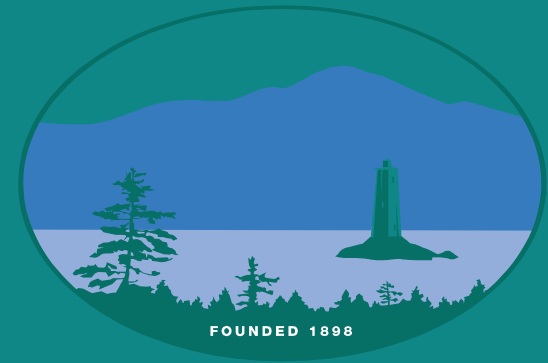




Robert Wood, Associate Director & Watershed Steward
Lake Sunapee Protective Association (LSPA)

LSPA



LSPA

*Devoted to the Environmental Quality
of the Lake Sunapee Watershed*

- Non-profit , 100+ yrs
- Environmental Education: public schools, community programs, general public
- Water Resource & Environmental Protection
- Lake & Watershed Management Issues
- NHDES satellite Water Quality lab – surface water , VLAP lakes, ponds, streams, sampling & analysis

Lake Sunapee

4,100 acres

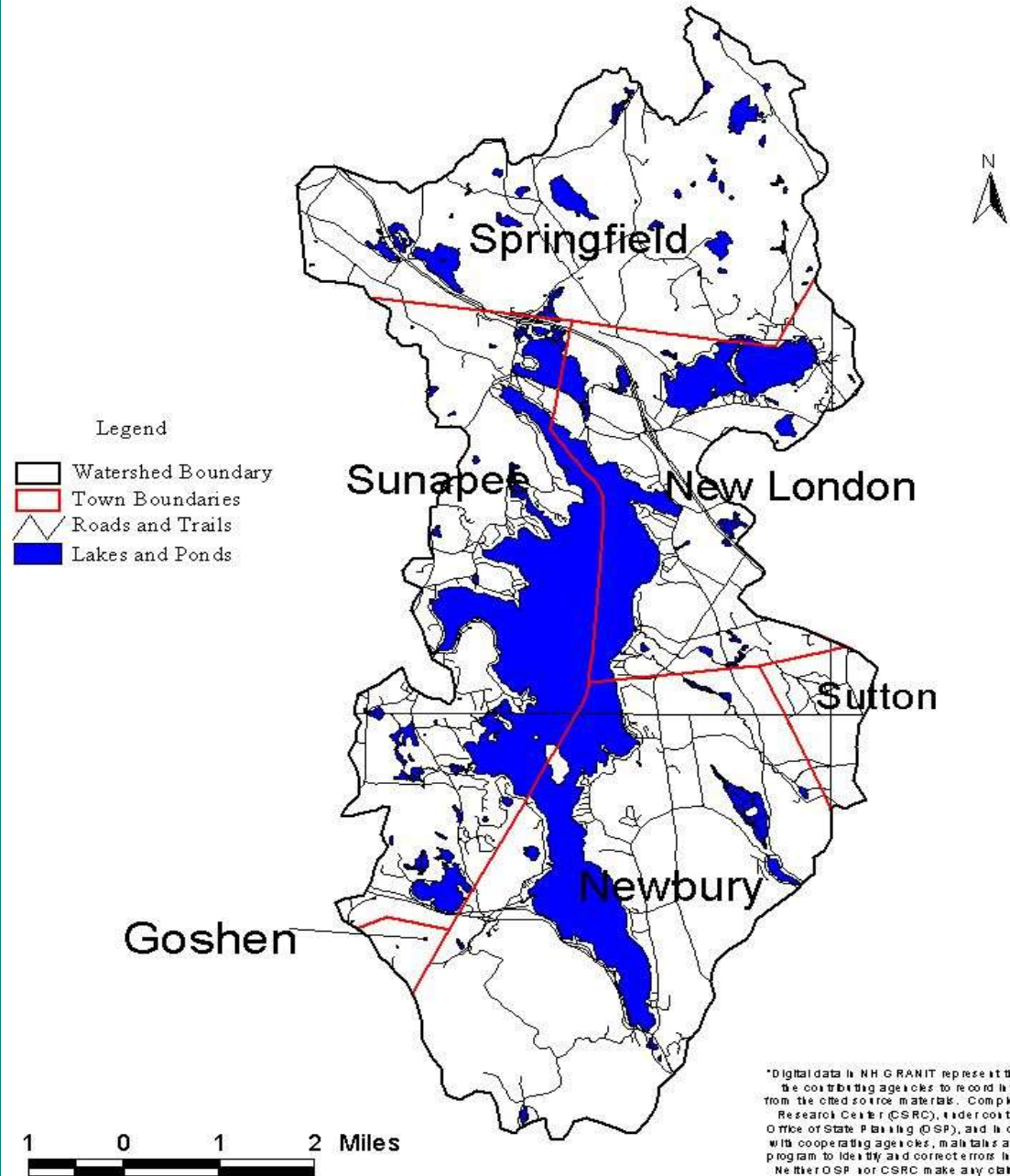
Municipal &
private
water supply

50 sq mi watershed

6 towns

11 other lakes/ponds

Lake Sunapee Watershed



Implementation / How

- Sometimes we: Initiate,.... are the catalyst,..... “mediate”
- Advisory
- Partnering
- Use of data, science
- Educate (in the process)
- Best management practices – advise, suggest, implement, exhibit individuals, contractors, towns, businesses
- Land preservation
- Research support and assistance
- Regulatory - zoning regs: suggest improvements, advise/guidance
- Grants

LSPA Project Partners

- Municipalities Highway Depts./ Con Coms, etc.
- NHDES Watershed Management Bureau
- NHDOT Department of Transportation
- UVLSRPC Upper Valley/Lake Sunapee RPC
- GSRWA Granite State Rural Water Association
- SAWC Sunapee Area Watershed Coalition
- ASLPT , SPNHF Land Trust, Conservation orgs.
- Colby-Sawyer, Antioch, Dartmouth
- Other Non-profits, local associations, (e.g., lake associations)

Educate

Raingardening in Your Watershed



An Introduction to Raingarden Planning and Installation

A Free Workshop
Sponsored by:

- Lake Sunapee Protective Association
- Merrimack County Conservation District
