Barnstable Town Council

Update on Wastewater Efforts In Barnstable

Department of Public Works
January 3, 2019

Agenda

- *Problem Review*
- *Plans*
  - *The Process*
  - *Actions to Date*
  - *The Plans*
    - *Non-Traditional Actions*
    - *Traditional Actions*
    - *Other Ideas*
- *Discussion*

The General Problem

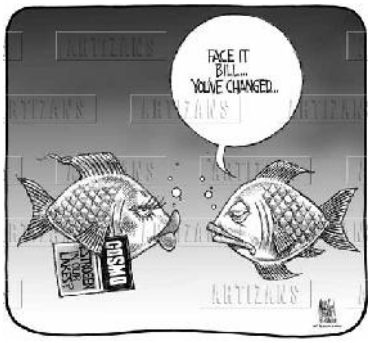
- *Wastewater issues*
  - *Impaired embayments*
  - *Groundwater quality concerns*
  - *Pond water quality concerns*
  - *Failing/expensive septic systems*
  - *Economic development requirements*
  - *New flood zones*
  - *Regulatory requirements*

The "208" Problem - Nitrogen

- *Impacts marine waters*
  - *Limiting nutrient*
- *Origins*
  - *Septic systems*
  - *Fertilizer runoff*
  - *Stormwater disposal*
  - *Atmospheric deposition*
  - *Sediment release*

Other Issues of Concern

- *Phosphorus in freshwater ponds*
- *Contaminants of Emerging Concern (CECs)*
  - *Pharmaceuticals*
  - *Antibiotics*
  - *Hormones*
  - *Personal care products*
  - *Chemicals*
- *PFOS/PFOA*

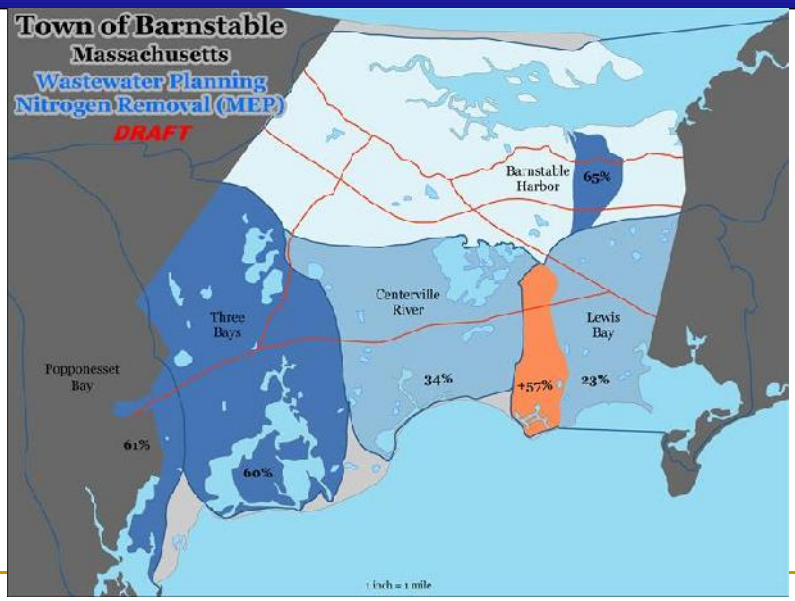


Regulations

- *Massachusetts Estuaries Program (MEP)*
  - *MA DEP & UMASS-Dartmouth*
  - *89 estuaries southeast MA*
  - *Watershed/estuary model*
    - *predicts water quality changes resulting from land use decisions*

- *DEP develops **TMDLs***
  - *Total Maximum Daily Loads*
    - *Max pollutant a water body can receive and still meet water quality standards*
- *Eelgrass is the sentinel species*
- *Cape Divided by watersheds*

