

Using Alternative Septic Treatment Systems to Protect Pleasant Bay

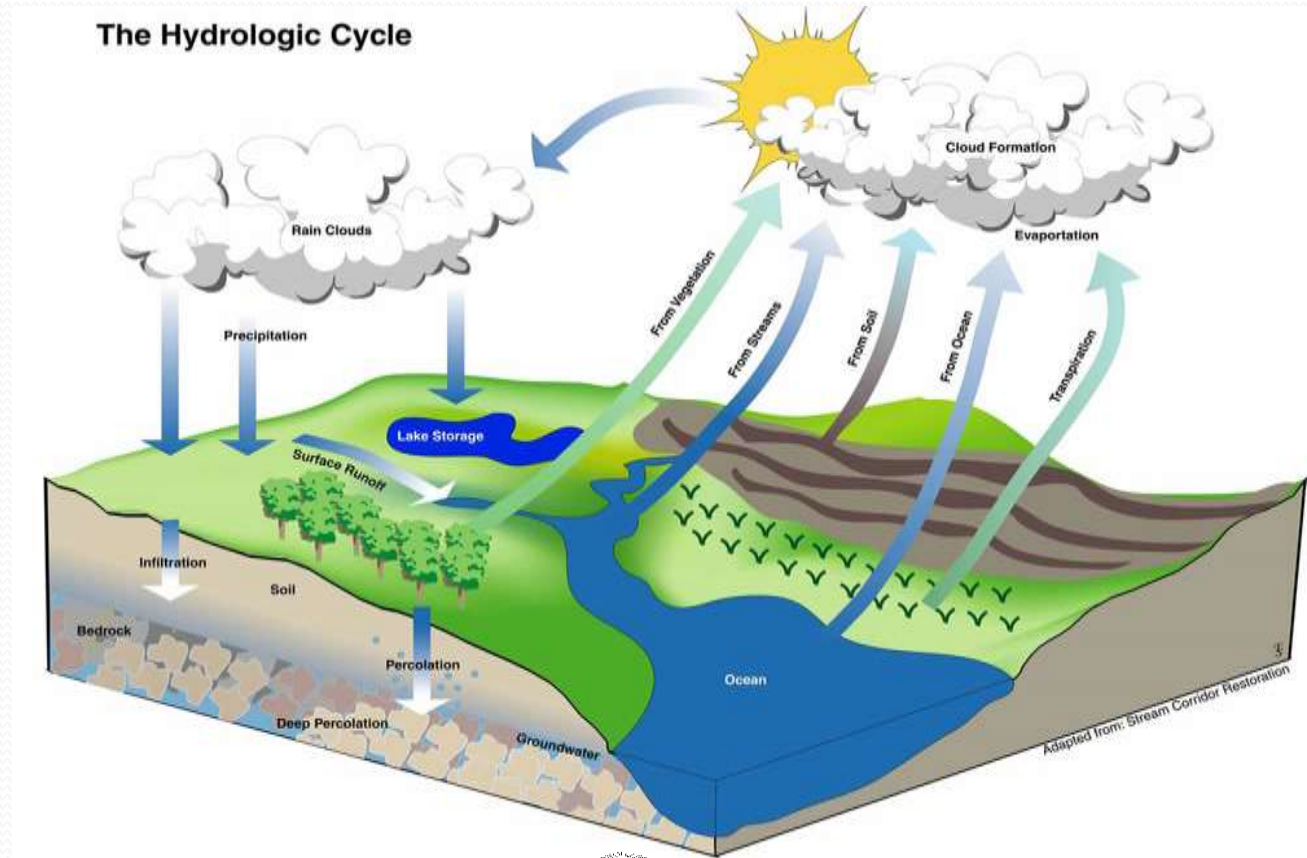
Mark Nelson, P.G.
Horsley Witten Group, Inc.

Chris Miller
Director of Natural Resources,
Town of Brewster, MA



All Water Resources are Interconnected

Therefore...



An Integrated Plan!

Why Integrated?

Everything is Connected

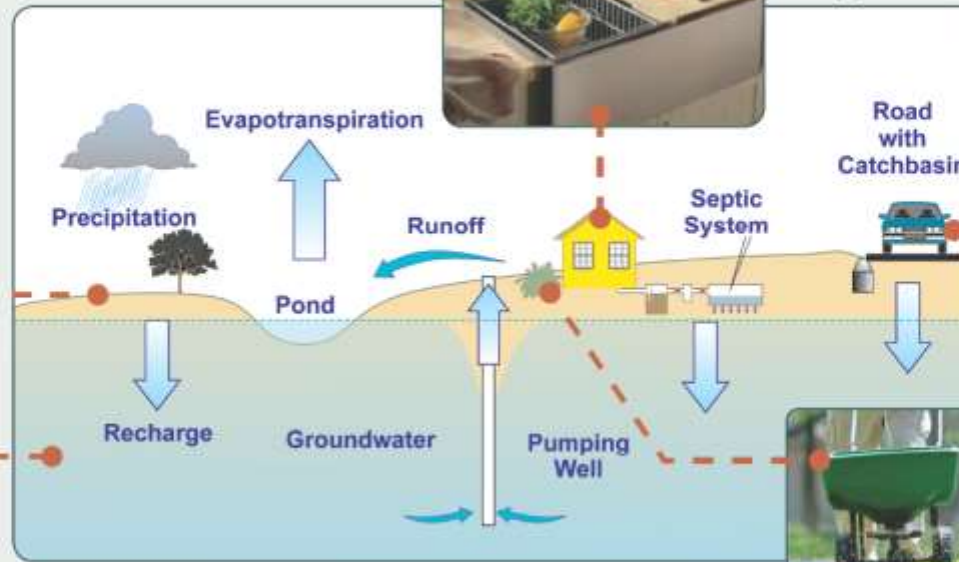
How you manage your property has a direct impact on water quality



Animal waste...
Also makes it to surface waters.



From the groundwater...
Back to your tap!



From the kitchen sink...
To the septic system...
To the groundwater!

From the oil leak under your car...
To the road drainage...
To the surface water!



From your lawn...
To groundwater and/or
ponds and coastal waters.



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The Big Picture...

Protecting the Town's Waters

- Managing Nitrogen Loads to Coastal Embayments
- Protecting Public and Private Drinking Water Supplies
- Protecting and Restoring Fresh Water Ponds
- Improving Stormwater Management



Integrated Water Planning Timeline

- 2009 Comprehensive Water Planning Committee
- Integrated Water Resources Management Plan Conducted in 2011-2015
- Implementation Phase Under Way.