- Newbury Beautification Committee

Raingardens are beautiful additions to the landscapes of residential, commercial/industrial and municipal properties that help to address water quality and other issues arising from increasing stormwater runoff. Learn how to plan and install this Low Impact Design feature in your landscape. The workshop will include presentations and site visits to local rain garden installations.

The program will be presented by:

Blakeman Engineering of Sutton, NH & Pellettieri Associates (Landscape Design/Build) of Warner, NH

When: Saturday, May 15, 2010
9:00 AM to Noon
(Includes Site Visit)

Where: LSPA Building, Sunapee Harbor
63 (Upper) Main St., Sunapee, NH



Water enters the rain garden, then dissipates slowly into the ground



Please RSVP to LSPA
(603) 763-2210
lspa@lakesunapee.org



Exhibit



Raingarden &
Infiltration “train”

- Sampling/Analyses : WQ Lab (NHDES satellite)
VLAP \approx 25 area lakes/ponds



GLEON:
Global Lakes
Ecological
Network



- Research Support

Cyanobacteria: *Gloeotrichia echinulata*



Toxins?

Land Protection

- Partner with others
- LSPA role –prioritize potential parcels from a water resources perspective

**LSPA Land Preservation
Committee**

**“Criteria for land conservation
from a water resources
perspective”**



“Recent” Regulatory Improvements in Municipalities in the Watershed

From NL Subdivision April 07

APPENDIX A: STORMWATER LOW IMPACT DEVELOPMENT PRACTICE – DESIGN CRITERIA

Acceptable Post-construction Low Impact Development (LID) Best
Management Practices (BMPs)

- minimum design criteria for six groups of BMPs ponds/wetlands, infiltration practices, alternative paving, bio-retention systems, open channels, and green roofs