Average Nitrogen Removal by Watershed



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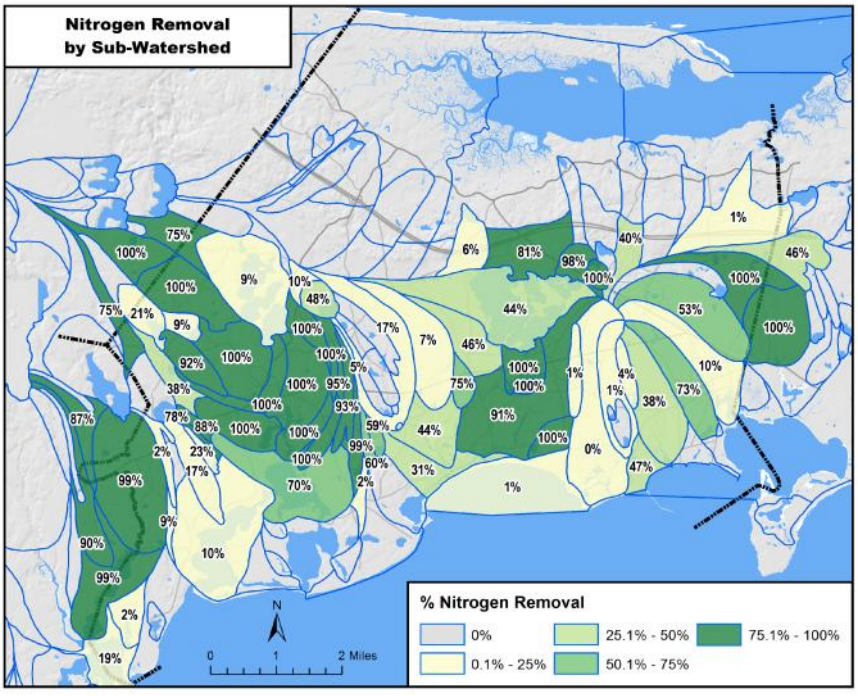


Plans

"5 Needs" Plans Should Address

- *Sanitary Needs*
  - *Poor Soils*
  - *Variances*
  - *High groundwater*
- *Convenience and Aesthetics*
  - *Excessively Expensive Systems*
  - *Mounded Systems*
    - *Impact on Village Aesthetics*
- *Protecting Groundwater and Water Supplies*
  - *Nitrogen*
  - *CECs*
- *Protecting Surface Waters*
  - *Nutrients*
- *Enabling Desired Sustainable Economic Growth*

What a Wastewater Plan Does

- *Town-wide comprehensive plan that:*
  - *Identifies water quality requirements*
  - *Identifies solutions*
    - *Nontraditional – dredging, aquaculture, PRBs, UD toilets, fertilizer plans, etc.*
    - *Traditional – sewers, etc.*
    - *Management – zoning, etc.*
  - *Recommends capital improvements*
  - *Identifies funding/financing mechanisms*

"Organic"

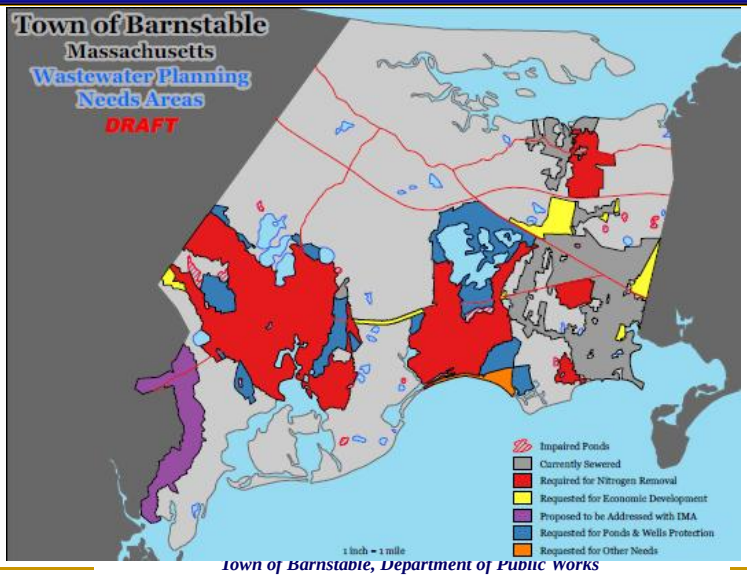
The Plan is Changing

- *Needs to meet regulatory requirements*
- *Flexible*
  - *In house staff leads consultant*
  - *Able to adapt to changes in technology*
- *Adapting to community needs and desires*
  - *Public feedback from presentations and Political Leaders*

The TOB Process

- *Collaboration of WRAC Members, Town Staff, and DEP*
- *A lot-by-lot evaluation of the "5 Needs" using GIS tool*
  - *Sanitary Conditions/Identified public health issues*
    - *bad soils/high groundwater*
    - *effluent surfacing over leaching field*
    - *Inadequate set-back from private wells/property lines*
    - *direct discharge of sanitary wastewater to a water body*
  - *Water Supply Protection*
    - *Identified "impaired" or endangered wells and neighborhoods likely impacting them*
  - *Surface Waters - Nutrient Enrichment*
    - *Marine – SMAST Modeling and CCC 208*
    - *Freshwater – TOB sampling and study of ponds*
  - *Convenience and Aesthetic Issues*
    - *Identified Mounded septic systems , velocity zones, and excessive septage pumping*
  - *Sustainable Economic Development*
    - *Met with Planning, and others, to understand where wastewater solutions needed for community chosen economic development*

