The Evolution of Source Protection: From petroleum to PFAS

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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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My 20 Minutes today will touch on…

- National and State Laws
- Source Water Protection - part of the "multi-barrier approach"
- Source Protection Plans – a prelude to actions
- Land Conservation, Riparian Buffers
- Low Impact Development / stormwater
- Harmful Substances and BMPs
- Emerging Contaminants
- Public Education

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Whose job is it to ensure safe drinking water?

Federal

Local

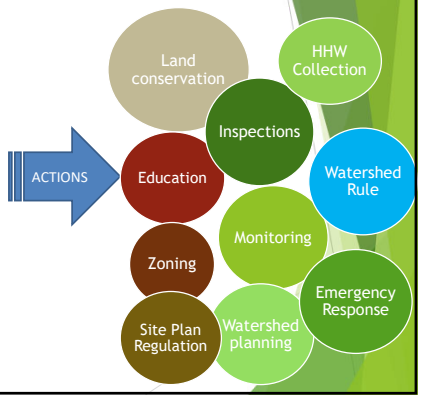
State

NGO/Private

3

What is your risk profile?

	RISK LEVEL
Well/intake integrity	H/M/L
KCSs/PCSs	H/M/L
Highways/Railroads	H/M/L
Pesticide application	H/M/L
Septic systems	H/M/L
Urban land cover	H/M/L
Agricultural land cover	H/M/L
Animal units	H/M/L
Wastewater treatment	H/M/L



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Legal Framework for Source Protection

- Federal Safe Drinking Water Act
- State:
  - New Hampshire Safe Drinking Water Act (RSA 485-A)
  - Groundwater Protection Act (485-C)
- Local:
  - RSA 674:21, Innovative Land Use Controls
  - RSA 36-A:4-a Conservation Commissions – Optional Powers
  - RSA 147 Nuisances (public health)

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Source Protection – Part of a Multi-barrier Approach

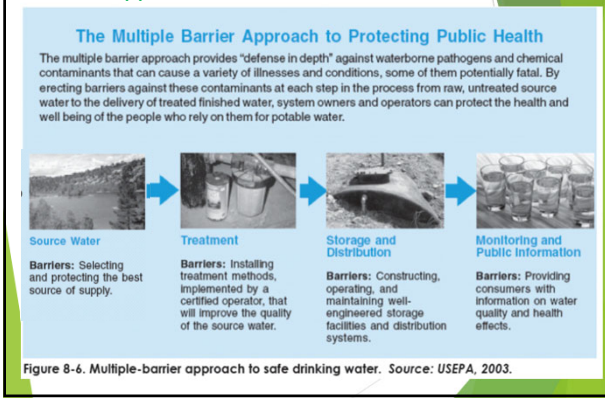

Figure 8-6. Multiple-barrier approach to safe drinking water. *Source: USEPA, 2003.*

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Source Protection Through Conservation (…varies greatly in NH)

Water Supply Watershed Lands with Permanent Protection

Prepared by NHDES 8/7/2017

PWS Source ID	Public Water System	POPULATION	Watershed Area (acres)	Acres Permanently Protected	Percent of Watershed Area Protected
0241010-001	BETHLEHEM VILLAGE DIST	1700	2060.1	2060.1	100
0241010-002	BETHLEHEM VILLAGE DIST	1700	4962.6	4962.6	100
1381010-003	LITTLETON WATER AND LIGHT DEPT	6010	5379.3	5379.3	100
1061010-001	HANCOCK WATER WORKS	413	155.9	155.7	100
0161010-001	BARTLETT VILLAGE PCT	625	3293.9	3290.7	100
1351010-002	LINCOLN WATER WORKS	2750	603.6	599.4	99
1351010-006	LINCOLN WATER WORKS	2750	73949.9	73274.4	99
1381010-001	LITTLETON WATER AND LIGHT DEPT	6010	5231.5	5169.8	99
0231010-001	BERLIN WATER WORKS	9500	16373.7	16078.9	98
1211010-004	JACKSON WATER PCT	500	18099.9	16250.9	90
1291010-001	LANCASTER WATER DEPT	2450	6941.2	6051.6	87
0991010-002	GREENVILLE WATER DEPT	1100	3997.6	172.0	4
0921010-003	GORHAM WATER AND SEWER DEPT	2630	1117.2	45.9	4
0921010-004	GORHAM WATER AND SEWER DEPT	2630	2640.8	63.8	2
1521010-001	MEREDITH WATER DEPT	2800	9504.7	160.0	2
0461010-004	CLAREMONT WATER DEPT	9000	2940.3	41.4	1
1141010-001	HILLSBOROUGH WATER WORKS	2000	1265.6	2.7	0
0351010-001	CANAAN WATER DEPT	600	1655.508262	0	0
0461010-007	CLAREMONT WATER DEPT	9000	58.32814	0	0
0461010-008	CLAREMONT WATER DEPT	9000	117.617563	0	0
1691010-001	NEW HAMPTON VILLAGE PCT	600	595.612118	0	0
1741010-001	NEWPORT WATER WORKS	5000	918.657298	0	0

