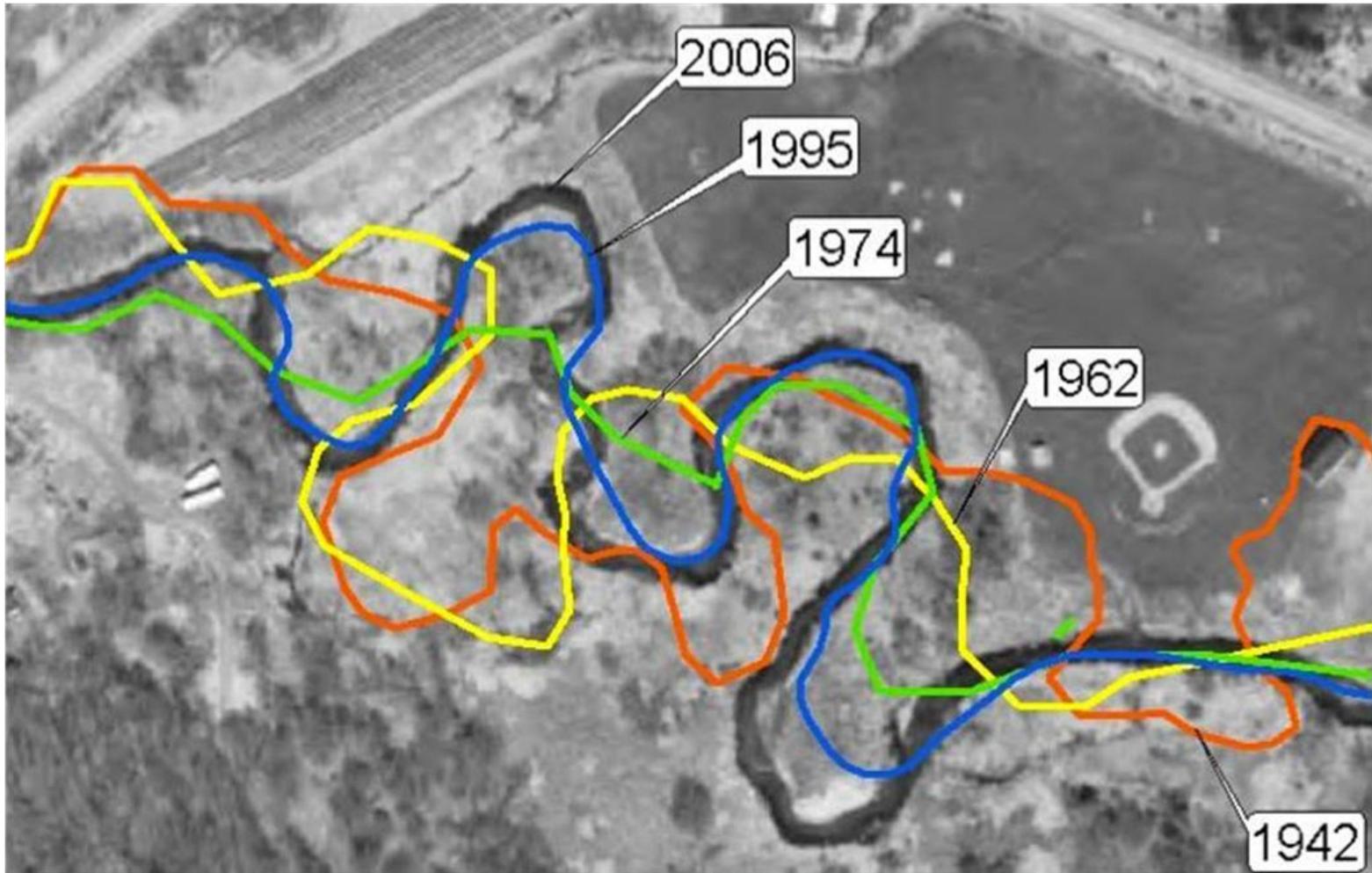
Ordinance Adoption



VLCT Model Riparian Buffer Ordinance—April 2007



Streams are NOT static: Lewis Creek, Starksboro, VT



VLCT Model Low Impact Development Stormwater Management Bylaw—May 2008



Excerpt from Model LID Stormwater Management Bylaw

“The use of LID design approaches is preferred and shall be implemented to the maximum extent practical given the site’s soil characteristics, slope, and other relevant factors.