Identified Needs



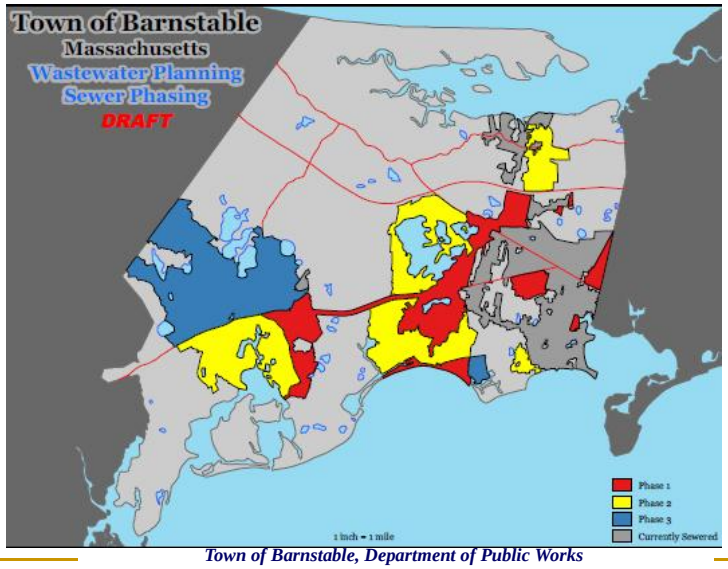
To Date

- ✓ *Winter 2015/16 formed the WRAC – Began meeting*
- ✓ *June 2016 – Complete the "208 Bookends"*
- ✓ *Fall 2016 - Completed Gap filling and GIS Mapping Layers*
- ✓ *Winter 2016 through Spring 2017 - Plan Construction*
- ✓ *Summer 2017 – Complete a Draft Plan*
- ✓ *Summer 2017 – Present Draft Plan to Town Council*
- ✓ *Fall/Winter 2017 & Winter/Spring 2018 – Develop the alternatives approach on Marstons Mills River*
- ✓ *Fall/Winter 2017 – Conceptually design, and propose for funding, initial round of Traditional Solution Projects*
- ✓ *Winter 2018 – Evaluation of Marstons Mills School Wastewater Facility*
- ✓ *Winter/Spring 2018 – Meet with DEP on Permitting of Alternatives*
- ✓ *Spring 2018 – Approved Funding for Preliminary Design of initial Traditional Solution Projects*
- ✓ *Spring 2018 – Approved Funding for Evaluation of Wastewater Disposal Alternatives*
- ✓ *Spring 2018 - Began sampling to support permitting for Alternatives*
- ✓ *Spring 2018 – Began modeling WPCF (BIOWIN)*
- ✓ *Summer 2018 – Began Preliminary Design of initial Traditional Solution Projects*
- ✓ *Summer 2018 – Begin Evaluation of Wastewater Disposal Alternatives*
- ✓ *Summer 2018 – Renewal of WPCF License*
- ✓ *Summer /Fall 2018-Construction of the Attucks Lane Pump Station*
- • *Summer/Fall 2018 – Begin Public Outreach and Feedback*
- • *Fall/Winter 2018 – Dredging of Sampson's Island – flushing in Three Bays*
- • *Winter 2018/19 – Understand Financial Options/Opportunities*
- • *Spring 2019 – Present "Final Draft" Plan to Town Council*
- • *Summer 2019 - Submit Final Draft Wastewater Plan to CCC for review*
- • *Fall 2019 – Draft CWMP to DEP*

The Plan - Phasing

- *Three 20-Year Phases*
  - *– Phase I – Years 0-20*
  - *– Phase 2 – Years 20-40*
  - *– Phase 3 – Years 40 -60*