Newbury
Zoning Ordinances
March 08

ARTICLE XXI :
Stormwater
Management

Applies to
individual sites





Rain-modified
Leach Field
Sunapee Hills
10/05

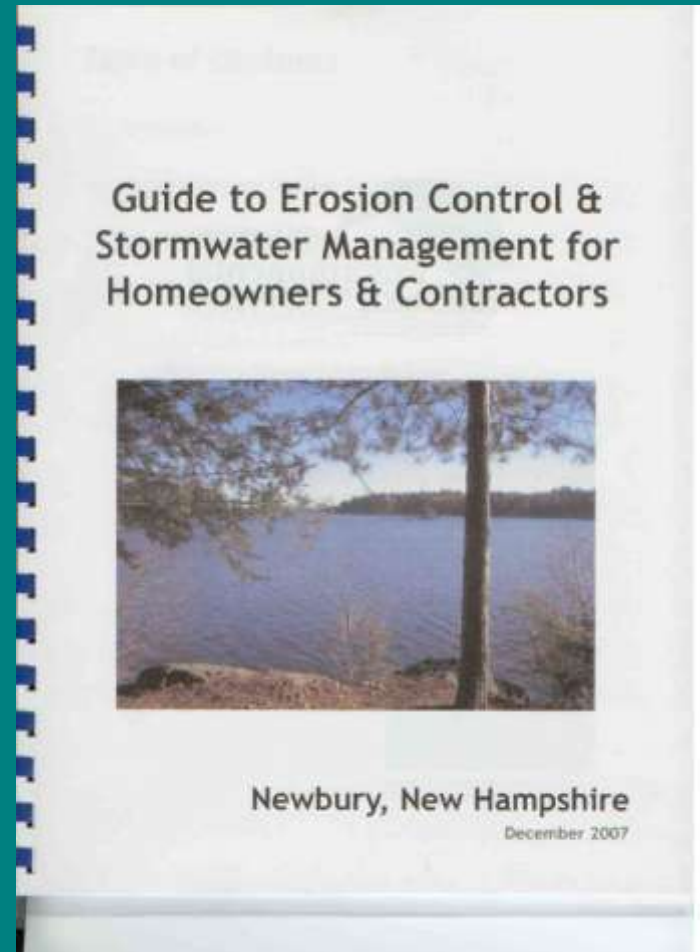


Newbury, Dec 2007

Stormwater Management

Applies to individual
sites

CLD Engineers
Town of Newbury



The “mediator” role



NPS Reduction Grant (319)

NPS Reduction

BMPs

infiltration basins

wetland treatment

stream bank stabilization

improving stormwater
infrastructure



Roadways Grant (319)

Nonpoint source ~
stormwater,
phosphorus and
sediment loading

Project sites in 4/6
w'shed towns

municipal, state
(NHDOT) &
private sector



319 Grant – Sunapee Roadways, Mt. Sunapee





Roadways Grant (319), partnered with NHDOT







Water Resource
Non-profit
Trade Association

Watershed
Pilot
Grant



Watershed Management Plan

Citizen Watershed Group

Upper Valley Regional
Planning Agency

Springfield
Newbury
Sutton
New London
Sunapee
Goshen

Non-profit Environmental Education &
Watershed Resource Protection Organization

Goal:

Generate Watershed Management Plan

To address: Phosphorus loading
 & other priority watershed/water quality concerns
 (as identified in the plan)

8 general areas of concern

Top 3:

Water quality impacts from stormwater runoff
Erosion from land development activities
Impacts of impervious cover to water quality

Watershed Pilot Grant

Generalized Tasks

- Prioritize wq issues, make recommendations (regulatory + non-reg)
- Educate, publicize, disseminate plan
- Public meetings & presentations
- Complete survey, guides, brochures, SAWC website, newsletters
- GIS mapping sub-watersheds, link land use & wq
- Municipal participation and endorsement of management plan (master planning)

Mgt. Plan Recommendations

6 page spreadsheet:

Concern (Priority Issue)

Objectives

Specific Strategies

Sunapee Swirler (2005)

Mooseplate Grant

Goals:

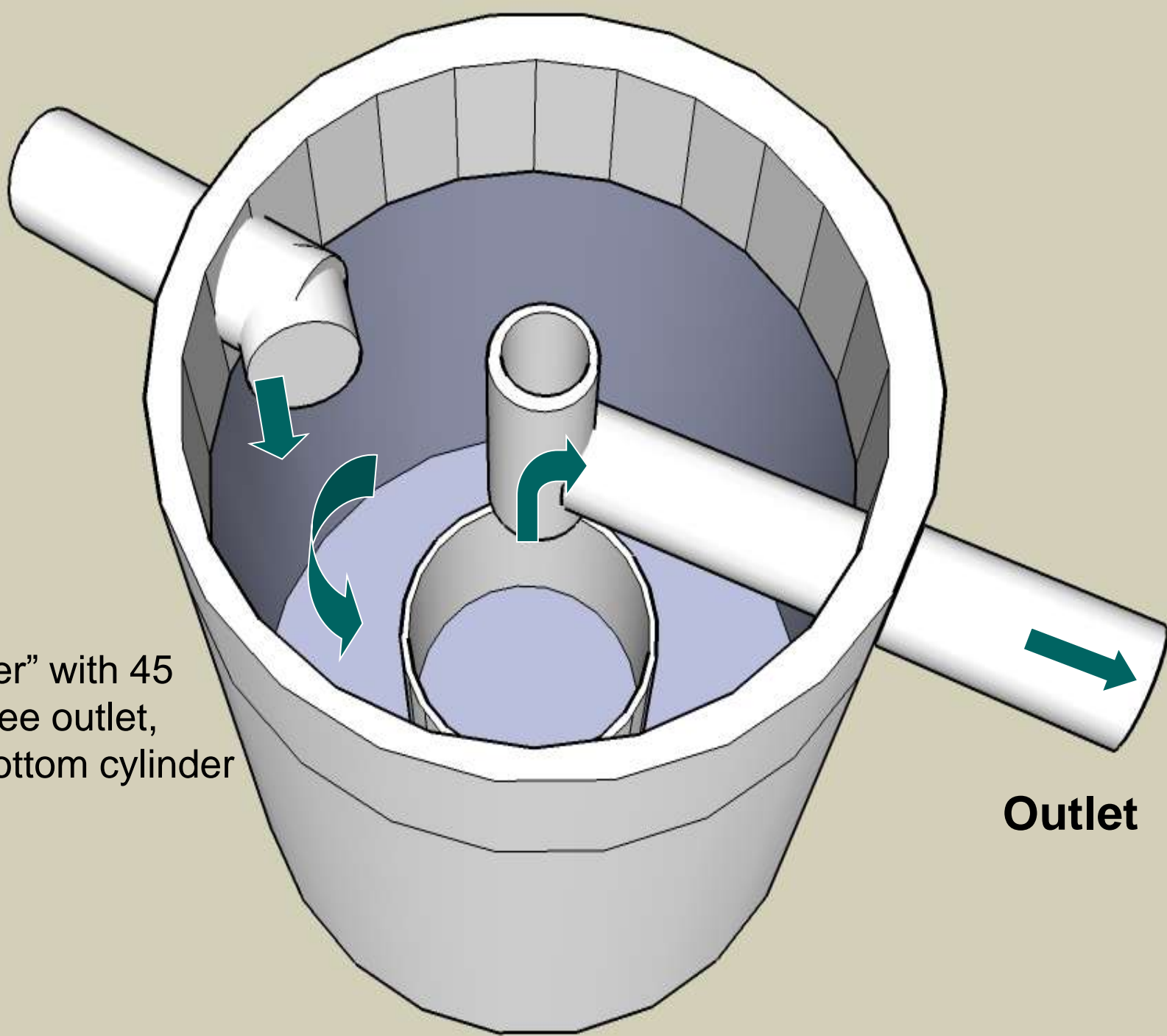
- Improve sediment retention of standard basin
limit disturbance/re-entrainment of fines
already in the basin
- Affordable for small town budgets -no custom components
- Maintain simplicity of design
Installation by highway/PW department
No special maintenance, no moving parts, no
stainless steel, no screens, no filters

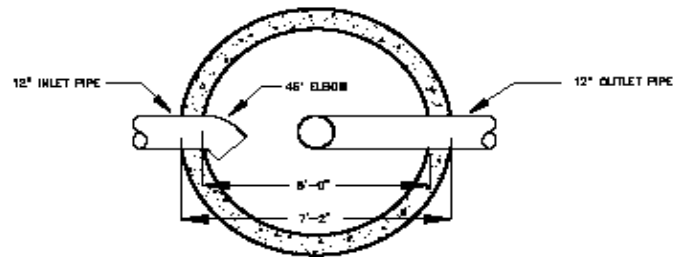


Inlet

“Swirler” with 45
inlet, tee outlet,
and bottom cylinder

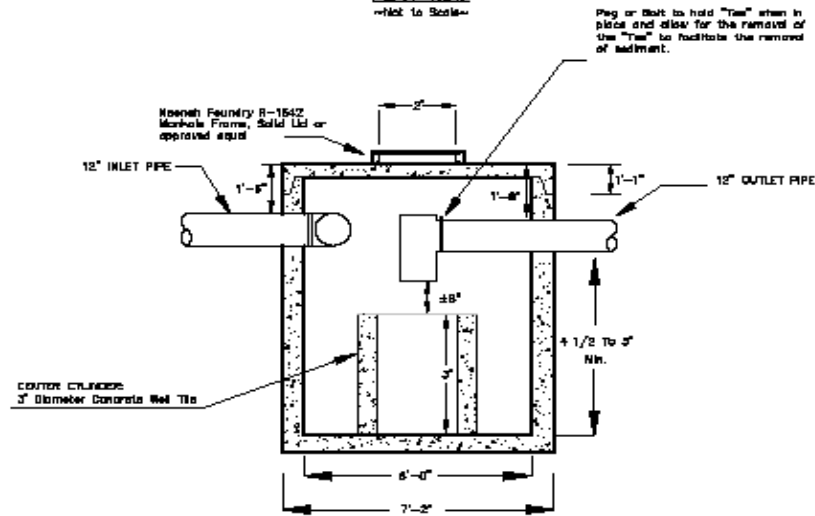
Outlet





PLAN VIEW

Not to Scale



SECTION VIEW

Not to Scale

NOTES:

1. Catchbasin to be reinforced pre-cast concrete, 4000 psi.
2. Concrete and all components shall be rated for H-20 traffic loading.
3. All catchbasin joints shall be sealed with a butyl rubber joint sealant per ASTM C-90 & ASTM-198.
4. Alternate center cylinder may be used, such as a piece of 3' diam. HDPE culvert, as long as it can be securely attached to the base of the catchbasin.

MAINTENANCE: Remove tee and vacuum accumulated sediment when it reaches to one-half the height of the center cylinder.



(4/08)

LSPA

THE SUNAPEE SWIRLER

~ Sediment Retaining Catch Basin ~

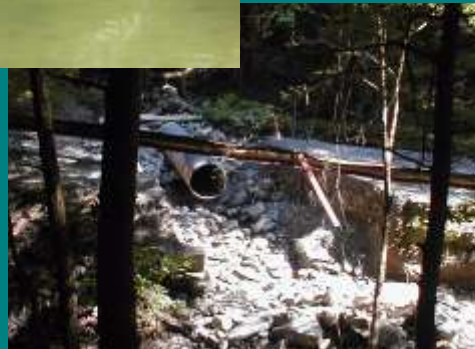


This project is supported by funds from the State of New Hampshire, Department of Transportation, Office of the Secretary of Transportation, Office of the Secretary of Transportation, Office of the Secretary of Transportation.

Sunapee Watershed Infrastructure Project

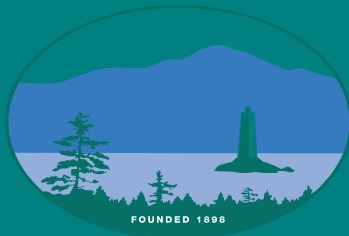
Water Infrastructure Vulnerability Analysis

*A Study of the Lake Sunapee
Watershed (Funded by NOAA)*



Research Team

Michael Simpson, Antioch University New England
Latham Stack, Syntectic, LLC
James Gruber, Antioch University New England
Thomas Crosslin, Climate Techniques, LLC
Robert Roseen, UNH Stormwater Center
Robert Wood, Lake Sunapee Protective Assoc.
Colin Lawson, Antioch University New England



