

SELECTMEN'S MEETING AGENDA*

Donn B. Griffin Meeting Room

Regular Meeting 6:30 P.M.

Monday, June 20, 2016

AGENDA

I. CALL TO ORDER

II. NEW BUSINESS

- A. Public Hearing – A petition by Cumberland Farms, Inc. requesting permission to amend the Fuel Storage License between the Town and Cumberland Farms to replace the old underground storage tanks with new increased capacity tanks.
- B. Approve and sign General Obligation Bonds in the amount of \$3,443,000 – *discussion and possible vote*
- C. Submission of Watershed Compliance Reports and revised cover letter to the Cape Cod Commission – David Young – *discussion and possible vote*

III. ADJOURNMENT

Authorized Posting Officer:

Posted by: _____

Town Clerk

Sandra Robinson, Admin. Secretary

Date: 6/16/2016

TOWN OF HARWICH
BOARD OF SELECTMEN
NOTICE OF PUBLIC HEARING
June 20, 2016

Pursuant to M.G.L. Ch. 148, § 13, the Harwich Board of Selectmen will hold a Public Hearing on June 20, 2016, no earlier than 6:30 PM in the Donn B. Griffin meeting room, 732 Main Street, Harwich, MA in reference to the following matter:

A petition by CUMBERLAND FARMS, INC. requesting permission to amend the Fuel Storage License between the Town and Cumberland Farms to replace old underground storage tanks with new increased capacity tanks at:

574 AND 576 ROUTE 28 IN HARWICH PORT

PROPOSED: Replace old tanks with new underground gasoline and diesel storage tanks to redevelop its gas operation and increase total capacity from 24,000 gallons to 40,000 gallons

All abutters and other interested persons are invited to attend. For further information, please call the Town Administrator's Office at (508) 430-7513 or stop by Town Hall, 732 Main Street, Harwich where the information is on file.

HARWICH BOARD OF SELECTMEN

Cape Cod Chronicle
June 9, 2016

CC: Police Department
Fire Department
Town Clerk
Cumberland Farms, Inc.
Abutters



April 20, 2016

Via UPS Ground

Office of the Board of Selectmen
Town of Harwich
732 Main Street
Harwich, MA 02645

Attention: Ann

Re: Cumberland Farms
574 & 576 Route 28

Dear Ann:

Enclosed is an application to amend the fuel storage license at the above Cumberland Farms' location which has been approved by the Fire Department. In the hope that the application is approved, I have also provided an amended license for the Board's signature.

Cumberland is proposing new underground storage tanks as part of its plan to redevelop its store and gas operation, increasing total capacity from 24,000 gallons to 40,000 gallons. Plans illustrating the new site layout and tank location, as well as tank and piping specifications, are provided for the Board's review.

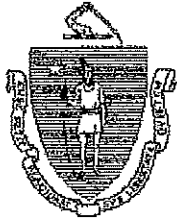
A check in the amount of \$50 was sent to Donna in the Assessor's Office on 4/14 for the list of abutters. Should she send the list to you, please feel free to email it to me at ksousa@cumberlandfarms.com. If I can be of help to you in the processing of this application, please don't hesitate to call me at 508-270-1466, as I do these all the time and would be happy to assist. Thank you, Ann.

Sincerely,

A handwritten signature in cursive script that reads "Kathleen A. Sousa".

Kathleen A. Sousa
Senior Pipeline Manager

Cumberland Farms, Inc.
100 Crossing Boulevard, Framingham, MA 01702
508-270-1400
www.cumberlandfarms.com



FP-002A
(Rev. 1.1.2015)

The Commonwealth of Massachusetts

City/Town of Harwich

Application For License

Massachusetts General Law, Chapter 148 § 13

New License Amended License

Application is hereby made in accordance with the provisions of Chapter 148 of the General Laws of Massachusetts for a license to store flammables, combustibles or explosives on land in buildings or structures herein described.

Location of Land: 574 & 576 Route 28 Map 14, Parcels S12 and W11-1

Number, Street and Assessor's Map and Parcel ID

Owner of Land: B&J Realty Associates, LLC., 14 Grove Street, Franklin, MA

Applicant: Cumberland Farms, Inc., 100 Crossing Boulevard, Framingham, MA 01702

Address of Applicant: 100 Crossing Boulevard, Framingham, MA 01702

Use and Occupancy of Buildings and Structures: Convenience store with gasoline sales

If this is an application for amendment of an existing license, indicate date of original license and any subsequent amendments

11/8/79

Attach a copy of the current license

Flammable and Combustible Liquids Flammable Gases and Solids

Complete this section for the storage of flammable and combustible liquids, solids, and gases; see 527 CMR 1.00 Table 1.12.8.50; Attach additional pages if needed. All tanks and containers are considered full for the purposes of licensing and permitting.

PRODUCT NAME	CLASS	MAXIMUM QUANTITY	UNITS gal., lbs, Cubic feet	CONTAINER UST, AST, IBC, drums
Gasoline*	IB	20,000	gal.	UST
Gasoline**	IB	12,000	gal.	UST
Diesel**	II	8,000	gal.	UST

*compartment tank

**20,000 gal. compartment tank (one of 12,000 gal. and one of 8,000 gal.)

Total quantity of all flammable liquids to be stored: 32,000 gal.