Current Plan

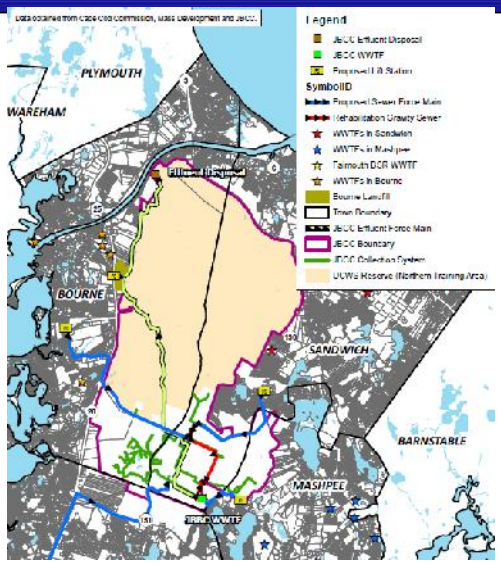


Phase Statistics

Item	Phase 1 (0-20 Years)	Phase 2 (20-40 Years)	Phase 3 (40-60 Years)	Total
WW Captured (GPD)	719,400	697,300	373,800	1,790,500
Load N Removed (kg/year)	24,000	25,000	14,000	63,000
Number of Parcels Affected	3,513	3,707	2,296	9,516
Road Miles	66	70	45	181
% N Removed	40%	39%	21%	100%

- *Conservative - No assumed credit for nontraditional solutions*
  - *Installed in Phase I*
  - *Monitored throughout Phase I and II*
  - *Ideally will enable avoidance of Phase III via Adaptive Management*

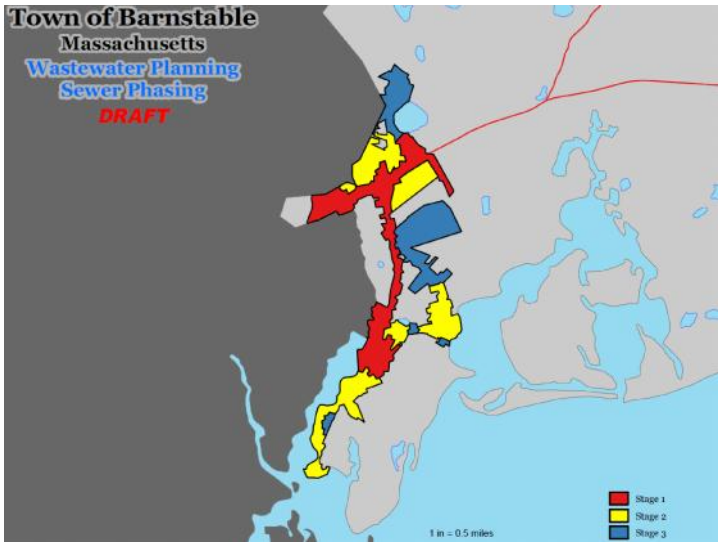
Joint Base Cape Cod (JBCC)



Joint Base Cape Cod (JBCC)

- *Existing Facility*
  - *Treatment Capacity = 360,000 gpd (annual average day)*
  - *Disposal Capacity = 840,000 gpd (max day)*
  - *Effective Available Capacity = 75,000 gpd (annual average day)*

Additional Cotuit Expansion

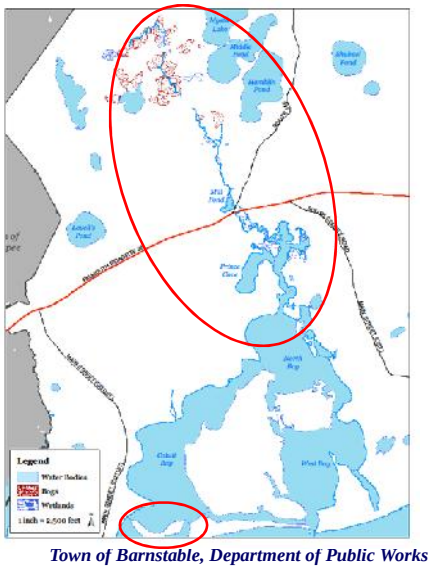


Additional Cotuit Expansion Stage Statistics

Item	Stage 1	Stage 2	Stage 3	Total
WW Captured (GPD)	37,195	84,460	22,808	144,463
Load N Removed (kg/year)	1,349	3,063	827	5,239
Number of Parcels Affected	253	480	155	888
Road Miles	6	9	3	18

Non-traditional Projects Underway

Focus Area – Three Bays



Focus Area – Three Bays

Non-traditional methods.