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Conservation to Protect Source Water

Conserve Priority Water Supply Lands

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Develop a Source Water Protection Plan

…provide specific recommendations to manage threats in order to maintain safe and reliable drinking water

- It's a collaborative roadmap.
  - Water suppliers
  - Landowners
  - Local boards
- Includes four components:
  - Delineation of SWPA's
  - Inventory of PCS's
  - Assessment of risks
  - Recommended management actions

Guidance is available from NHDES and from Granite State Rural Water Association

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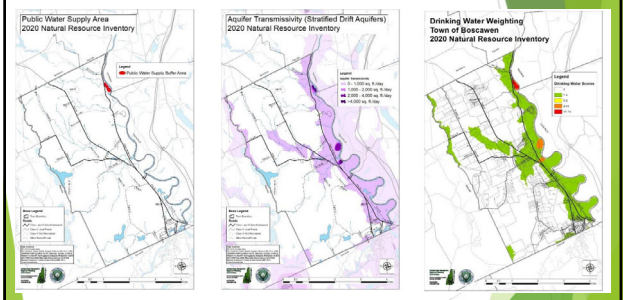
Boscawen's Plan Focus on Aquifers/Public Water Systems



(Natural Resources Inventory and Assessment with Co-Occurrence Mapping Town of Boscawen, New Hampshire, 2020)

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Objectives…Simple, right?

- ✓ Maximize open space and clean recharge
- ✓ Prevent release of contaminants from land use activities
- ✓ Ensure long-term availability of drinking water

Photo Credit: http://www.ence.umd.edu/~apdavis/bioretw_wet.jpg

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Manage "PCSs"

RSA 485-C Groundwater Protection Act - *"Potential Contamination Sources"*

- Vehicle service & repair
- General service & repair
- Metalworking
- Manufacturing
- USTs and ASTs
- Waste & scrap processing
- Transportation corridors
- Large septic systems
- Laboratories & health care
- Agricultural chemicals
- Salt storage
- Snow dumps
- Stormwater infiltration
- Cleaning services
- Food processing
- Fueling & maintenance of earth moving equipment
- Concrete, asphalt, tar manufacturing
- Cemeteries
- Hazardous waste facilities

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Keeping "Regulated Substances" out of groundwater…

"The best thing for a municipality wishing to protect its aquifers is to put into place a groundwater protection ordinance and apply *Performance Standards.*

"Performance Standards are efficient and easy to implement."
2011 NH Planner Survey

On-site "BMP" inspections can enforce performance standards called for in a local Groundwater/ Aquifer Protection District.

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Effective Groundwater Zoning

Protection through better planning and land use…

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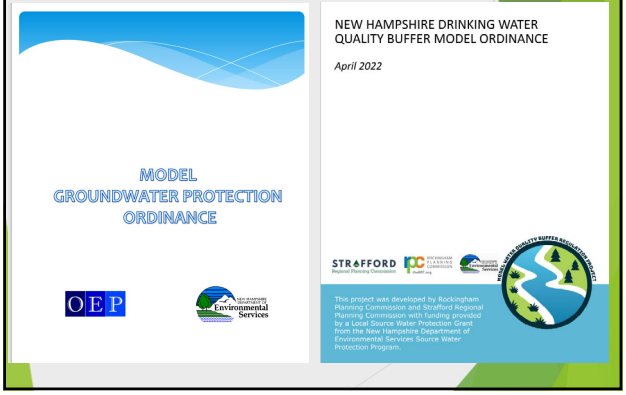
Model Zoning (Groundwater & Surface Water)



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Model Ordinance: Local Authority

- ✓ RSA 674:2 (natural resource plan) and 674:17,I - local authority to protect groundwater
- ✓ RSAs 31:39 and 147 give broad authority to towns to protect health, welfare and public safety.
- ✓ Model cites authority under RSA 674:16 relative to innovative land uses

Authority
Purpose
Definitions
District Boundary
Applicability
Perform. Standards
Permitted Uses
Prohibited Uses
Conditional Uses
Non-Conforming
Exemptions
Maint. & Inspection

