

# WATERSHEDS: LOWER CAPE Allen, Saquatucket and Wychmere Harbors



## The Problem

The Massachusetts Estuaries Project (MEP) technical reports (available at [www.oceanscience.net/estuaries/](http://www.oceanscience.net/estuaries/)) indicate that Allen, Saquatucket and Wychmere Harbors exceed their critical threshold for nitrogen, resulting in impaired water quality. A Total Maximum Daily Load (TMDL) for nitrogen has not yet been established for any of these embayments.

## Allen Harbor

- **MEP TECHNICAL REPORT STATUS:** Final
- **TMDL STATUS:** In Progress
- **TOTAL WASTEWATER FLOW:** 27 MGY (million gal per year)
  - Treated WW Flow: 2 MGY
  - Septic Flow: 25 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 2,779 kg/Y (kilograms per year)
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 2,492 kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
  - 86% Septic Systems
  - 5% Lawn Fertilizer
  - 7% Stormwater from Impervious Surfaces
  - 2% Golf Course Fertilizers

## CONTRIBUTING TOWN

- HARWICH

## THE MEP RESTORATION SCENARIO

- **WATERSHED TOTAL REDUCTION TARGET:** 63%
- **WATERSHED SEPTIC REDUCTION TARGET:** 74%  
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

## ALLEN HARBOR ESTUARY

- **EMBAYMENT AREA:** 23 acres
- **EMBAYMENT VOLUME:** 8 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Not listed
  - [www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf](http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf)

## ALLEN HARBOR WATERSHED

- **ACRES:** 278
- **PARCELS:** 351
- **% DEVELOPED RESIDENTIAL PARCELS:** 79%
- **PARCEL DENSITY:** .79 acres per parcel (approx.)
- **WASTEWATER TREATMENT FACILITIES:** 1
  - 1 groundwater discharge permit- Harwich Laundry

Allen, Wychmere and Saquatucket Harbors are a set of separate small embayments with shorelines located entirely in the Town of Harwich and with outlets to Nantucket Sound. Unlike Wychmere and Saquatucket Harbors, Allen Harbor includes a small tributary called Oyster Creek. Allen, Saquatucket and Wychmere Harbors support a variety of recreational uses including boating, swimming, shell fishing and fin fishing.

## Saquatucket Harbor

- **MEP TECHNICAL REPORT STATUS:** Completed
- **TMDL STATUS:** Approved fecal coliform. In progress for completion of nutrients.
- **TOTAL WASTEWATER FLOW:** 82 MGY
  - Treated WW Flow: 0 MGY
  - Septic Flow: 82 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 10,583 kg/Y
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 6,349 kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
  - 79% Septic Systems
  - 5% Lawn Fertilizer
  - 7% Stormwater From Impervious Surfaces
  - 5% Golf Course Fertilizer
  - 3% Cranberry Fertilizer
  - 1% Farm Animal Loads

### CONTRIBUTING TOWNS

- **HARWICH:** 100%

### THE MEP RESTORATION SCENARIO

- **WATERSHED TOTAL NITROGEN REDUCTION TARGET:** 46%

- **WATERSHED SEPTIC REDUCTION TARGET:** 60%  
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

### SAQUATUCKET HARBOR ESTUARY

- **EMBAYMENT AREA:** 13 acres
- **EMBAYMENT VOLUME:** 7 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Category 4a for fecal coliform
  - Category 4a: TMDL is completed
  - [www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf](http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf)

### SAQUATUCKET HARBOR WATERSHED

- **ACRES:** 1,763
- **PARCELS:** 1,327
- **% DEVELOPED RESIDENTIAL PARCELS:** 79%
- **PARCEL DENSITY:** 1.3 acres per parcel (approx.)
- **WASTEWATER TREATMENT FACILITIES:** 0

## Wychmere Harbor

- **MEP TECHNICAL REPORT STATUS:** Completed
- **TMDL STATUS:** In Progress

- **TOTAL WASTEWATER FLOW:** 10 MGY
  - Treated WW Flow: 0 MGY
  - Septic Flow: 10 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 1,483 kg/Y
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 1,483 kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
  - 83% Septic Systems
  - 4% Lawn Fertilizer
  - 2% Wastewater Treatment Facilities
  - 6% Golf Course Fertilizers
  - 5% Cranberry Fertilizer