- *Cotuit Bay Inlet Dredging*
- *Mill Pond dredging*
- *Abandoned cranberry bogs conversion*
- *Warren's Cove - aquaculture*
- *Alternative septic systems*
- *Permeable Reactive Barriers (PRBs)*
- *Stormwater treatment*

Sampson's Island Dredging

Sampson's Island Dredging

Predicted Change in N levels

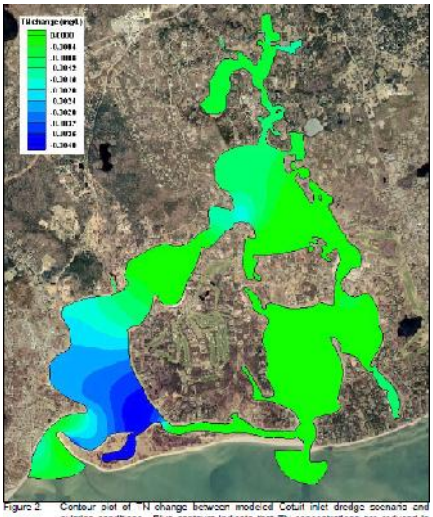
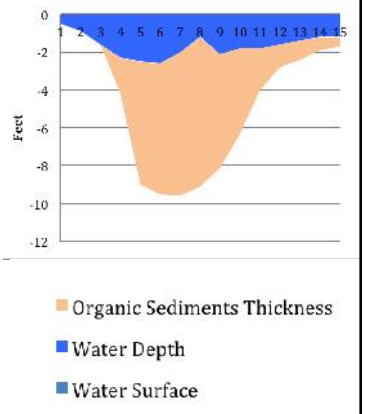


Figure 2. Contour plot of TN change between modeled Cotuit inlet dredge scenario and existing conditions. Blue contours indicate that TN concentrations are reduced in the dredge scenario compared to existing conditions.

Mill Pond Dredging

- **The Issue:**
  - *Mill Pond is full of silt and debris – 9 feet thick in places*
  - *In 20 years nitrogen removal capacity has declined from 20% to 10%*
  - *Healthy ponds = 30% to 50%*
  - *If 50% restored, estimated remove over 2,200 kg/year of additional nitrogen*
- **The Solution:**
  - *Dredge to its original depths (sand layer) and perimeter*
  - *Estimated 60,000 CYs of material (to be confirmed)*
  - *Pond depths restored to approximately 8 feet in the deepest areas*



Cranberry Bogs

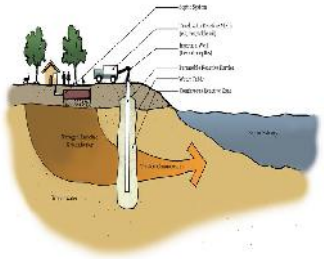
- **The Issue**:
  - *Existing and abandoned bogs - Ideal locations for nontraditional solutions*
- **The Solutions:**
  - *Conversion to ponds (~50%)*
  - *Conversion to wetlands (TBD)*
  - *Installation of floating wetlands (8-15%)*

Warrens Cove

- *The Issue:*
  - *Warrens Cove currently not appropriate for aquaculture due to silt.*
  - *Potential to be ideal nursery for aquaculture farms*
  - *The product relocated to established aquaculture farms*
- *The Solution:*
  - *Dredging Warrens Cove back to a sandy bottom*
  - *Establish aquaculture nurseries*
    - *Variety of species*
  - *The Cape Cod Commission estimated that aquaculture beds/floating racks can remove 8-15% of the nitrogen they encounter*

Other Non-traditional Opportunities

- *PRBs*
  - *EPA Demonstration Project*
    - *Prince Cove Area*
  - *Horse Farms?*
- *Alternative Septic Systems*
  - *Prince Cove*
- *Alternative Toilets*
  - *Cape Cod Academy*



Stormwater

- *The Issue:*
  - *Stormwater systems are in various states of repair*
- *The Solution:*
  - *A comprehensive survey identifying those that need repair, or replacement.*
  - *Identify new systems/BMP needed to protect water quality*
  - *Credit for work already done*
    - *Cotuit Town Dock, etc.*

Three Bays Storm Water Project Overview

- *3 Year Project*
- *Total Cost: $692,386*
  - *$472,574 from U.S. EPA Southeast New England Program*
  - *$59,014 from MA Office of Coastal Zone Management*
  - *$160,798 in-kind match from partners*