LSPA

*Devoted to the Environmental Quality
of the Lake Sunapee Watershed*

SYNTECTIC
INTERNATIONAL



Sunapee Watershed (Stormwater) Infrastructure Project



Changing precipitation patterns

Increase in development/land use



Research Focus: Culvert Infrastructure Vulnerability

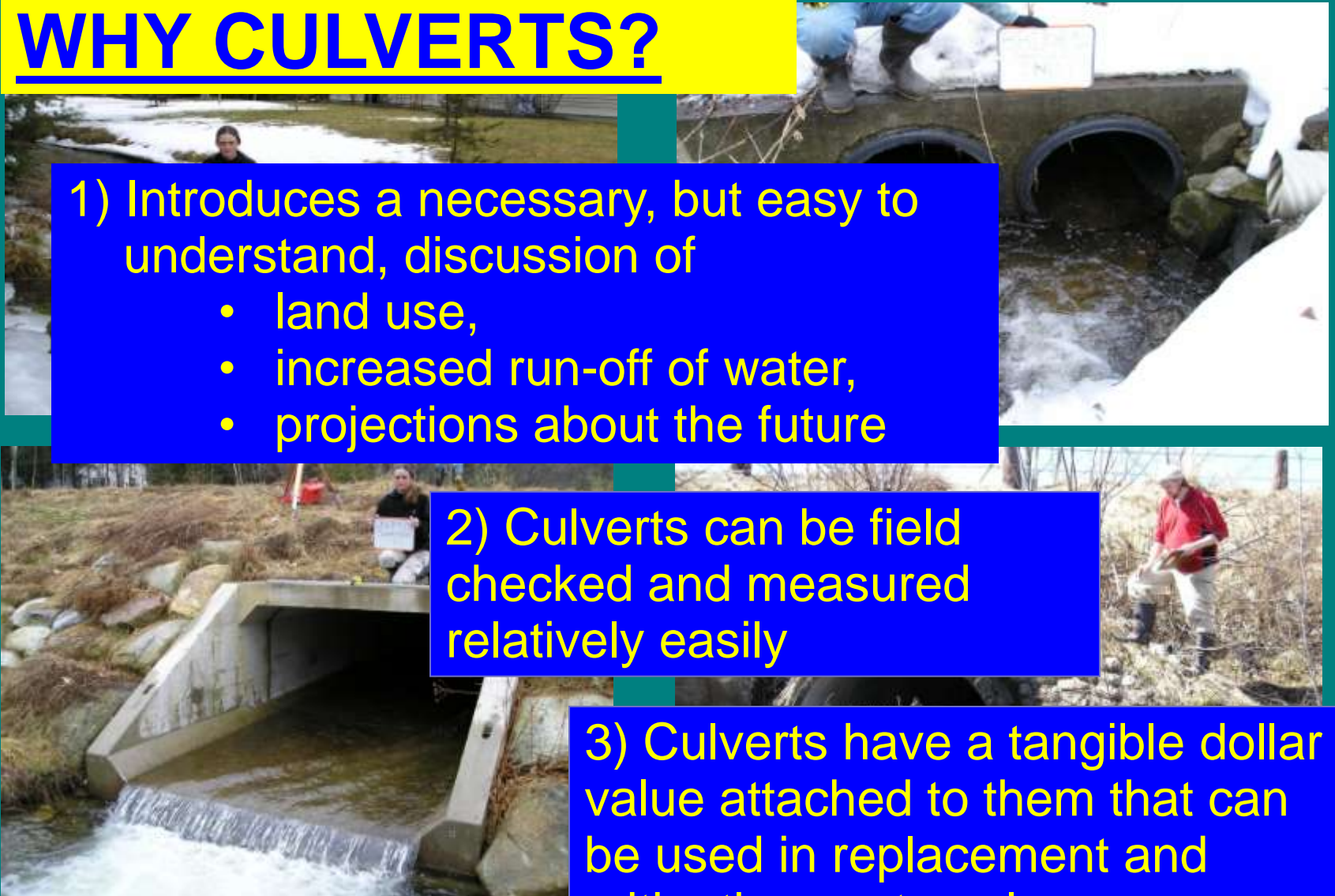
WHY CULVERTS?

1) Introduces a necessary, but easy to understand, discussion of

- land use,
- increased run-off of water,
- projections about the future

2) Culverts can be field checked and measured relatively easily

3) Culverts have a tangible dollar value attached to them that can be used in replacement and mitigation cost analyses



Lake Sunapee watershed: Delineated catchments

DELINEATED CATCHMENTS



1:76,000

1 inch = 1.199 miles

ELEVATION (m)