### CONTRIBUTING TOWNS

- **HARWICH:** 100%

### THE MEP RESTORATION SCENARIO

- **WATERSHED TOTAL NITROGEN REDUCTION TARGET:** 83%
- **WATERSHED SEPTIC REDUCTION TARGET:** 100%  
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

## LOCAL PROGRESS

### TOWN OF HARWICH

The Draft Comprehensive Wastewater Management Plan (CWMP) for Harwich, submitted for review in 2012, proposes wastewater collection in the Allen, Saquatucket

and Wychmere Harbors watersheds as part of Phases 6 and 8, to be completed by 2038. The CWMP also proposes a review of the water quality criteria for these coastal “boat basins,” which could change the degree of restoration necessary. The Harwich CWMP includes both structural and non-structural interventions, such as the use of stormwater best management practices (BMPs),

enhanced natural attenuation, and permeable reactive barriers (PRBs) to reduce wastewater collection.

The Harwich CWMP also recognizes several areas for wastewater infrastructure for non- nitrogen issues.

Local efforts in Harwich are described in Chapter 6.

WYCHMERE HARBOR ESTUARY

- **EMBAYMENT AREA:** 14 acres
- **EMBAYMENT VOLUME:** 7 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Not Listed
  - [www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf](http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf)

WYCHMERE HARBOR WATERSHED

- **ACRES:** 107
- **PARCELS:** 152
- **% DEVELOPED RESIDENTIAL PARCELS:** 79%
- **PARCEL DENSITY:** 0.7 acres per parcel (approx.)
- **WASTEWATER TREATMENT FACILITIES:** 1
  - Snow Inn, Harwich

Freshwater Sources

PONDS

- **IDENTIFIED SURFACE WATERS:** 12
- **NUMBER OF NAMED FRESHWATER PONDS:** 3
- **PONDS WITH PRELIMINARY TROPHIC CHARACTERIZATION:** 1  
(Listed In Appendix 4C, Ponds With Water Quality Data)
- **2012 INTEGRATED LIST STATUS:** None listed

STREAMS

- **SIGNIFICANT FRESHWATER STREAM OUTLETS:** 3
  - Un-named Creek:
    - Average Flow: 1,431 cubic meters per day (m3/D)
    - Average Nitrate Concentrations: .505 milligrams per liter (mg/L)
  - East Saquatucket Stream:
    - Average Flow: 3,929 (m3/D)
    - Average Nitrate Concentrations: .63 (mg/L)
  - Cold Spring Brook:
    - Average Flow: 10,328 (m3/D)
    - Average Nitrate Concentrations: .67 (mg/L)
- **DISCUSSION:** Characterization of fresh water streams like these is a regular part of the MEP technical reports. These concentrations are higher than areas of the aquifer with less than 0.05 mg/L background concentrations that are evident in public supply wells located in pristine areas. This provides evidence of the impact of non-point source nitrogen pollution from residential areas on the aquifer and receiving coastal waters.

DRINKING WATER SOURCES

- **WATER DISTRICTS:** 1
  - Harwich Water Department
- **GRAVEL PACKED WELLS:** 7
  - 6 have nitrate concentrations between 0.5 and 1 mg/L
  - 1 has nitrate concentrations between 1 and 2.5 mg/L
- **SMALL VOLUME WELLS:** 0

Degree of Impairment and Areas of Need

For the purposes of the §208 Plan Update areas of need are primarily defined by the amount of nitrogen reduction required as defined by the total maximum daily load (TMDL) and/or MEP technical report. In watersheds where a MEP technical report has been completed, but there is no finalized TMDL the need is defined by the critical nitrogen loading values as put forth in the MEP report. These were referred to above as 74%, 60% and 100% of the septic load and 63%, 46%, and 83% of the total load for Allen, Saquatucket and Wychmere Harbors, respectively. The MEP technical reports also provide a specific targeted amount of nitrogen reduction required by subwatershed (Figure 4-1 ASW Subwatersheds with Total Nitrogen Removal Targets and Figure 4-2 ASW Subwatersheds with Septic Nitrogen Removal Targets).