Managing Nitrogen to Protect Coastal Embayments

- Pleasant Bay
 - Work coordinated through the Pleasant Bay Alliance comprised of Brewster, Chatham, Harwich and Orleans



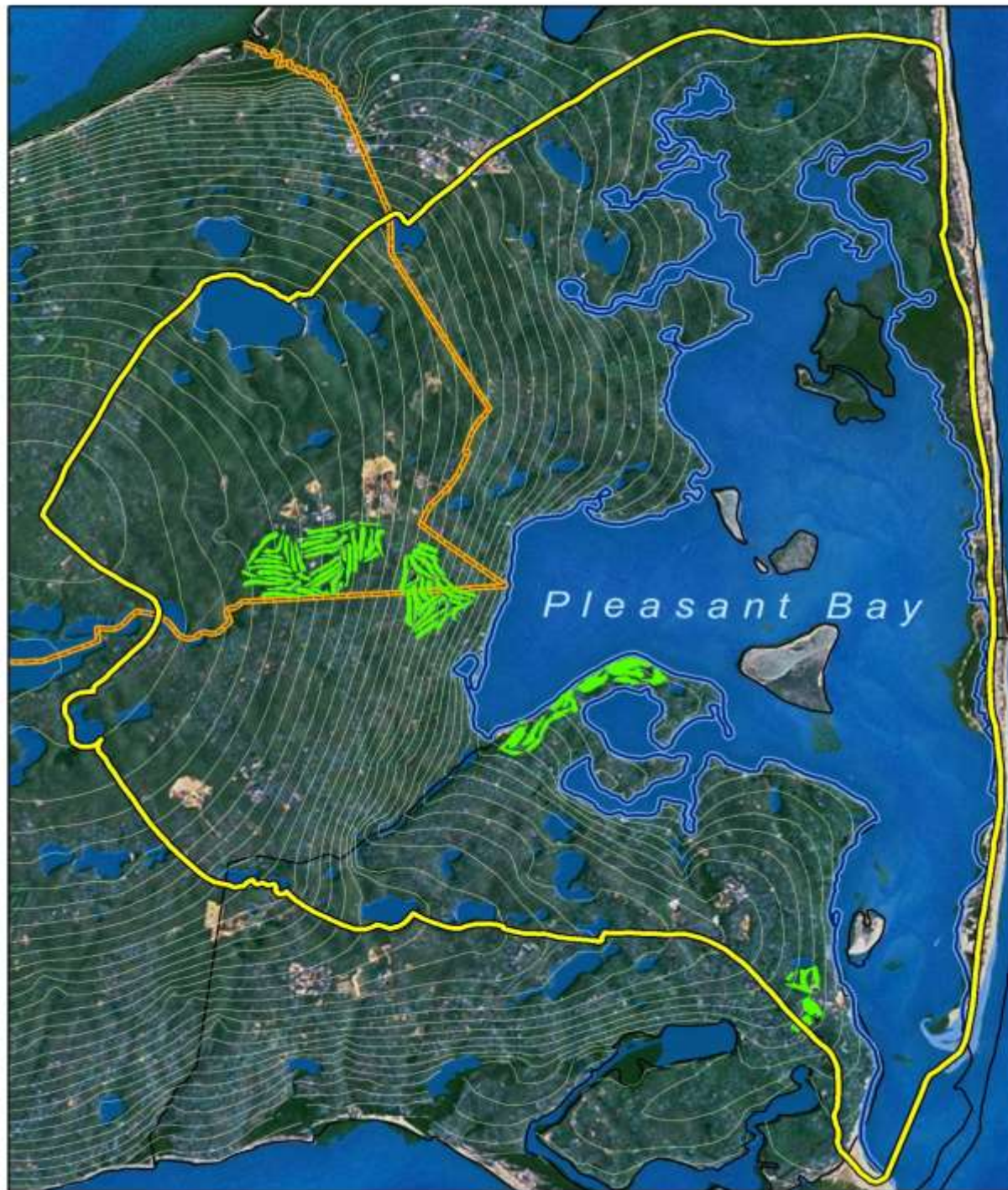
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Managing Nitrogen to Protect Coastal Embayments

- **Pleasant Bay**
 - **Work coordinated through the Pleasant Bay Alliance comprised of Brewster, Chatham, Harwich and Orleans**