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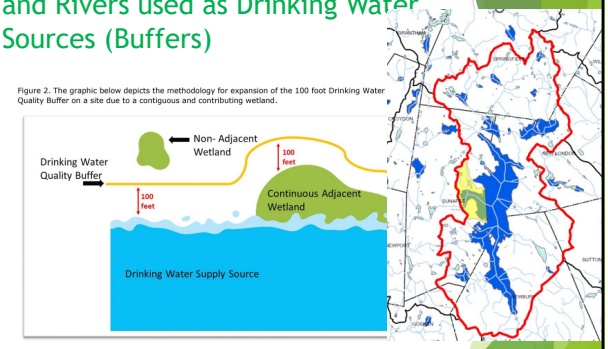
Zoning to Protect Reservoirs, Lakes and Rivers used as Drinking Water Sources (Buffers)



NHDES sponsored model developed by Rockinham/Strafford Planning Commission
NHDrinkingWaterQualityBufferModelOrdinance.Dec2021.FINAL.pdf (therpc.org)

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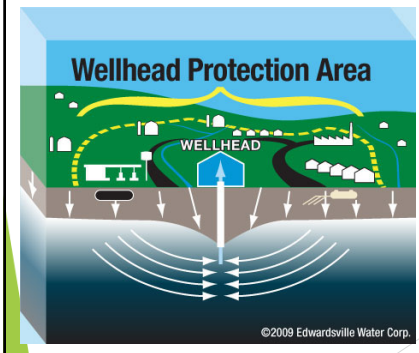
Stratified Drift Aquifers and Wellhead Protection Areas



ZONING

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Institute Source Controls in Site Designs

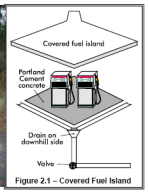

Figure 2.1 – Covered Fuel Island

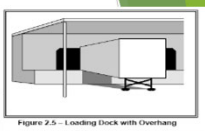
Figure 2.5 – Loading Dock with Overhang

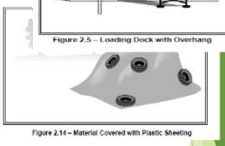
Figure 2.14 – Material Covered with Plastic Sheeting

…source controls are BMPs that limit the release of contaminants to ground or surface water

Photo Source: http://www.ecy.wa.gov/pubs/0510032.pdf

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Land use Planning: Low Impact Development: (Ex. Somersworth, NH)

- A total of 125,000 sq. ft of office /business space
- 719 parking stalls using porous asphalt
- Allowed runoff from RT 108 (State owned highway) into drainage system

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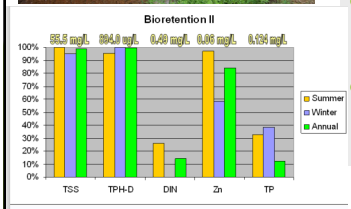
Land use Planning:Improve Stormwater



Source: Stormwater BMP Test Facility (neiwpcc.org)

Goal:
Improve water quality by reducing stormwater velocity, precipitating suspended solids and infiltrating runoff

Outcome:
- Functioning vegetated bioretention basin reduces polluted runoff
- Highly visible site provides perpetual educational model

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Landuse Planning: Rethink parking …minimize NPS pollutants

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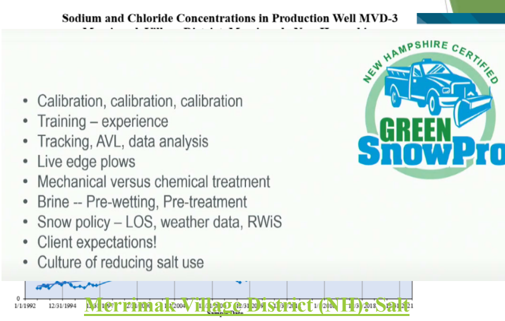
Reduce Salt Use
Reduces Na, Cl in Groundwater



- Calibration, calibration, calibration
- Training – experience
- Tracking, AVL, data analysis
- Live edge plows
- Mechanical versus chemical treatment
- Brine -- Pre-wetting, Pre-treatment
- Snow policy – LOS, weather data, RWiS
- Client expectations!
- Culture of reducing salt use

Merrimak Village District (NH): Salt Mitigation Presentation – YouTube

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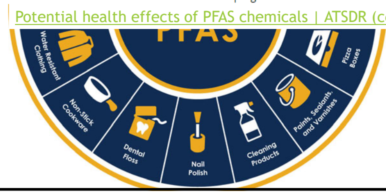
Emerging Contaminant: PFAS

A large number of studies have examined possible relationships between levels of per- and polyfluoroalkyl substances (PFAS) in blood and harmful health effects in people. However, not all of these studies involved the same groups of people, the same type of exposure, or the same PFAS. These different studies therefore reported a variety of health outcomes. Research involving humans suggests that high levels of certain PFAS **may** lead to the following:

- Increased cholesterol levels
- Changes in liver enzymes
- Small decreases in infant birth weights
- Decreased vaccine response in children
- Increased risk of high blood pressure or pre-eclampsia in pregnant women
- Increased risk of kidney or testicular cancer