Total quantity of all combustible liquids to be stored: 8,000 gal.

Total quantity of all flammable gases to be stored: _____

Total quantity of all flammable solids to be stored: _____

LP-gas (Complete this section for the storage of LP-gas or propane)

Indicate the maximum quantity of LP-gas to be stored and the sizes and capacities of all storage containers. (See 527 1.00 Table 1.12.8.50)

❖ Maximum quantity (in gallons) of LP-gas to be stored in aboveground containers: _____

List sizes and capacities of all aboveground containers used for storage: _____

❖ Maximum quantity (in gallons) of LP-gas to be stored in underground containers: _____

List sizes and capacities of all underground containers used for storage: _____

Total aggregate quantity of all LP-gas to be stored: _____

Fireworks (Complete this section for the storage of fireworks)

Indicate classes of fireworks to be stored and maximum quantity of each class. (See 527 CMR 1.00 Table 1.12.8.50)

❖ Maximum amount (in pounds) of Class 1.3G: _____ Type/class of magazine used for storage: _____

❖ Maximum amount (in pounds) of Class 1.4G: _____ Type/class of magazine used for storage: _____

❖ Maximum amount (in pounds) of Class 1.4: _____ Type/class of magazine used for storage: _____

Total aggregate quantity of all classes of fireworks to be stored: _____

Explosives (Complete this section for the storage of explosives)

Indicate classes of explosive to be stored and maximum quantity of each class. (See 527 CMR 1.00 Table 1.12.8.50)

❖ Maximum amount (in pounds) of Class 1.1: _____ Number of magazines used for storage: _____

❖ Maximum amount (in pounds) of Class 1.2: _____ Number of magazines used for storage: _____

❖ Maximum amount (in pounds) of Class 1.3: _____ Number of magazines used for storage: _____

❖ Maximum amount (in pounds) of Class 1.4: _____ Number of magazines used for storage: _____

❖ Maximum amount (in pounds) of Class 1.5: _____ Number of magazines used for storage: _____

❖ Maximum amount (in pounds) of Class 1.6: _____ Number of magazines used for storage: _____

I, Kathleen A. Sousa, Senior Pipeline Mgr of Cumberland Farms, Inc. hereby attest that I am authorized to make this application. I acknowledge that the information contained herein is accurate and complete to the best of my knowledge and belief. I acknowledge that all materials stored pursuant to any license granted hereunder must be stored or kept in accordance with all applicable laws, codes, rules and regulations, including but not limited to Massachusetts Chapter 148, and the Massachusetts Fire Code (527 CMR 1.00). I further acknowledge that the storage of any material specified in any license granted hereunder may not exceed the maximum quantity specified by the license.

Cumberland Farms, Inc.

Signature By: Kathleen Sousa Date 3/10/2016 Name Kathleen A. Sousa, Senior Pipeline Mgr
Kathleen A. Sousa

Fire Department Use Only

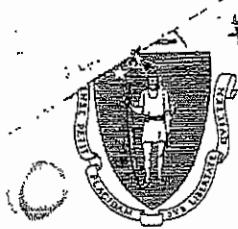
I, Daniel Malone, Head of the Haverhill Fire Department endorse this application with my

Approval Disapproval

Signature of Head of the Fire Department [Signature]

Date 3/16/2016

Recommendations: _____



#2116

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC SAFETY—DIVISION OF FIRE PREVENTION
1010 COMMONWEALTH AVENUE, BOSTON

Harwich November 8, 19 79
(City or Town) (Date)

LICENSE

In accordance with the provisions of Chapter 148 of the General Laws, a license is hereby granted to use the land herein described for the lawful use of the building... or other structure... which is/are or is/are to be situated thereon, and as described on the plot plan filed with the application for this license.

Location of land 578 Main St., Harwich Port Nearest cross street Bank Street
Owner of land Bay Colony Realty Assocs. Address 777 Dedham St., Canton, Mass.
Number of buildings or other structures to which this license applies One (1)
Occupancy or use of such buildings Food store with gasoline facility
Total capacity of tanks in gallons:—Aboveground Underground 24,000
Kind of fluid to be stored in tanks Gasoline
Restrictions—If any:

Signature of Dan B. Griffin
(Signature of licensing authority)

THIS LICENSE OR A PHOTOSTATIC OR CERTIFIED COPY THEREOF MUST BE CONSPICUOUSLY POSTED IN A PROTECTED PLACE ON THE LAND FOR WHICH IT IS GRANTED

Cumberland Farms, Inc.
100 Crossing Boulevard, Framingham, MA 01702
508-270-1400
www.cumberlandfarms.com



OWNER'S AUTHORIZATION

**Cumberland Farms, Inc.
576 Main Street, Route 28, Harwich, MA
Parcel ID 14-W11-1-0-R**

B&J Realty Associates LLC is the current owner of the property referenced above. The undersigned hereby confirms the owner's consent to the filing and processing of applications, etc., by Cumberland Farms, Inc., and its agents.