Pleasant Bay

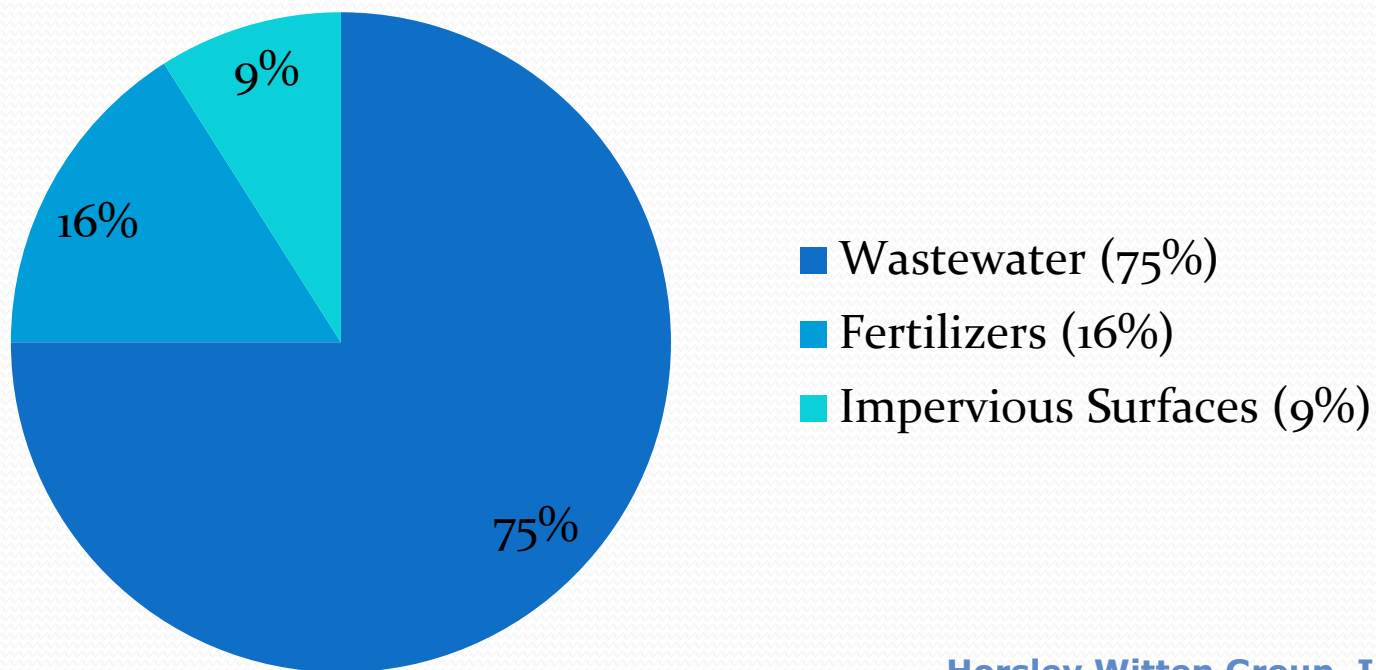


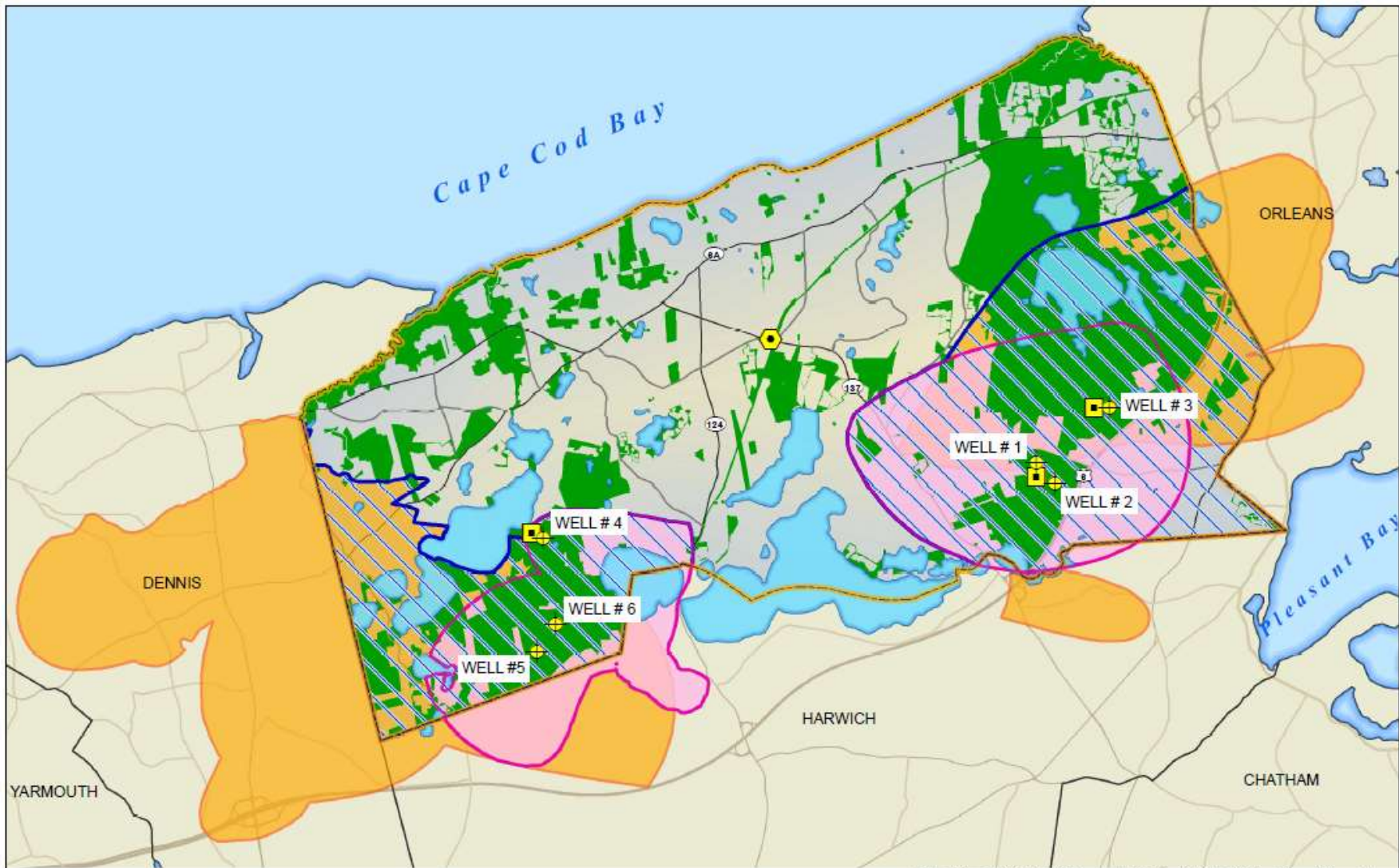
-  Brewster Boundary
-  Pleasant Bay Watershed
-  Pleasant Bay
-  Groundwater Levels (ft)



Nitrogen Loading to Pleasant Bay

Sources of Nitrogen That Can Be Controlled Locally

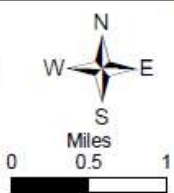




Path: H:\Projects\2011\11109 Brewster Int.Wtr.Res.Mgt Plan\GIS\Maps\Report\Figure E-1.mxd

Legend

-  Town of Brewster
-  Conservation Lands
-  Ponds
-  Public Wells
-  Storage Tanks
-  Water Treatment Facility
-  Brewster Zone II
-  Other Zone II
-  DCPC Areas

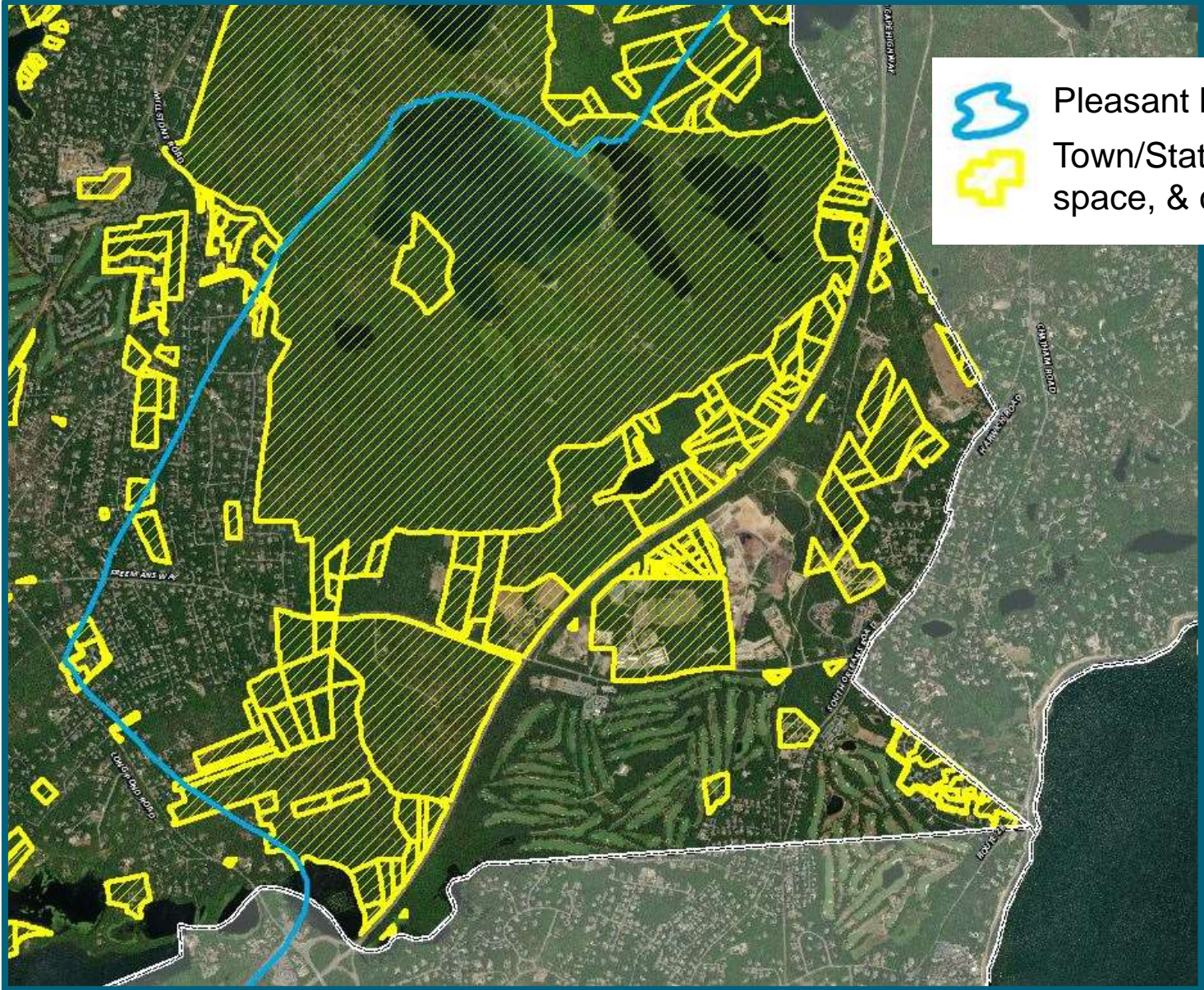




Horsley Witten Group
 Sustainable Environmental Solutions
 50 North St. • Scituate, MA • 02557
 Tel: 508-633-0820 • Fax: 508-633-3707 • www.horsleywitten.com