Potential health effects of PFAS chemicals | ATSDR (cdc.gov)



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More specifically… PFAS sources

Table S-1. NAICS codes included in presumptive contamination model

NAICS code	title	sources	number of facilities
313320	Fabric Coating Mills	bcdefghik	380
325510	Paint and Coating Manufacturing	abcdefhik	2100
322220	Paper Bag and Coated and Treated Paper Manufacturing	bcdefghi	0
313210	Broadwoven Fabric Mills	bcdefhk	484
322121	Paper (except Newsprint) Mills	bcdefhk	610
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	bcdefhi	5642
324110	Petroleum Refineries	abcdehk	594
325612	Polish and Other Sanitation Good Manufacturing	abdefhk	673
334413	Semiconductor and Related Device Manufacturing	bcdefi	1552
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing	bdefhi	597
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	bcefgi	3587
333318	Other Commercial and Service Industry Machinery Manufacturing	bdefgh	0
334419	Other Electronic Component Manufacturing	bcdefg	1663
562212	Solid Waste Landfill	cdefjk	4765
325199	All Other Basic Organic Chemical Manufacturing	abdefi	1847
323111	Commercial Printing (except Screen and Books)	bcdhk	4226

Presumptive Contamination: A New Approach to PFAS Contamination Based on Likely Sources | Environmental Science & Technology Letters (acs.org)

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Lists of Commercial Uses…

INTERSTATE COUNCIL ITRC TECHNOLOGY REGULATORY

Table 2-5. Sample historic and current uses of PFAS

Industry/Application	PFAS Type	Documented Use and Examples of Some PFAS
Aviation and Aerospace	Polymer	Mechanical components made of fluoropolymers (such as PTFE and PFA tubing, piping, seals, gaskets, cables, and insulators)
	Nonpolymers	Hydraulic fluid additives made from PFSA salts (such as PFOS at about 0.1%) to prevent evaporation, fires, and corrosion
Automotive	Polymer	Mechanical components made of fluoropolymers, including wiring and cable, fuel delivery tubing, seals, bearings, gaskets and lubricants, and some polymer coatings on carpets
	Nonpolymers	Surface treatment for textiles, upholsteries, carpets, leather and exterior surfaces
Biocides (Herbicides and Pesticides)	Polymer	None reported
	Nonpolymers	Active ingredients such as short-chain sulfonamides in plant growth regulators and herbicides, and EtFOSA (sulfluramid) in ant and termite baits; inert enhancing ingredients in pesticides; PFPAs and

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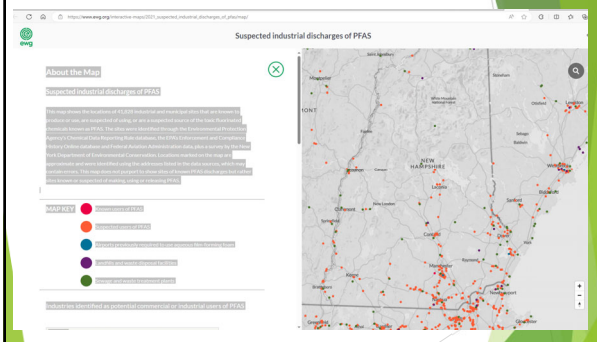
PFAS Info: Suspected discharges



Interactive Map: Suspected industrial discharges of PFAS (ewg.org)

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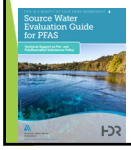
AWWA Source Water Evaluation (PFAS) – High level summary

Step 1: Evaluate Available Data	Step 2: Identify Potential Sources	Step 3: Establish Monitoring Program	Step 4: Interpret Results
…a water system can draw on that information to guide its monitoring effort.	…land uses where there are known examples or associations with PFAS contamination	…Critical components of a successful monitoring program include selecting sampling locations, sample frequency, and appropriate analytical methods.	…Knowing which PFAS are present in a water sample can help water systems determine a "PFAS fingerprint" to gain a better understanding of a contamination source(s).



Credit: Slide summary from Source: AWWA Source Water Evaluation Guide for PFAS (online)

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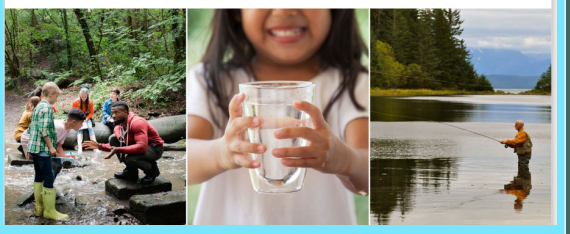
PFAS Strategic Roadmap: EPA's Commitments to Action 2021–2024



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