B&J Realty Associates LLC

By:  _____

Title: Manager

Date: March 4, 2016



TOWN OF HARWICH

OFFICE OF THE TREASURER/COLLECTOR

732 MAIN STREET, HARWICH, MA 02645

TEL: 508-430-7501 FAX: 508-430-7504

Amy Bullock
Treasurer / Collector

Nancy Knepper
Assistant Treasurer/Collector

Memorandum

June 14, 2016

To: Harwich Board of Selectmen

From: Amy Bullock, Treasurer

Re: \$3,443,000 General Obligation Bond Anticipation Note

Sale Date: 6/9/2016

Dated Date: 6/24/2016

Delivery Date: 6/24/2016

Due Date: 6/22/2017

In order to fulfill the requirements of the General Obligation Bond Anticipation Note please proceed as follows:

- 1.) The Board of Selectmen are required to take the vote as described in the document titled "Vote of the Board of Selectmen". Four copies of such are enclosed requiring the signature of the Secretary to the Board of Selectmen where indicated.
- 2.) The Board of Selectmen are required to sign four copies of the "Tax Certificate" for the Town of Harwich, Massachusetts \$3,443,000 where indicated.
- 3.) The Board of Selectmen are required to sign four copies of the "Significant Events Disclosure Certificate" where indicated.
- 4.) The Board of Selectmen are required to sign the Town of Harwich General Obligation Bond Anticipation Note where indicated.

Town of Harwich, Massachusetts

\$3,443,000 General Obligation Bond Anticipation Notes

Sale Date: 6/9/2016
Dated Date: 6/24/2016
Delivery Date: 6/24/2016
Due Date: 6/22/2017
Days Per Year: 360
Day Count: 358
Bank Qualified: Yes
Rating: None



Bidder	Principal	Coupon Rate	Premium	Interest	Net Interest	NIC	Prorata Premium	Prorata Interest	Award	Reoffering Yield
Cape Cod Five Cents Savings Bank	\$3,443,000	1.15%	\$11,950.00	\$39,374.53	\$27,424.53	0.8010%	\$11,950.00	\$39,374.53	\$3,443,000	
Century Bank	\$3,443,000	1.15%	\$10,329.00	\$39,374.53	\$29,045.53	0.8483%				
Eastern Bank	\$3,443,000	2.00%	\$38,320.59	\$68,477.44	\$30,156.85	0.8808%				
Jefferies LLC	\$3,443,000	2.00%	\$31,780.00	\$68,477.44	\$36,697.44	1.0718%				
Award Totals							\$11,950.00	\$39,374.53	\$3,443,000	

Weighted Average Net Interest Cost: 0.8010%

MUNICIPAL PURPOSE LOAN

Town of Harwich, Massachusetts

\$3,443,000 General Obligation Bond Anticipation Notes

Sale Date: 6/9/2016
 Dated Date: 6/24/2016
 Delivery Date: 6/24/2016
 Due Date: 6/22/2017
 Bank Qualification: Yes



Purpose	Vote Date(s)	Reference	Amount Authorized	Previous Issues	Bonds, Grants, and/or Paydowns	Renewal This Issue	New This Issue	Total This Issue	Balance Unissued	Original Issue Date	Prorate Interest	Prorate Premium	
Greensands Well	5/3/10, 5/6/13 & 5/6/14	Ch. 44, s. 6(4)	\$3,500,000	\$150,000	\$3,350,000	\$150,000	\$0	\$150,000	\$0	6/26/2014	\$1,715.42	\$520.62	
Roads	5/6/2013	Ch. 44, s. 7(5)	\$500,000	\$300,000	\$200,000	\$300,000	\$0	\$300,000	\$0	6/26/2014	\$3,430.83	\$1,041.24	EXEMPT
Road Maintenance Program	5/5/2014	Ch. 44, s. 7(5)	\$500,000	\$400,000	\$100,000	\$400,000	\$0	\$400,000	\$0	6/26/2015	\$4,574.44	\$1,288.32	EXEMPT
Wychmere Harbor Piers & Bulkheads	5/5/2014	Ch. 44, s. 7(3)	\$1,704,000	\$418,000	\$60,000	\$418,000	\$0	\$418,000	\$1,226,000	6/26/2015	\$4,780.28	\$1,450.80	
Land Acquisition- Downey	5/5/2014	Ch. 44, s. 7(3)	\$825,000	\$825,000	\$0	\$825,000	\$0	\$825,000	\$0	8/26/2015	\$9,434.79	\$2,863.42	EXEMPT
Skinnequit Road Betterments	5/6/2013	Ch. 44, s. 7(5)	\$172,000	\$0	\$0	\$0	\$100,000	\$100,000	\$72,000	6/24/2016	\$1,143.61	\$347.08	
Saquetucket Harbor Dock Replacement	5/4/2015	Ch. 44, s. 7(2)	\$500,000	\$0	\$0	\$0	\$500,000	\$500,000	\$0	6/24/2016	\$5,718.06	\$1,735.41	EXEMPT
Road Maintenance	5/4/2015	Ch. 44, s. 7(5)	\$250,000	\$0	\$0	\$0	\$250,000	\$250,000	\$0	8/24/2016	\$2,859.03	\$867.70	EXEMPT
Muddy Creek Bridge & Culvert	5/4/2015	Ch. 44, s. 7(1) & 7(4)	\$500,000	\$0	\$0	\$0	\$500,000	\$500,000	\$0	6/24/2016	\$5,718.06	\$1,735.41	EXEMPT
Totals			\$6,451,000	\$2,083,000	\$3,710,800	\$2,093,000	\$1,350,000	\$3,443,000	\$1,288,000		\$30,374.53	\$11,950.30	