Figure E1. Brewster Conservation Lands and Zone II Areas

Date: 12/20/2012 - eym

Open Space Purchases Protect Brewster's Waters



-  Pleasant Bay
-  Town/State-owned, open space, & conservation land

Pleasant Bay Watershed Permit



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

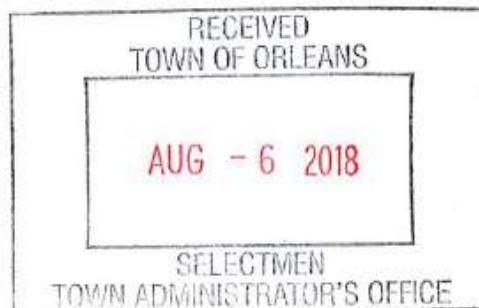
Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner



August 3, 2018

Select Board
2198 Main Street
Brewster, Massachusetts 02631

Board of Selectmen
732 Main Street
Harwich, Massachusetts 02645

RE: PLEASANT BAY –
Watershed Permit 001-0

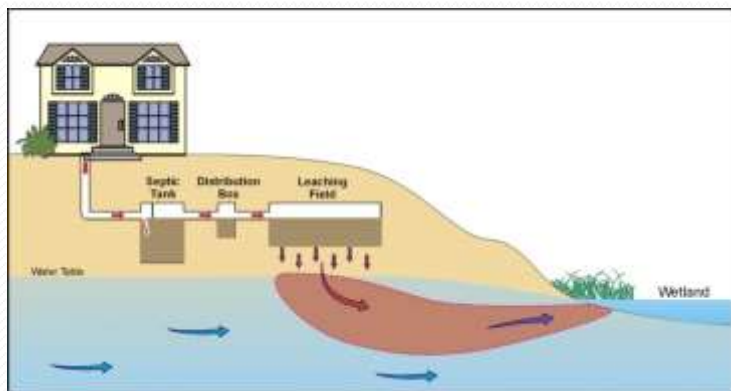
Board of Selectmen
549 Main Street
Chatham, Massachusetts 02633

Board of Selectmen
19 School Road
Orleans, Massachusetts 02653

Dear Board Members:

Pleasant Bay Watershed Permit

- First of its kind in Massachusetts
- Regulated Area is the Pleasant Bay Watershed – includes portions of all four watershed towns
- Developed to implement plans to meet the TMDL for Pleasant Bay
- Combination of existing plans for each town





Pleasant Bay
Alliance



**PLEASANT BAY TARGETED
WATERSHED MANAGEMENT PLAN**

A Compilation of the Wastewater and Nitrogen Management Plans
of Brewster, Chatham, Harwich and Orleans
in Support of a DEP Watershed Permit

May
2018

Based on a Targeted Watershed Management Plan



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Nitrogen Management Alternatives

- **Fertilizer Management**
- **Onsite Treatment Systems**
- Neighborhood Treatment Systems
- Permeable Reactive Barriers
- Regional Opportunities – Nitrogen Trading



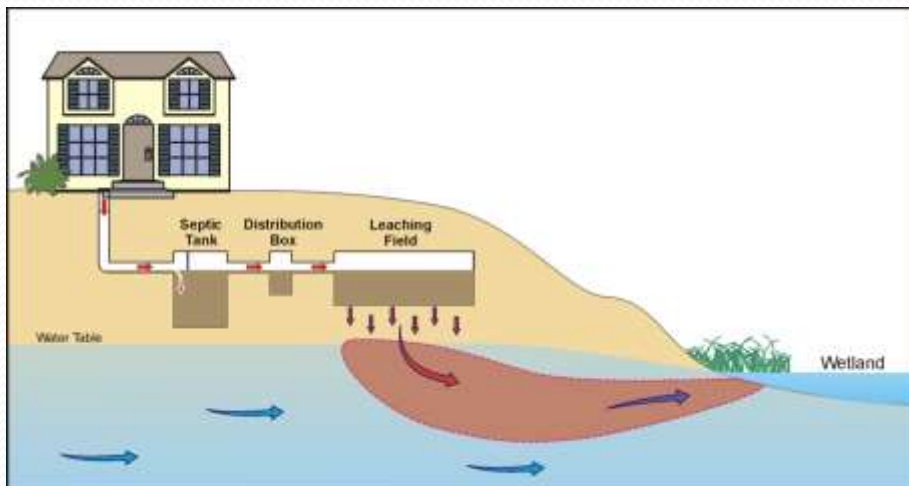
Pleasant Bay Watershed Permit

- Brewster is required to remove 2,262 kg N/year.
- The Town has already removed 56%.
 - Mostly through fertilizer management at Captains Golf Course
- This leaves 981 kg/year to be removed using alternative onsite septic systems.



Onsite Program Components

- Selecting onsite technologies and effluent limits.
- Regulatory approach: general bylaw or BoH regulation?
- Town oversight of onsite system O&M required.
- Regular performance monitoring required.