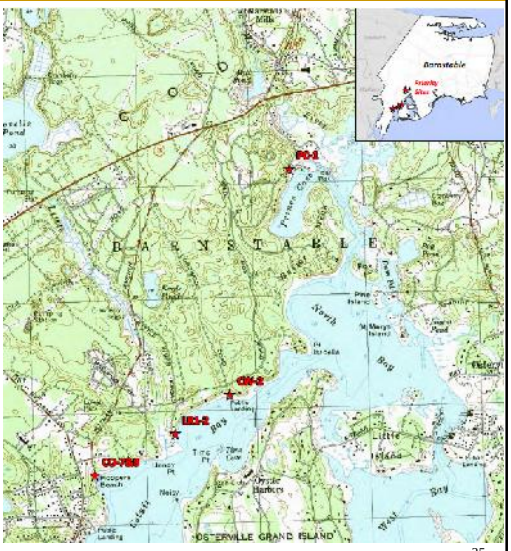
Priority Sites Selected for Design and Permitting

Cotuit

- Ropes Beach (2 BMPs)
- Cordwood Landing

Marstons Mills

- Prince Cove Marina



Results

Short-Term Results

- Treat drainage from 4.8 acres
- Eliminate 70-85% of bacteria and 55% of nitrogen from stormwater runoff at these sites
- Reduce impervious surface by 1,245 square feet
- Restore salt marsh and coastal dunes/beaches
- Remove invasive plant species
- Provide improved public access

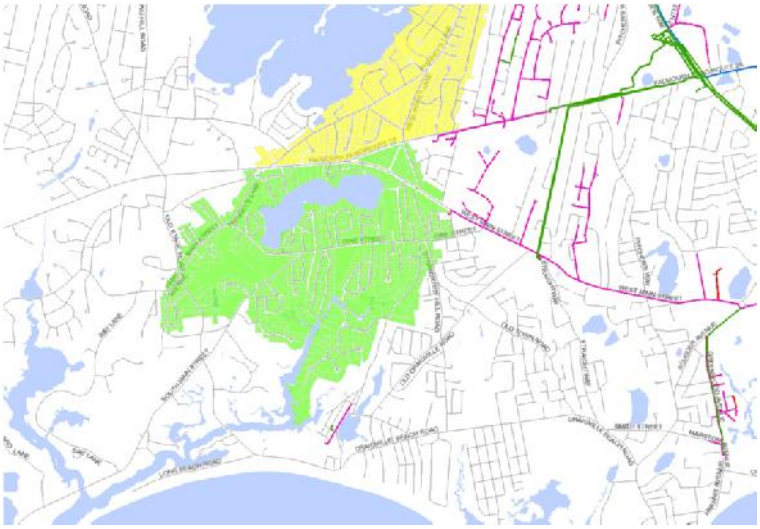
Long-Term Goals

- 50% reduction in beach and shellfish closures due to bacteria pollution
- Reduction of algal blooms and fish kills in adjacent embayments
- Improve habitat for fish, shellfish and other wildlife
- Improve water quality
- Support commercial and recreational uses

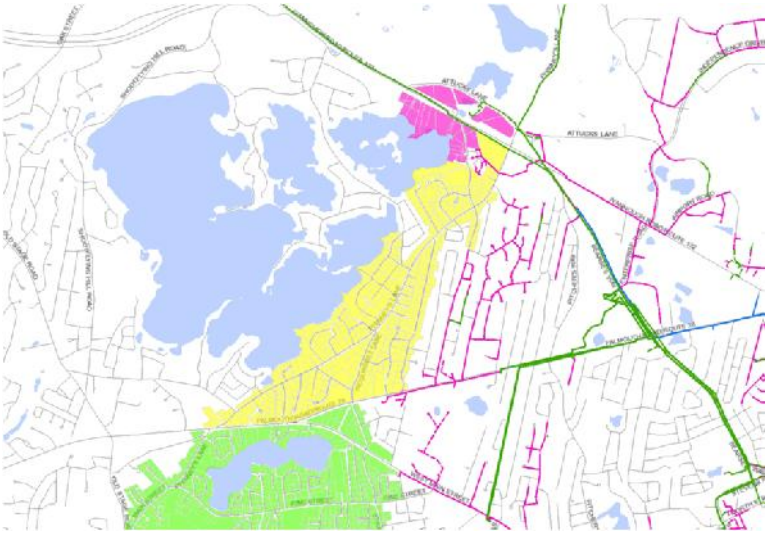
Traditional Projects Underway (funded)