High : 830.2

Low : 205.5



Soils
Slope
Land use/cover

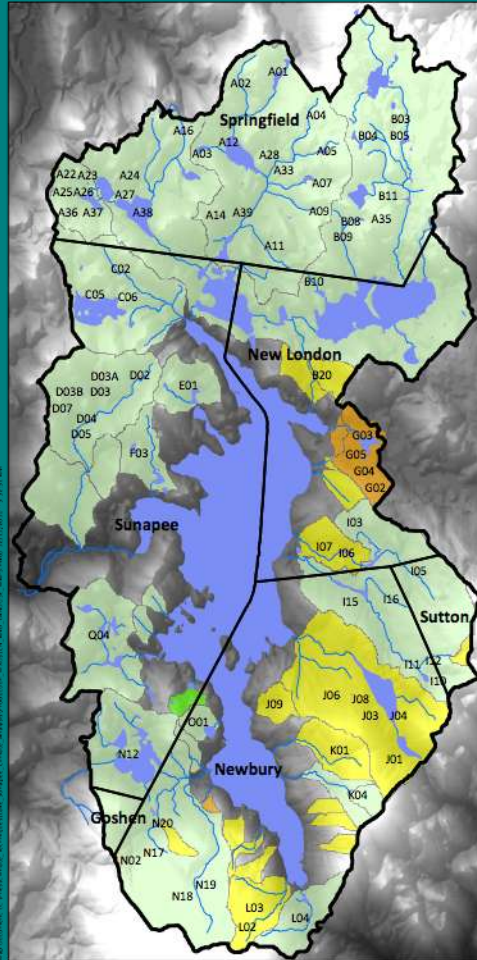
SYNTECTIC
INTERNATIONAL

ANTIOCH
UNIVERSITY
NEW ENGLAND

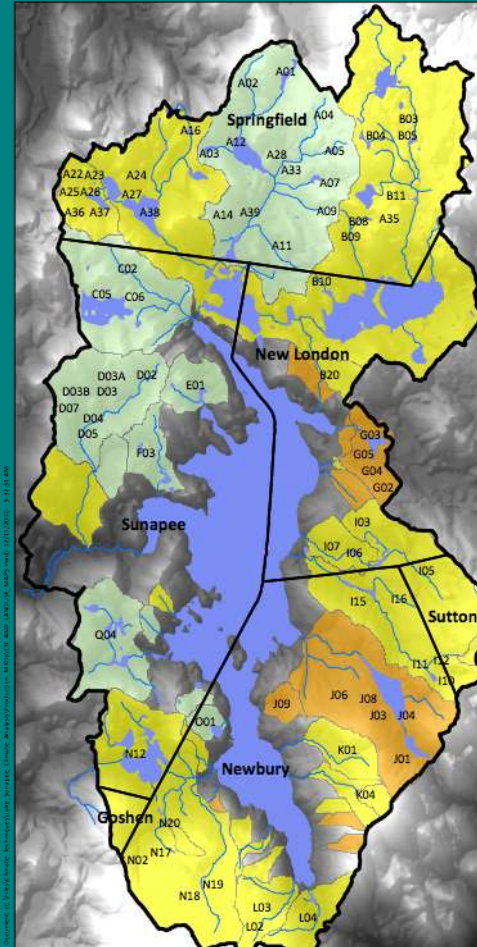


As the result of land-use change

Current

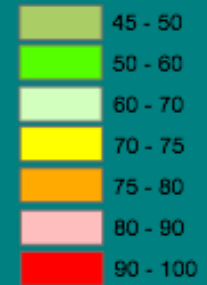


Buildout



CATCHMENT AVERAGE CN VALUES

CN LEGEND



Culvert capacity analysis scenarios

- current land use/cover & precipitation patterns
- projected mid-century rainfall
- & full build-out

Lake Sunapee watershed: Drainage system vulnerability

Rainfall ('71-'00)

Projected mid-21st

Mid-21st projected
25-yr storm:
**35% of culverts
undersized**

REPLACE (YES, TRANS, or NO)

YES

TRANS

NO

Result Position

BUILDOUT

BUILDOUT
NSS

CURRENT

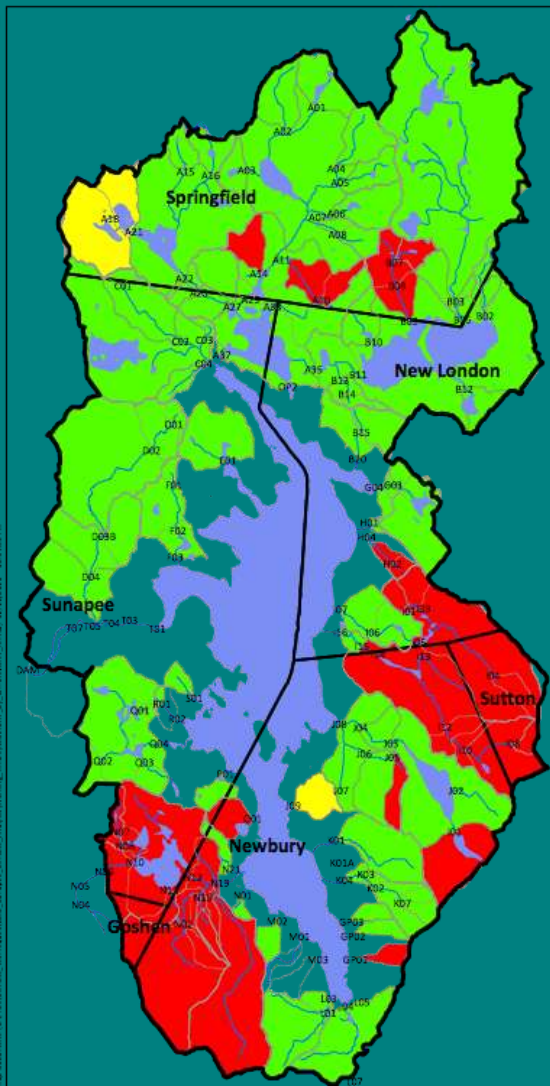
Trans = transitional

NSS = no steep slopes

4.06 inches

6.65 inches

Recent conditions



REPLACE (YES, TRANS, or NO)