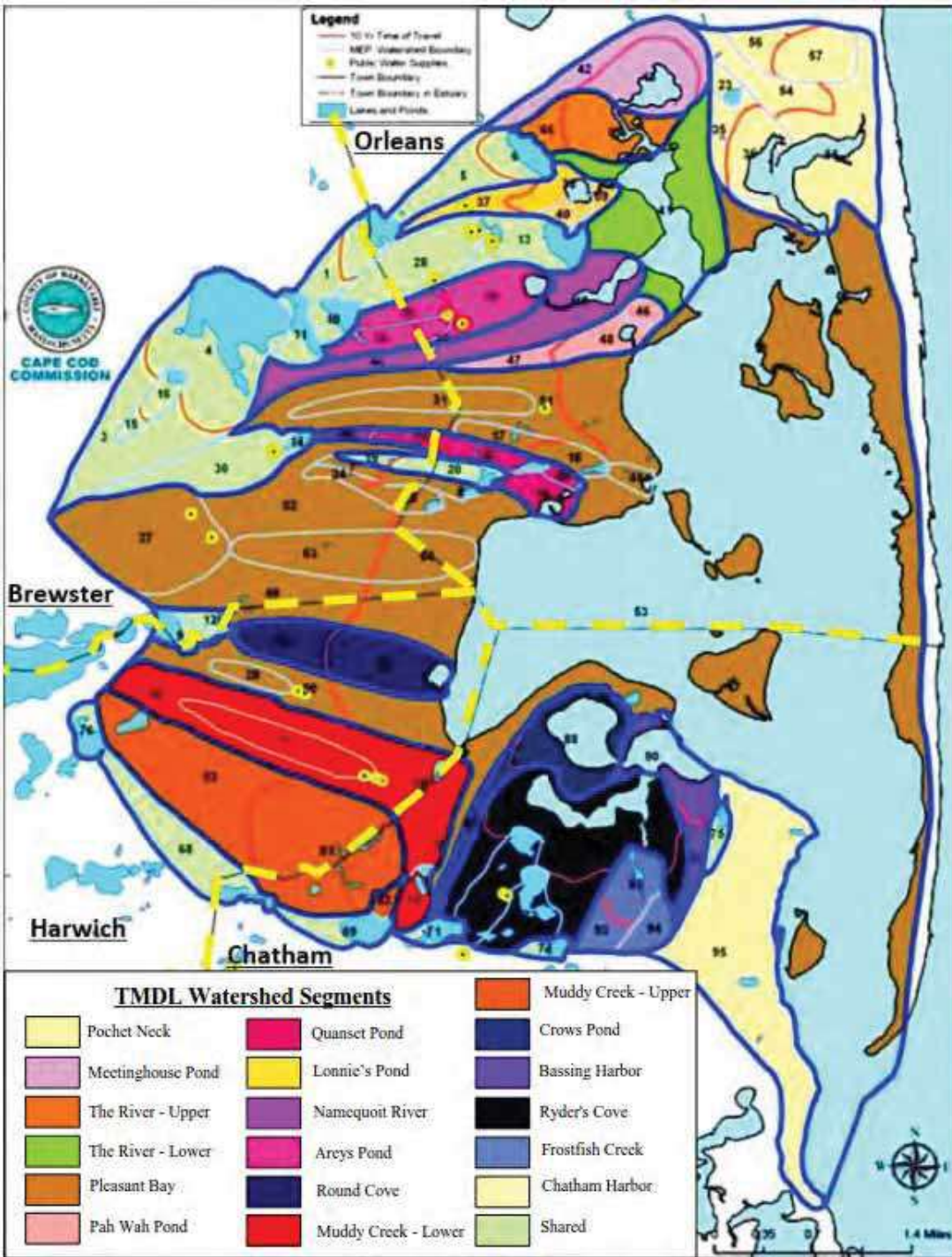


How Many Upgrades Needed?

- Factors
 - Attenuated vs Non-Attenuated Watersheds
 - Extent of Nitrogen Removal Provided by Selected System(s)
 - How System Performance is Simulated in the Watershed Model.



Pleasant Bay Subwatersheds



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Onsite Alternative Treatment Systems

- Brewster properties located within the Pleasant Bay Watershed: **593**
- Properties in unattenuated watersheds available for upgrade: **319**
- Future development must be managed to prevent additional nitrogen input to Pleasant Bay



The Magic Number

- What is the Modeled Septic System Nitrogen Concentration for Pleasant Bay?



The Magic Number

26.25 mg/L



Nitrogen Reductions Provided by Onsite System Upgrades

SCENARIO	REDUCTION KG/YEAR	TMDL GOAL KG/YEAR
19 mg/L	487	979
15 mg/L	752	979
12 mg/L	960	979
10 mg/L	1,096	979



Regulatory Approach

- General Bylaw – Requires majority approval at Town Meeting
- Board of Health Regulation – Requires majority vote of the Board
- Considering General Bylaw with implementation regulations adopted by the Board of Health



O&M Oversight

- Town is responsible for meeting the nitrogen reduction goals in the Watershed Permit
- Therefore responsible for system performance and O&M oversight
- How?
 - Town staff?
 - Contracted to certified operators(s)?

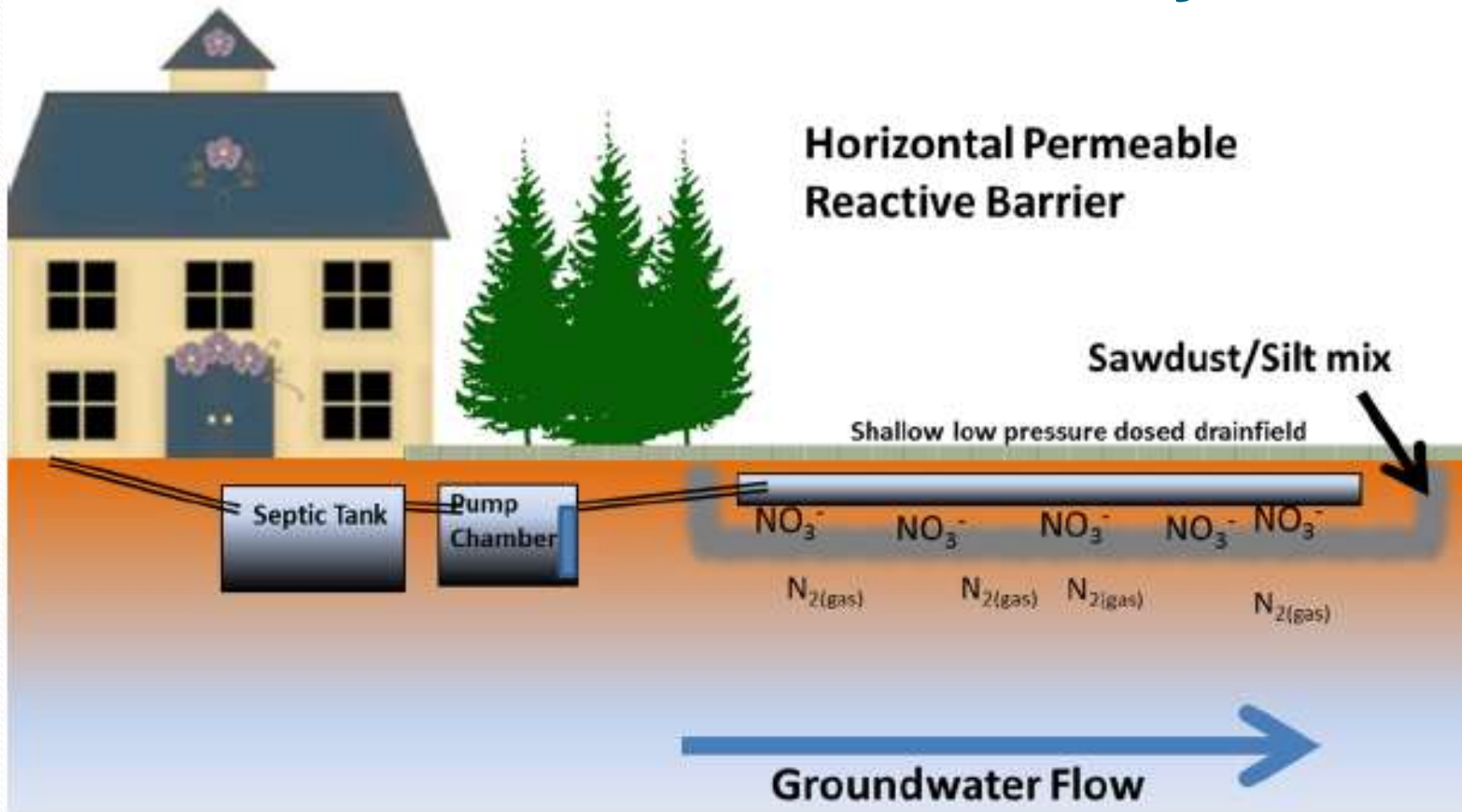


Performance Monitoring

- Monitoring required based on MassDEP approval of innovative technologies
- Additional monitoring to confirm TMDL compliance – randomly selected performance tests for systems within each subwatershed.



Which Alternative Treatment Systems?



Onsite Alternative Treatment Systems Upgrade Costs

- Approximately 320 Homes
- Cost Range = \$15,000-\$25,000 per home?
- Overall Cost = \$4,800,000-\$8,000,000
- Costs for Town oversight, system O&M and water quality monitoring to be determined.