Attucks Lane Pump Station Area Expansion – Full Design

Long Pond Area Sewer Expansion – Preliminary Design



Phinney's Lane Sewer Expansion – Preliminary Design



Effect of the Projects

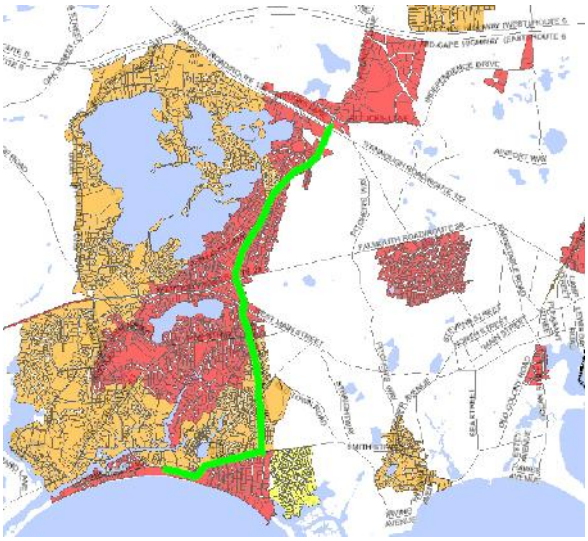
ALL PROJECTS TOTAL:

Affected MEP Watershed	Watershed Estimated Nitrogen Loading (g/day)	Watershed Nitrogen Removal Target(kg/day)	Total Parcels Affected By Projects	Wastewater Flow Removed By Projects (gal/day)	Nitrogen Removed By Projects (g/day)	% Total Nitrogen Removed	% of Target Nitrogen Removal
Centerville River	128,128	180	1,374	246,970	24,525	19.3%	**40.8%**
Lewis Bay	54,300	35	17	2,680	266	0.5%	**0.8%**
Barnstable Harbor	65,519	24	37	15,724	1,548	2.4%	**12.7%**
TOTAL:	**247,947**	**240**	**1,428**	**265,374**	**26,340**		

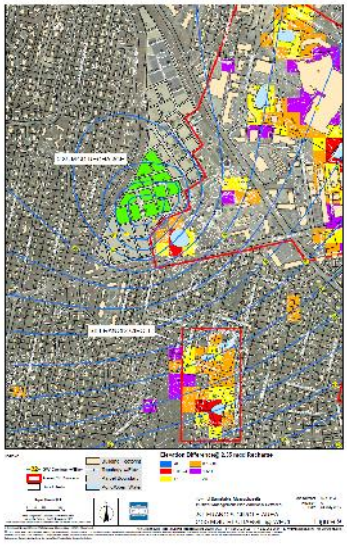
BY PROJECT

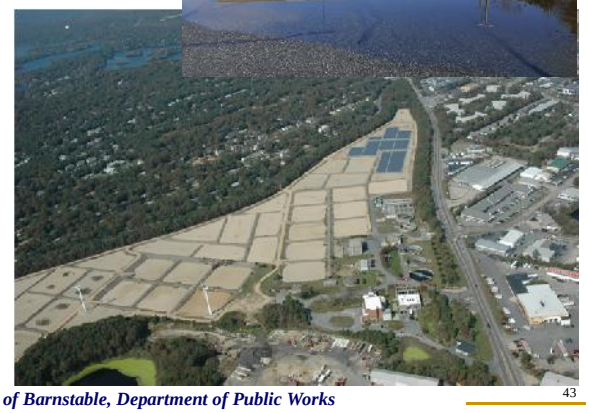
Project	Affected MEP Watershed	Watershed Estimated Nitrogen Loading (g/day)	Watershed Nitrogen Removal Target(kg/day)	Total Parcels Affected By Project	Wastewater Flow Removed By Project (gal/day)	Nitrogen Removed By Project (g/day)	% Total Nitrogen Removed	% of Target Nitrogen Removal
Attucks Lane	Centerville River	128,128	60	6	1,094	109	0.09%	0.18%
	Barnstable Harbor	65,519	12	31	13,993	1,390	2.1%	11.4%
	PROJECT TOTAL:			**37**	**15,087**	**1,499**		
Phinney's Lane	Centerville River	128,128	60	534	80,631	8,011	6.30%	13.33%
	Lewis Bay	54,300	35	17	2,680	266	0.49%	0.77%
	Barnstable Harbor	65,519	12	6	1,731	158	0.24%	1.29%
	PROJECT TOTAL:			**557**	**85,042**	**8,435**		
Long Pond	Centerville River	128,128	60	834	165,245	16,406	12.89%	27.30%
	PROJECT TOTAL:			**834**	**165,245**	**16,406**		