TOWN OF  HARWICH
Harwich, Massachusetts
02645

June 14, 2016

Ms. Patty Daley, Deputy Director
Cape Cod Commission
P.O. Box 226
3225 Main Street
Barnstable, MA 0263

Subject: Watershed Reports – Harwich, Massachusetts

Dear Ms. Daley,

As required in the Cape Cod Area Wide Water Quality Management Plan Update, the “Section 208 Plan Update”, the Town of Harwich acting through its Board of Selectmen who are the designated Wastewater Treatment Management Agency (WMA) is pleased to submit the watershed reports for which they are responsible. With the Section 208 Plan Update certified by Governor Charlie Baker in June 2015, WMAs had 12 months to develop “watershed reports” that outline potential scenarios to address water quality issues for each of their watersheds. Enclosed you will find the reports for watersheds that fall in whole or in part within the Town of Harwich.

Since 2007, Harwich has been working through its Wastewater Implementation Committee (WIC), and predecessor committees, and its consultant, CDM Smith, to develop a recommended wastewater management plan. A recommended wastewater management scenario was identified and a Draft Comprehensive Wastewater Management Plan (CWMP) filed with the Massachusetts Environmental Policy Act (MEPA) office and the Cape Cod Commission (CCC) in February 2013. Over the past three years the Town continued to fine tune the program phasing, review nontraditional technologies put forth in the 208 Plan Update and develop a cost recovery policy plan. In March 2016 the Final CWMP was filed with MEPA and the CCC for regulatory approval. The Development of Regional Impact (DRI) review will begin with the CCC once that process is complete.

Building on its recommended wastewater management plan and the watershed report template provided in Appendix 8D of the Section 208 Plan Update, Harwich has developed watershed reports for each of the following watersheds:

1. Allen Harbor
2. Wychmere Harbor
3. Saquatucket Harbor
4. Herring River
5. Pleasant Bay

At its May 4, 2016 meeting, the WIC discussed and approved the draft watershed reports. In addition, the Town of Harwich Board of Selectmen acting as the designed WMA approved the watershed reports at its meeting on May 31, 2016.

The reports are attached for your review. Please contact me at (508) 430-7513, or our consultant David Young of CDM Smith at (617) 452-6544 or youngdf@cdmsmith.com if you have any questions or need additional information.

Sincerely,

Christopher Clark, Town Administrator
Town of Harwich

CC: David Young, CDM Smith

Watersheds: Lower Cape

Water Threat Level: Moderate

Allen, Wychmere and Saquatucket

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.

Allen Harbor is a simple estuary located entirely within the Town of Harwich, comprised of a small tributary basin near the inlet called Oyster Creek, where tidal waters enter from Nantucket Sound. Open water area is 19 acres.

Wychmere Harbor is a simple estuary located entirely within the Town of Harwich which is comprised of a small marina and a single outlet. Flushing with Nantucket Sound occurs through a canal bounded by jetties, which was dredged to be navigable in 1887.

Saquatucket harbor was formed by tidal flooding of channels within the outwash deposits of a stream.

The Allen, Wychmere and Saquatucket Harbors support a variety of recreational uses including boating, swimming, shell fishing and fin fishing.

The Problem

The Massachusetts Estuaries Project (MEP) technical reports (available at 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 been drafted by MassDEP and US EPA for these embayments and is pending.

Allen Harbor

- MEP Technical Report Status: Final
- TMDL Status: Pending (Draft TMDLs issued April 2015)
- Total Wastewater Flow: 23.1 MGY (million gal per year)

- ⊛ Treated WW Flow: 0.1 MGY
- ⊛ Septic Flow: 23 MGY



- Unattenuated Total Nitrogen Load (MEP): 2,779 Kg/Y (kilograms per year)
- Attenuated Total Nitrogen Load (MEP): 2,492 Kg/Y
- MEP Sources of Controllable Nitrogen
 - ✪ 86% Septic Systems
 - ✪ 7% Impervious Surfaces
 - ✪ 5% Residential Lawn Fertilizer
 - ✪ 2% Golf Fertilizer

CONTRIBUTING TOWNS

- Harwich

THE MEP RESTORATION SCENARIO

- Watershed Total Nitrogen Reduction Target: 63%
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)
- Watershed Septic Reduction Target: 74%

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

ALLEN HARBOR WATERSHED

- Acres: 303
- Parcels: 358
- % Developed Residential Parcels: 79%
- Parcel Density: 0.85 acres per parcel (approx.)
- Wastewater Treatment Facilities: 1