The nitrogen load from the watersheds exceeds the critical nitrogen thresholds, resulting in impairment of water quality in all three Harbors. The ecological health of a water body is determined from water quality, extent of eelgrass, assortment of benthic fauna, and dissolved oxygen and ranges from 1-severe degradation, 2-significantly impaired, 3-moderately impaired, 4- healthy habitat conditions.

## MEP ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

### ■ ALLEN HARBOR

- Overall Ecologic Condition: Moderately to Significantly Impaired
- Main Basin: Moderately Impaired
- Creek: Significantly Impaired

#### Sentinel Stations:

- Total Nitrogen Concentration Threshold: 0.50 mg/L
- Total Nitrogen Concentration Existing : 0.68 mg/L  
(As reported at the MEP sentinel water-quality monitoring stations)

### ■ SAQUATUCKET HARBOR

- Overall Ecologic Condition: Moderately to Significantly Impaired

#### Sentinel Stations:

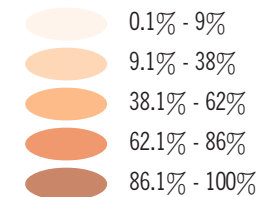
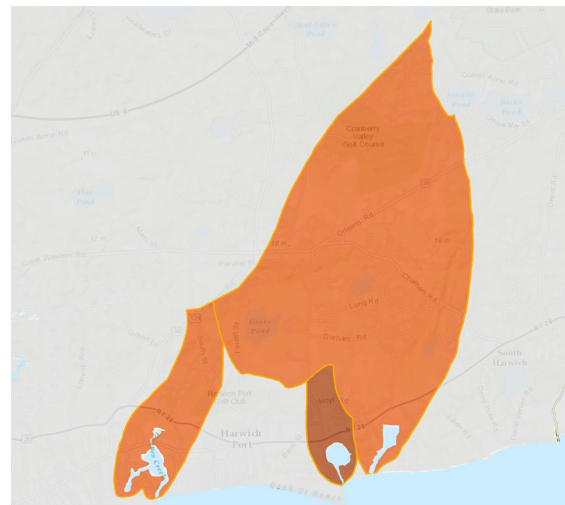
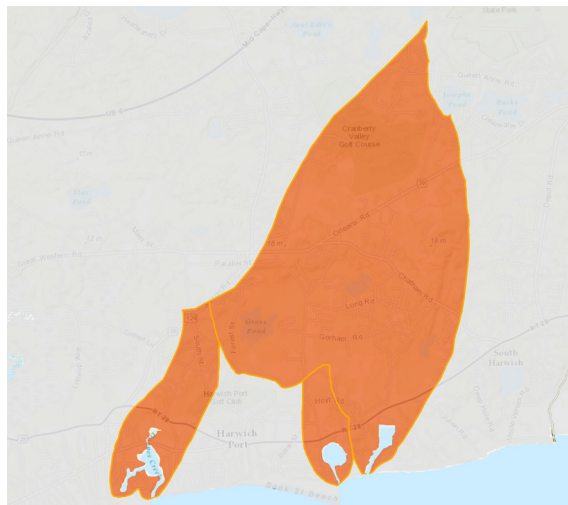
- Total Nitrogen Concentration Threshold: 0.49 mg/L
- Total Nitrogen Concentration Existing: 0.65 mg/L  
(As reported at the MEP sentinel water-quality monitoring stations)

### ■ WYCHMERE HARBOR

- Overall Ecologic Condition: Moderately to Significantly Impaired

#### Sentinel Stations:

- Total Nitrogen Concentration Threshold: 0.50 mg/L
- Total Nitrogen Concentration Existing: 0.81 mg/L  
(As reported at the MEP sentinel water-quality monitoring stations)



Subwatersheds with Total Nitrogen Removal Targets

Figure 4-1 ASW

Subwatersheds with Septic Nitrogen Removal Targets

Figure 4-2 ASW