Leveraging Vineyard Wind's Work

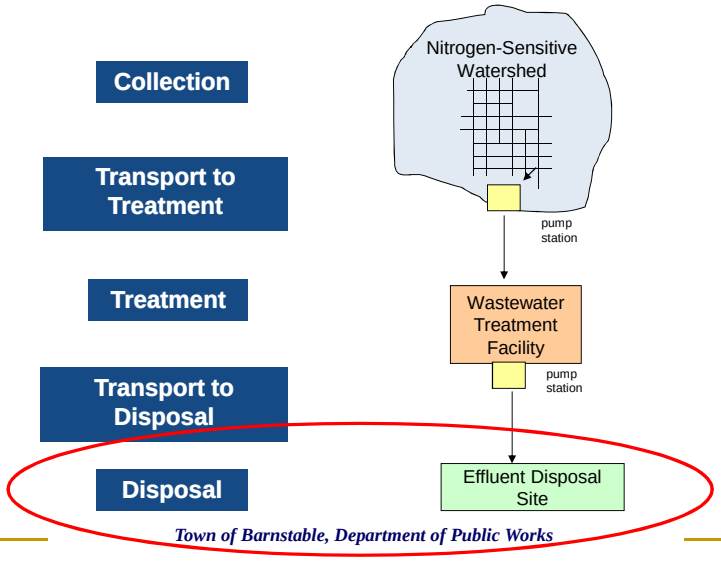


Effluent Disposal Capacity Study & Design





Effluent Discharge Location Evaluation



Other Ideas Being Considered

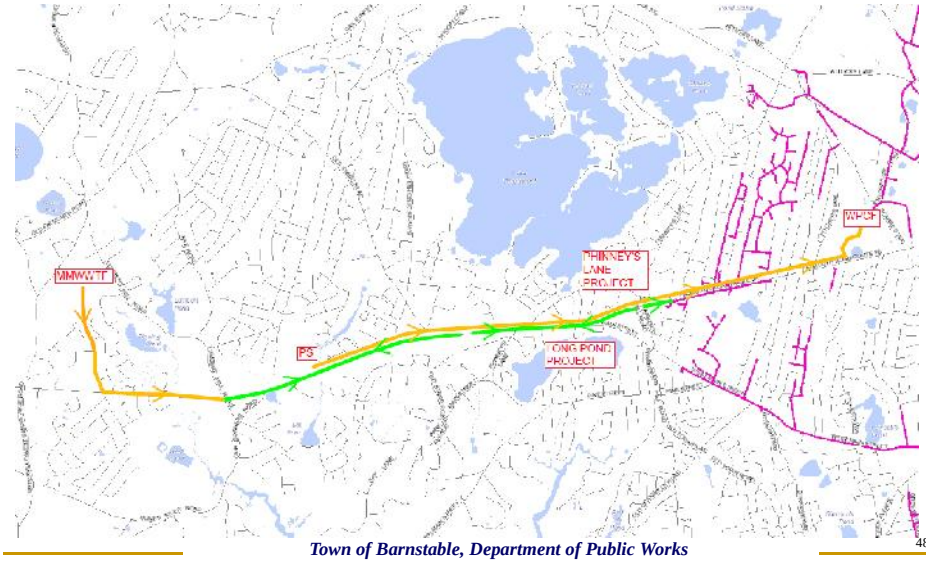
Marstons Mills WWTF

- *Desire to Expand WW collection in the Area*
- *Existing Plant fully allocated 42,900 gpd.*
  - *30,000 gpd schools*
  - *12,000 gpd Housing Trust*
- *Built 1993 – Beyond 20-year design life*
- *Limited expansion potential*
  - *Max. = +/- 113,000 gpd*

Marstons Mills WWTF

- *Expand and Upgrade MMWWTP*
  - *~ $16,000,000*
    - *Includes offsetting sewering for new disposal field*
    - *Not including costs if required TOC < 3 mg/l*
- *Convert MMWWTP to a Pump Station*
  - *~ $19,000,000*
  - *Convey flow to Hyannis WPCF*
    - *Includes gravity sewer along Route 28*
    - *~ $15,500,000 if no gravity sewer along Rte 28*

Marstons Mills WWTF



Next Steps

Next Steps

- *Continuing public outreach and Plan evolution*
- *Developing the financial plan*
- *Keep pressing alternatives*
  - *Permitting, funding, executing, monitoring*
- *Preliminary design of traditional projects*
- *Vet possibilities for MMWWTF*
- *Document the plan for submission to CCC and DEP*
- *Continue to aggressively get after the issue*

Discussion?