- ✦ Harwich Laundry and Cleaners

Saquatucket Harbor

- MEP Technical Report Status: Final
- TMDL Status: Pending for nutrients (Draft TMDLs issued April 2015). Approved fecal coliform.
- Total Wastewater Flow: 83 MGY (million gal per year)
 - ✦ Treated WW Flow: 0 MGY
 - ✦ Existing Septic Flow: 114 MGY
- Unattenuated Total Nitrogen Load (MEP): 10,583 Kg/Y (kilograms per year)
- Attenuated Total Nitrogen Load (MEP): 6,349 Kg/Y
- MEP Sources of Controllable Nitrogen
 - ✦ 79% Septic Systems
 - ✦ 7% Impervious Surfaces
 - ✦ 5% Residential Lawn Fertilizer
 - ✦ 8% Golf/Cranberry Fertilizer
 - ✦ 1% Farm/Animal

CONTRIBUTING TOWNS

- Harwich

THE MEP RESTORATION SCENARIO

- Watershed Total Nitrogen Reduction Target: 46%
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)
- Watershed Septic Reduction Target: 60%

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

SAQUATUCKET HARBOR WATERSHED

- Acres: 1,796
- Parcels: 1,442
- % Developed Residential Parcels: 79%
- Parcel Density: 1.2 acres per parcel (approx.)
- Wastewater Treatment Facilities: 0

Wychmere Harbor

- MEP Technical Report Status: Final
- TMDL Status: Pending (Draft TMDLs issued April 2015)
- Total Wastewater Flow: 16 MGY (million gal per year)
 - ★ Treated WW Flow: 8 MGY
 - ★ Septic Flow: 8 MGY
- Unattenuated Total Nitrogen Load (MEP): 1,483 Kg/Y (kilograms per year)
- Attenuated Total Nitrogen Load (MEP): 1,483 Kg/Y
- MEP Sources of Controllable Nitrogen
 - ★ 83% Septic Systems
 - ★ 6% Residential Lawn Fertilizer
 - ★ 5% Cranberry Fertilizer
 - ★ 4% Residential Lawn Fertilizer
 - ★ 2% WWTF

CONTRIBUTING TOWNS

- Harwich

THE MEP RESTORATION SCENARIO

- Watershed Total Nitrogen Reduction Target: 83%
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)



- Watershed Septic Reduction Target: 100%

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

WYCHMERE HARBOR WATERSHED

- Acres: 101
- Parcels: 123
- % Developed Residential Parcels: 79%
- Parcel Density: 0.8 acres per parcel (approx.)
- Wastewater Treatment Facilities: 1

★ Snow Inn

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 (Discharged to Allens Harbor):

- ✦ Average Flow: 1,905 cubic meters per day (m³/d)
- ✦ Average Nitrate Concentrations: 0.505 milligrams per liter (mg/L)

East Saquatucket Stream (Discharges to Saquatucket Harbor):

- ✦ Average Flow: 3,929 m³/d
- ✦ Average Nitrate Concentrations: 0.63 mg/L

Cold Stream Brook (Discharges to Saquatucket Harbor):

- ✦ Average Flow: 10,328 m³/d
- ✦ Average Nitrate Concentrations: 0.67 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

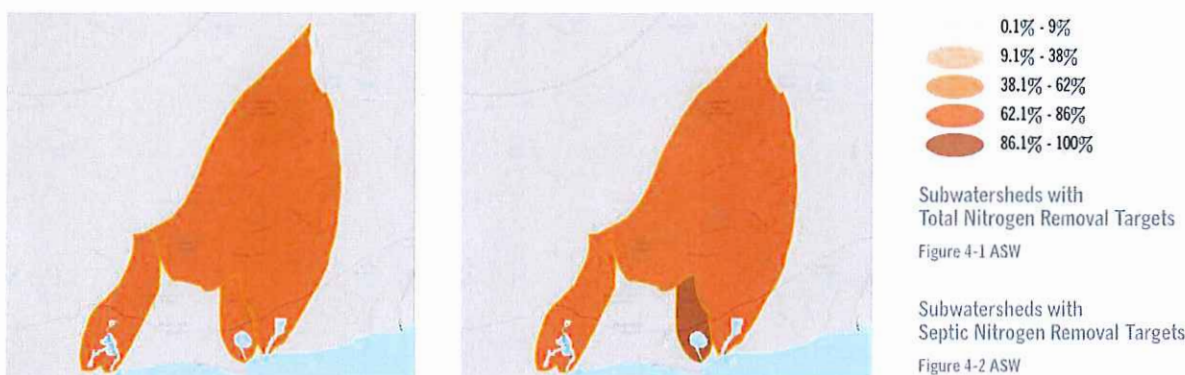
- Water Districts: 1
 - ✦ Harwich Water Department
- Gravel Packed Wells: 7
 - ✦ 6 have nitrate concentrations between 0.5 and 1 mg/L
 - ✦ 1 has nitrate concentrations between 1 and 2.5 mg/L
- Small Volume Wells: 0

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: 0.67-0.82 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: 0.50 mg/L
- Total Nitrogen Concentration Existing: 0.66 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)