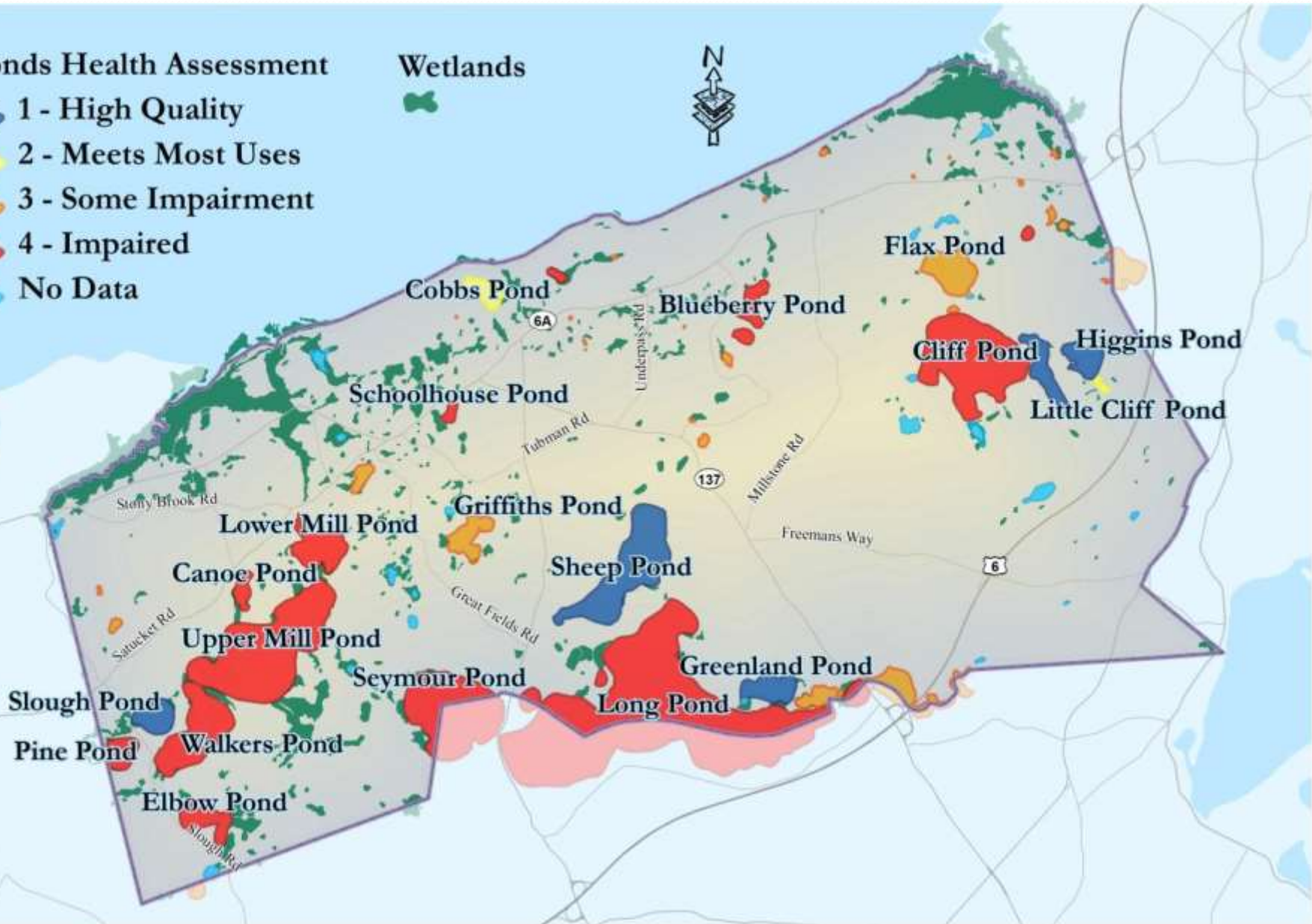


Status of Brewster's Ponds

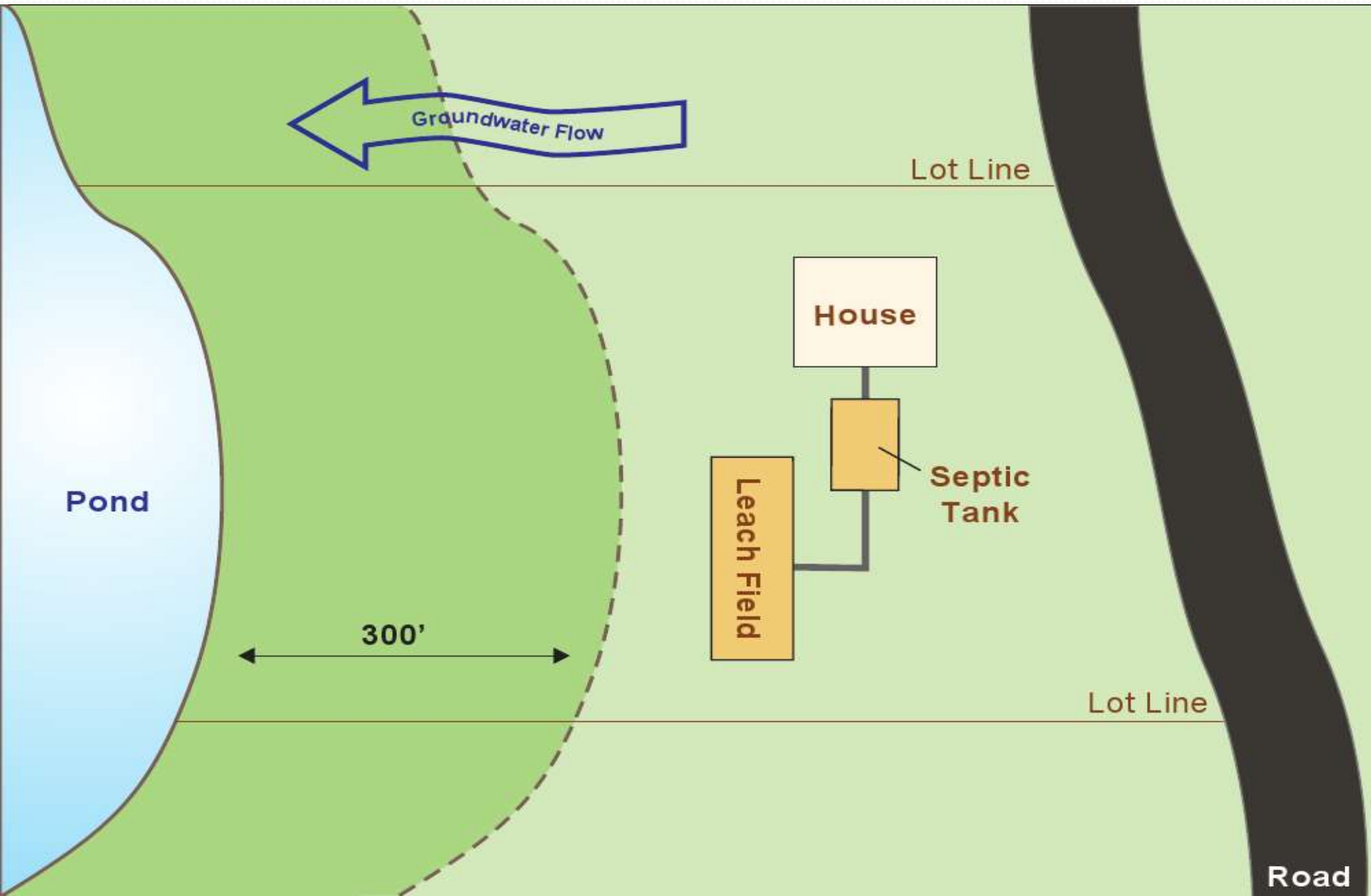
Ponds Health Assessment

- 1 - High Quality
- 2 - Meets Most Uses
- 3 - Some Impairment
- 4 - Impaired
- No Data