YES

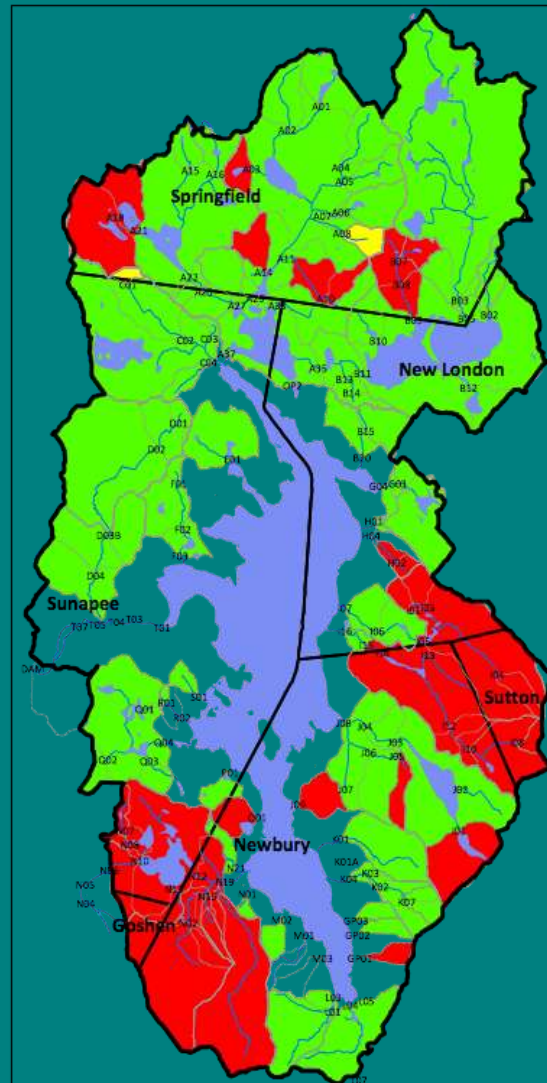
TRANS

NO

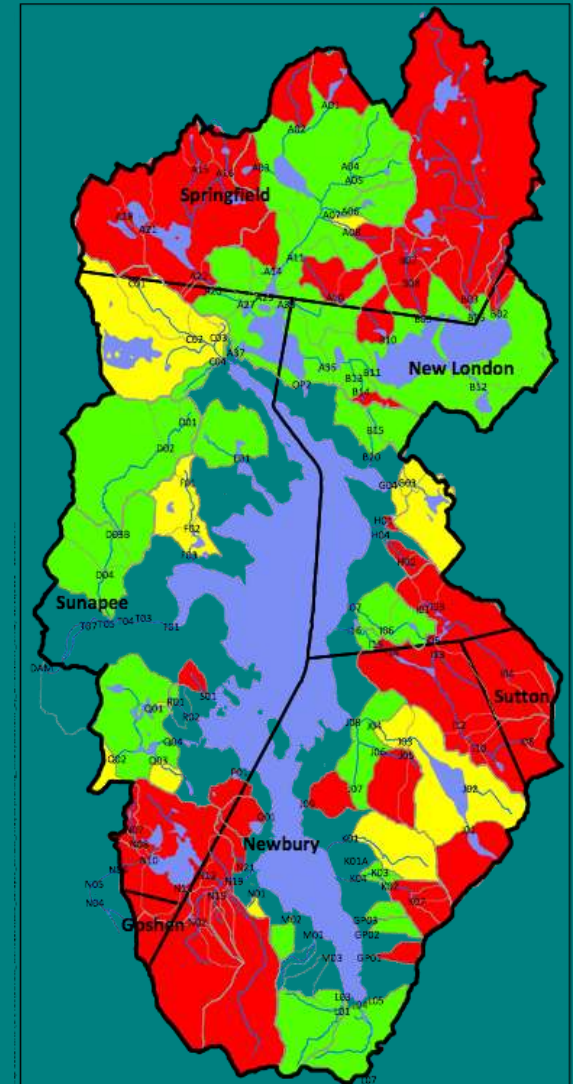
Trans = transitional

Drainage system adequacy

With population growth



And more extreme rainfall



For the municipalities:

- Culvert adequacy
- Comparative Cost analysis
 - e.g., proactive culvert upgrades vs. repair/replacement due to failure/washout
- Low Impact Development (LID) Analysis
 - how much LID technique implementation (into regs) could reduce impacts, & \$avings potential with LID

A short-term and long-term plan

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