LOCAL PROGRESS

HARWICH

All three watersheds are located solely within the Town of Harwich. The town submitted its Draft Comprehensive Wastewater Management Plan (CWMP) for review in 2013 and the Final CWMP Single Environmental Impact Report (SEIR) in March 2016 (MEPA approval certificate issued May 13, 2016). The CWMP proposes wastewater collection in Allens Harbor, Saquatucket Harbor and Wychmere Harbor watersheds. Harwich's recommended wastewater program has sewered components but the core system includes a collection and conveyance system utilizing two centralized treatment facilities. The Harwich CWMP proposes sewerage in Allen Harbor and Wychmere Harbor (including the Route 28 area outside of MEP) in Phase 6 and Saquatucket Harbor (also including the Campground area) in Phase 8 to be completed by 2042 and 2052 respectively. Collected wastewater will be pumped to the HR-12 site for treatment and recharge. The Harwich CWMP includes both structural and non-structural interventions such as use of stormwater best management practices (BMPs), open space acquisition, enhanced natural attenuation, and permeable reactive barriers (PRBs) to reduce wastewater collection.

Local efforts in Harwich are described in Chapter 2.

Potential Watershed Scenarios

HYBRID

The Town of Harwich has submitted their final CWMP/SEIR; as such a chosen alternative was presented which was chosen working closely with the Wastewater Implementation Committee (WIC) and the Board of Selectmen (BOS). Since 2007, these efforts have been coordinated predominantly by the WIC and BOS. The resultant recommended program for implementation by the community will be phased over the next 40 years. The chosen scenario was ultimately recommended as the preferred scenario because it allows for multiple effluent recharge sites in different watersheds, allows for easier phasing with adaptive management, presents a regional solution between the Towns of Harwich and Chatham (and potentially Dennis in the future), and reduces the overall size of the facilities in Harwich. It also allows infrastructure components to be implemented, results monitored and the later program phases adapted as needed. The recommended non-infrastructure program components which include fertilizer and stormwater management programs, potential land use changes, open space acquisition, and several community involved conservation and pollution reduction programs.

CREDITS

- Stormwater
- ☒ None, implement Best Management Practices (BMPs) recommended in CWMP/SEIR

- Fertilizer
 - ⊕ None, continue fertilizer education recommended in CWMP/SEIR

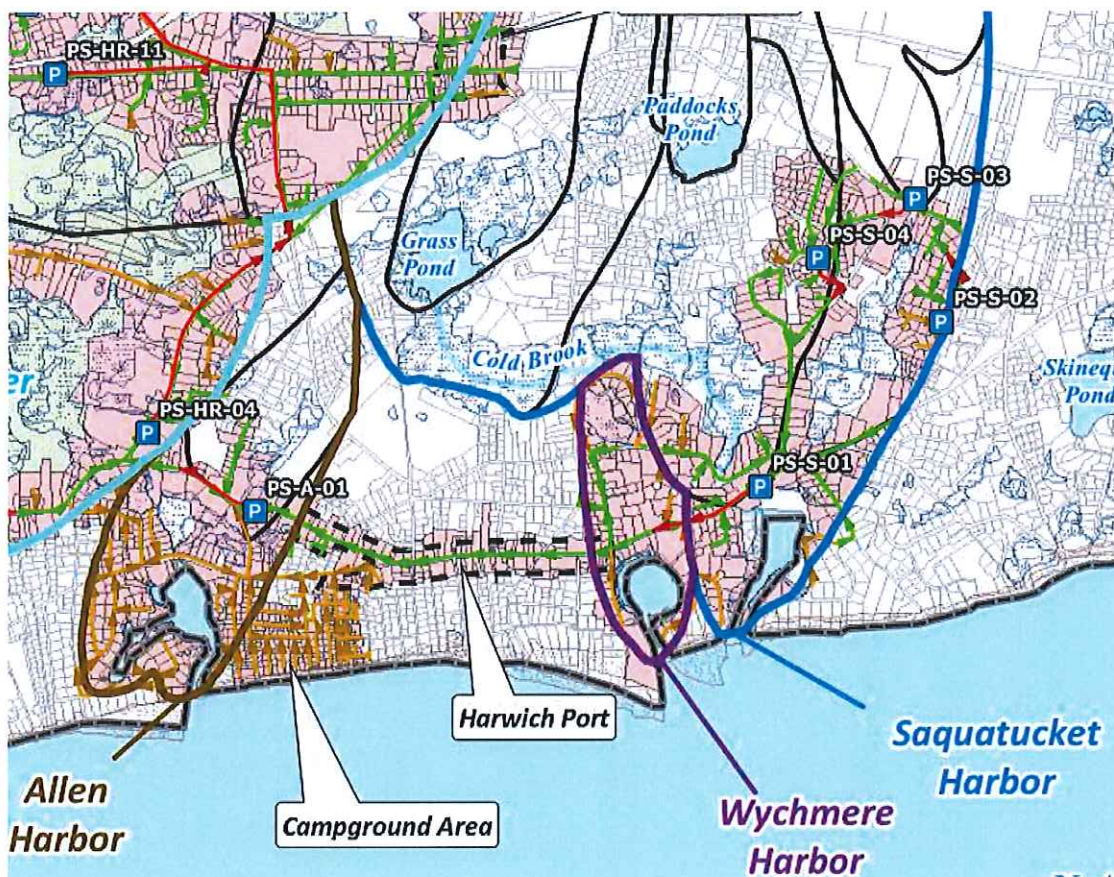
SCENARIO DETAILS (ALLEN, SAQUATUCKET, AND WYCHMERE HARBOR WATERSHEDS)