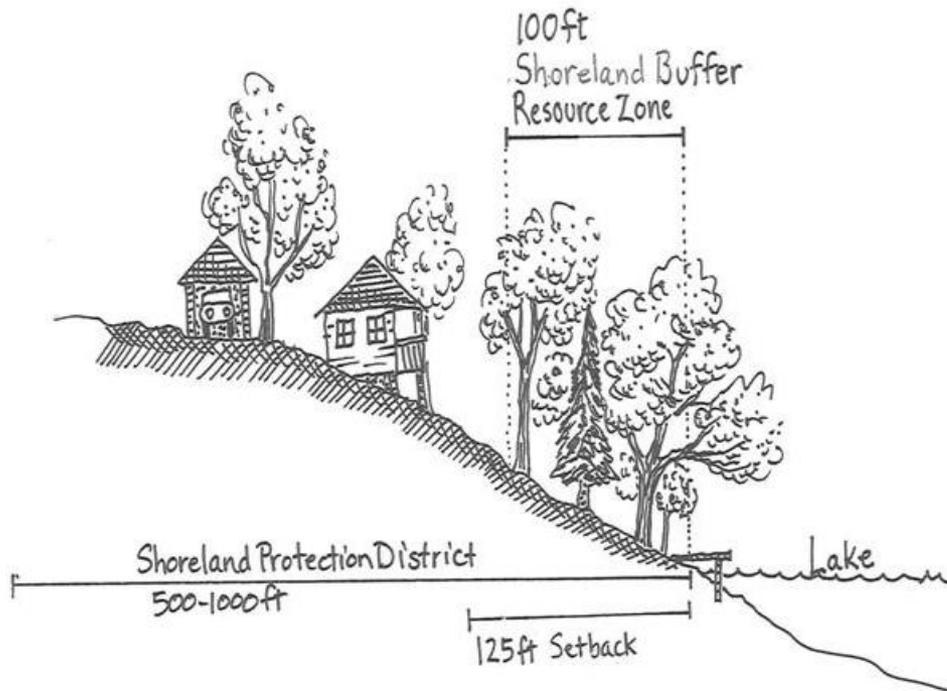
To the extent that LID design approaches are not proposed, the applicant shall provide a full justification and demonstrate why the use of LID approaches is not possible before proposing to use conventional structural stormwater management measures that channel stormwater away from the development site.”

VLCT Model Shoreland Protection District Bylaw—June 2011

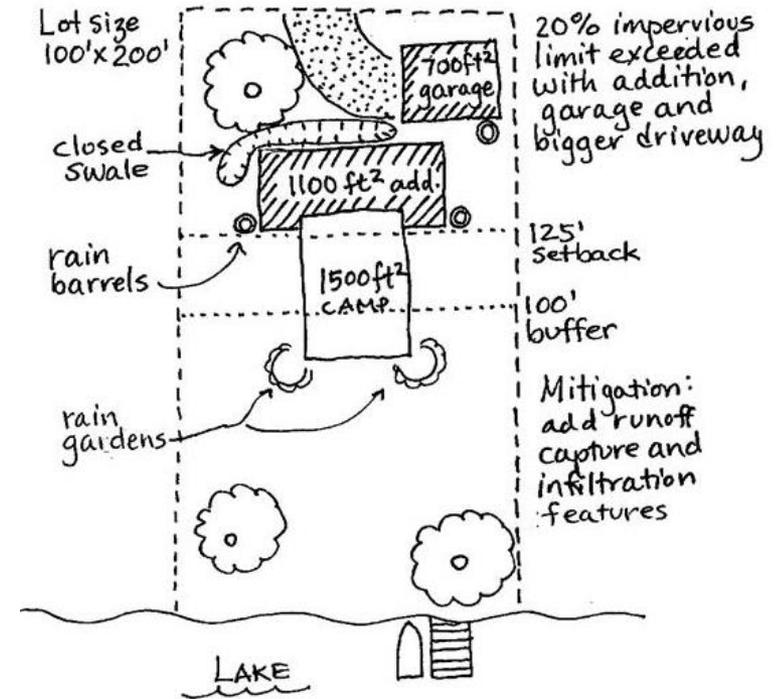


Excerpt from Model Lake Shoreland District Protection Bylaw

Shoreland Protection District with 100 foot Shoreland Buffer Resource Zone



Nonconforming Structure Mitigation – Stormwater Capture and Infiltration



Model Subdivision Standards Incorporating LID Standards—*coming soon*



Zoning vs. Subdivision

Zoning

- Zoning is used to regulate the location, type and density of development through the delineation of zoning districts

Subdivision

- Subdivision controls the way land is divided up to accommodate land uses and supporting infrastructure including *stormwater management systems*

Model Subdivision Standards

Four-Step Design Process

- Identify environmental resource areas
- Locate building envelopes
- Locate and design roads and public infrastructure
- Draw lot lines

Environmental Resource Area Definition

Any natural area that must be documented prior to subdivision development including: floodplains, river corridors, wetlands, streams, lakes, riparian buffers, forested areas and significant natural communities, wildlife habitat and travel corridors, greenways, fields, well-drained soils and natural drainage ways, steep slopes and ridgelines.

Questions?



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