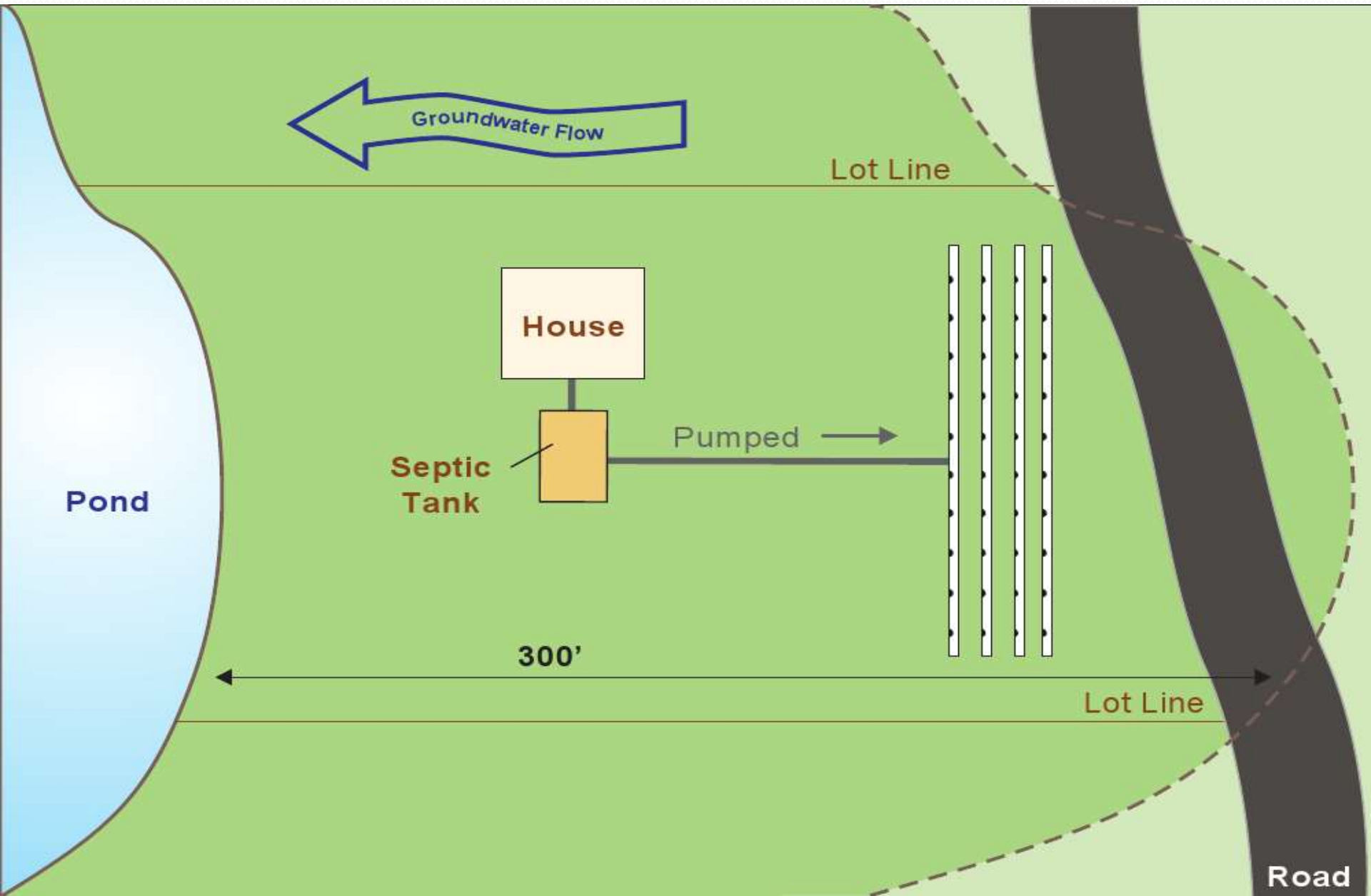
Wetlands



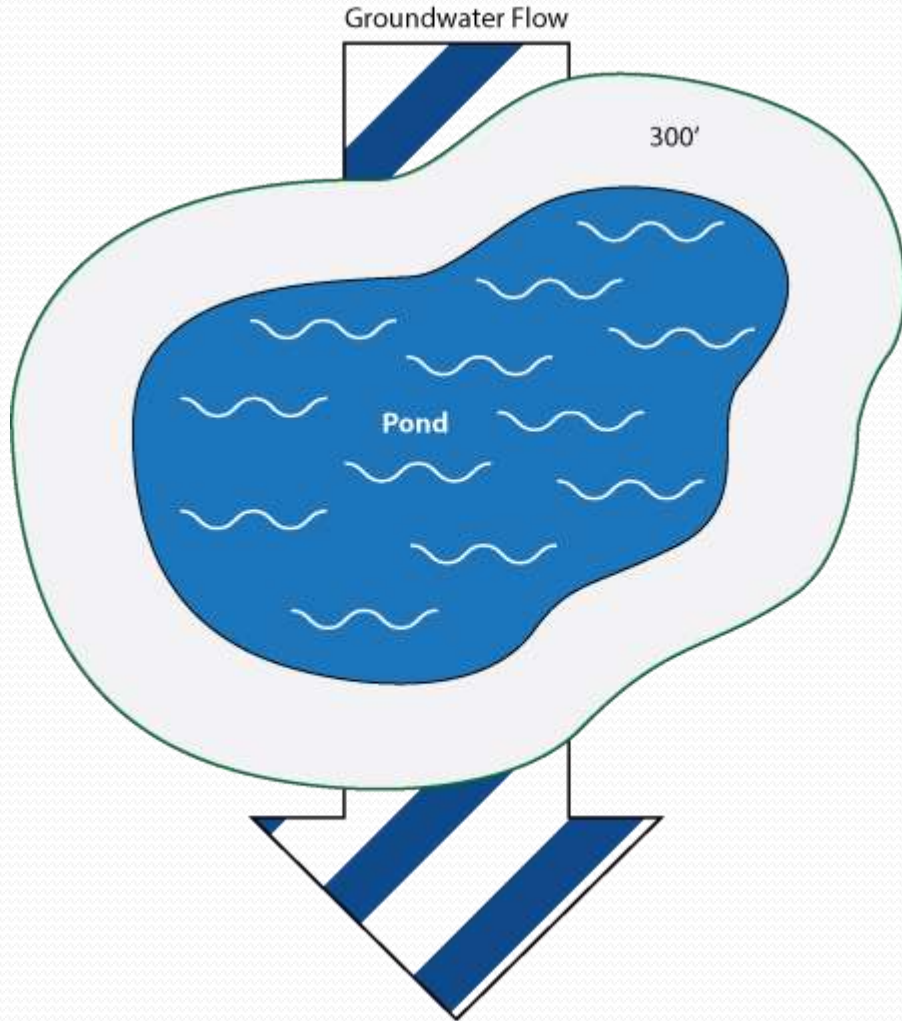
Septic Management Near Ponds



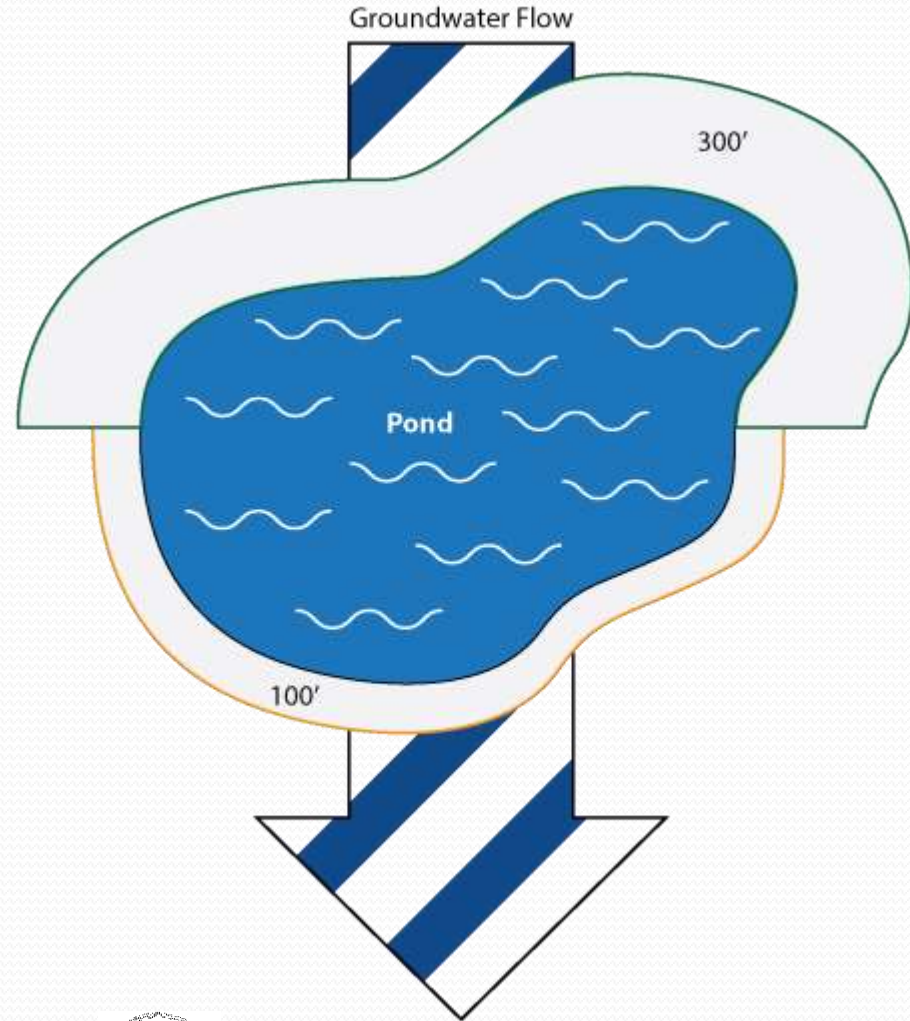
Septic Management Near Ponds

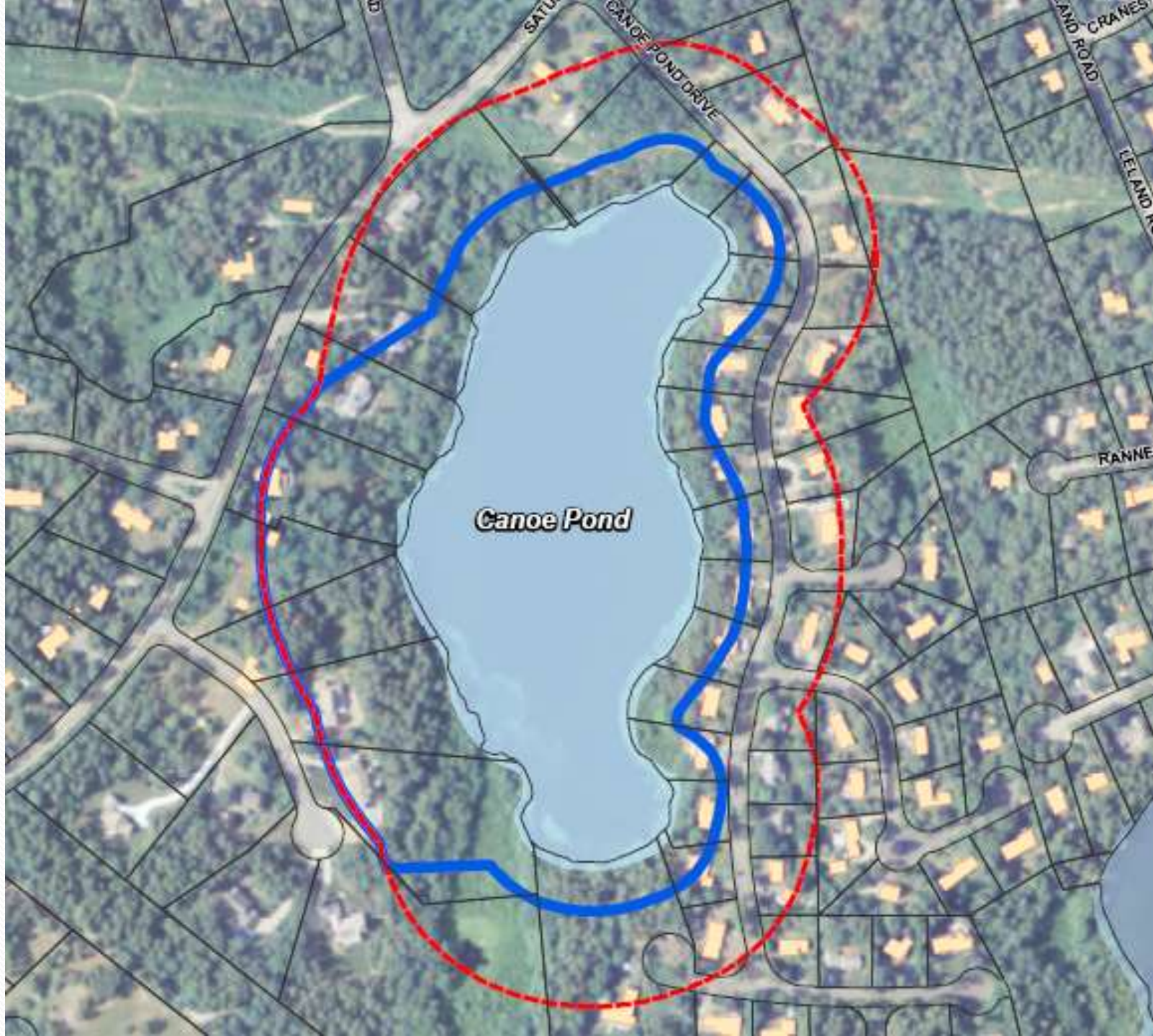


Current Regulation



Proposed Regulation





Canoe Pond

Draft Health Reg for Ponds

- Reset septic buffer
 - 300 feet upgradient
 - 100 feet downgradient
- Require shallow leachfields to capture phosphorus in iron rich soils
- Pilot testing would be beneficial



How Many Properties Affected?

- Further Research on Individual Properties Needed.
- Estimate 400 Homes Would Require an Upgrade
- Total cost at \$15,000-\$25,000 per property = \$6,000,000 to \$10,000,000



Financing – Pleasant Bay and Ponds

- Pleasant Bay Septic Upgrades
 - \$4.8 to \$8.0 million
- Freshwater Pond Septic Upgrades
 - \$6,000,000 - \$10,000,000
- Total
 - \$10,800,000 - \$18,000,000
- Annual Town Oversight, O&M and Monitoring Costs to be Determined.



Financing – Who Pays?

- Town's Contribution?
- Property Owner's Contribution?
- Incentive for Early Upgrades?



Potential Financing Options

- State Revolving Fund (SRF) Loans at low or 0% interest
- Cape and Islands Water Protection Fund
- Barnstable County Septic System Loan program



Questions?

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