- Number of properties sewered: 1,132 (also includes Route 28 Outside of MEP and the Campground area)
- Flow collected (MGY): 98 (includes build-out and estimated I/I)

COST (HARWICH)

- Collection
 - Collection System Cost: \$154,400,000
 - Collection System Cost in Chatham (Harwich Share of System Developed by GHD): \$2,400,000
- Transport: Included in Operations and Maintenance costs, shown below
- Treatment and Disposal
 - Chatham Treatment Facility Expansion Cost: \$9,200,000
 - HR – 12 and PB-3 Facility Cost: \$56,300,000
- Annual Operations and Maintenance
 - Chatham Treatment Facility O&M Costs: \$ 260,000
 - Harwich Collection System O&M Costs: \$910,000
 - Treatment System O&M (HR-12 Facility): \$1,800,000

Chosen Scenario: Allen, Saquatucket, and Wychmere Harbor Watersheds Recommended Plan Overview



Legend

-  Force Main
-  Pressure Sewer
-  Gravity Sewer
-  Pumping Station
-  Treatment / Effluent Recharge
-  Area to be Sewered
-  Areas with Significant Wetlands
-  Village Center
-  Subwatershed Boundaries
-  Coastal Wetlands
-  Inland Wetlands



Watershed Report Figure_Harwich_Fig 13-1Recommended_Plan_Overview_20160324.pdf

Watersheds: Lower Cape

Water Threat Level: Moderate

Herring River (Harwich)

The Herring River is a large estuary with shoreline located in the Town of Harwich. The Herring River has a tidal reach that extends approximately 3 miles to West Reservoir. The River is fed by freshwater streams including the upper Herring River that extends through Hinckleys Pond to Long Pond, and Coy Brook that extends east to Walker Pond. According to the Massachusetts Estuaries Project (MEP), the Herring River is functionally a wetland with salt marsh dominant along the river's lower and mid reaches and brackish to fresh water in its upper marsh.

The Problem

According to the Final Massachusetts Estuaries Project (MEP) technical report (available at www.oceanscience.net/estuaries/) the Herring River system exceeds its critical threshold for nitrogen, resulting in impaired water quality. A nitrogen total maximum daily load (TMDL) has been drafted by MassDEP and US EPA for the Herring River system and is pending.

- MEP Technical Report Status: Final
- TMDL Status: Pending (Hearing held in 2015)
- Total Wastewater Flow: 234 MGY (million gal per year)
 - ✪ Treated WW Flow: 17 MGY
 - ✪ Septic Flow: 217 MGY
- Unattenuated Total Nitrogen Load (MEP): 41,340 Kg/Y (kilograms per year)
- Attenuated Total Nitrogen Load (MEP): 23,164 Kg/Y
- MEP Sources of Controllable Nitrogen
 - ✪ 68% Septic Systems
 - ✪ 5% Lawn Fertilizer
 - ✪ 7% Stormwater from Impervious Surfaces
 - ✪ 4% Cranberry Fertilizer
 - ✪ 7% Impervious Surfaces
 - ✪ 10% Landfill



CONTRIBUTING TOWNS

- Brewster
- Harwich
- Dennis

THE MEP RESTORATION SCENARIO

- Watershed Total Nitrogen Reduction Target: 24%
 - Watershed Septic Reduction Target: 38%
- (The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

HERRING RIVER (HARWICH) ESTUARY

- Embayment Area: 45 acres
 - Embayment Volume: 26 million cubic feet
 - 2012 Integrated List Status: Category 4A for fecal coliform
- ★ Category 4a: TMDL is completed, EPA TMDL No. 36772
 - ★ www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf

HERRING RIVER (HARWICH) WATERSHED

- Acres: 7,100
 - Parcels: 4,243
 - % Developed Residential Parcels: 72%
 - Parcel Density: 1.7 acres per parcel (approx.)
 - Wastewater Treatment Facilities: 2
- ★ Cranberry Point Nursing Home
 - ★ Harwich Middle and Elementary Schools



Freshwater Sources

PONDS

- Identified Surface Waters: 44
- Number of Named Freshwater Ponds: 27
- Ponds With Preliminary Trophic Characterization: 18
(Listed In Appendix 4C, Ponds With Water Quality Data)
- 2012 Integrated List status: 3 (Long Pond, Hinckleys Pond, and Herring River)

STREAMS

- Significant freshwater stream outlets: 2

Herring Run:

- ✪ Average Flow: 42,111 cubic meters per day (m³/d)
- ✪ Average Nitrate Concentrations: 0.12 milligrams per liter (mg/L)

Lothrop Road:

- ✪ Average Flow: 20,533 m³/d
- ✪ Average Nitrate Concentrations: 0.15 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: 3
 - ✪ Harwich Water Department
 - ✪ Brewster Water Department
 - ✪ Dennis Water District
- Gravel Packed Wells: 2

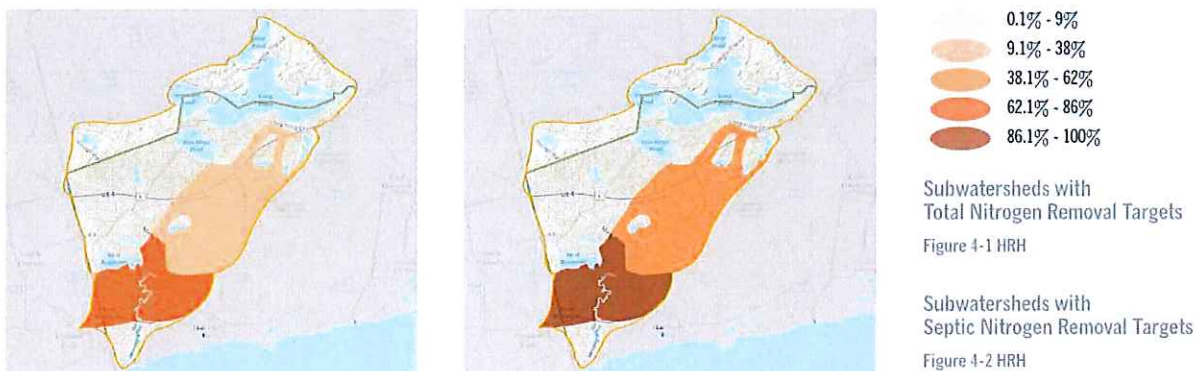
- ★ I has nitrate concentrations between 1 and 2 mg/L
- ★ I has no public data

- Small Volume Wells: 0

Degree of Impairment and Areas of Need

For the purposes of the Section 208 Plan Update areas of need are primarily defined by the amount of nitrogen reduction required as defined by the TMDL and/or MEP technical report. The aggregated watershed removal rates for the Herring River watershed are 24% and 38% for total watershed nitrogen loads and septic nitrogen loads, respectively. More specifically the targeted amount of nitrogen reduction required by subwatershed is shown in Figure 4-1 HRH Subwatersheds with Total Nitrogen Removal Targets and Figure 4-2 HRH Subwatersheds with Septic Nitrogen Removal Targets.

Habitat in the Herring River system ranges from healthy in the upper marsh system to significantly impaired in the lower portion of the estuary due to eelgrass loss. 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

- MEP Ecological Characteristics and Water Quality
 - ★ Overall Ecologic Condition: Healthy to Significantly Impaired
 - ★ Tidal Wetlands (Upper Estuary) – West: Healthy
 - ★ Tidal Wetlands (Upper Estuary) – Main Creek: Healthy
 - ★ Tidal Wetlands (Upper Estuary) – East: Healthy
 - ★ Tidal River (Lower Estuary): Significantly Impaired
 - ★ Sentinel Total Nitrogen Concentration Threshold: 0.370 mg/L
 - ★ Sentinel Total Nitrogen Concentration Existing: 0.48-0.97 mg/L
(As reported at the MEP sentinel water-quality monitoring station)

LOCAL PROGRESS

Updates for all towns that contribute to the watershed are provided below; however since the town of Harwich contributes the majority of the nitrogen load to the watershed, the alternative presented below only addresses the plans for the town of Harwich.

HARWICH

The Town of Harwich contributes approximately 90% of the attenuated wastewater nitrogen load to the Herring River watershed. The town submitted its Draft Comprehensive Wastewater Management Plan (CWMP) for review in 2013 and the Final CWMP Single Environmental Impact Report (SEIR) in March 2016 (MEPA approval certificate issued May 13, 2016). Harwich's recommended wastewater program has sewer components but the core system includes a collection and conveyance system utilizing two centralized treatment facilities. The Harwich CWMP proposes treatment and disposal facilities in the Herring River watershed as part of phases 4A, 4B, 5, 6, and 7 to be completed by 2028, 2032, 2037, 2042 and 2047 respectively. The Harwich CWMP includes both structural and non-structural interventions such as use of stormwater best management practices (BMPs), open space acquisition, enhanced natural attenuation, and permeable reactive barriers (PRBs) to reduce wastewater collection.

BREWSTER

The Town of Brewster contributes approximately 4% of the attenuated wastewater nitrogen load to the Herring River watershed. The significant level of natural attenuation attributed by the MEP to ponds and streams in the upper portions of the Herring River watershed are responsible for the low nitrogen contribution from Brewster reaching the Herring River. The town is presently developing an Integrated Water Resource Management Plan (IWRMP). Phase II of the IWRMP was issued in 2013 with subsequent updates in 2015 with assessments and recommendations addressing nitrogen loading, existing and future drinking water, stormwater and freshwater pond needs.

DENNIS

The Town of Dennis, specifically portions of Dennisport, contributes approximately 6% of the attenuated wastewater nitrogen load to the Herring River watershed. To date, Dennis has identified a nitrogen management scenario, but continues to pursue community partnership options with Harwich and Yarmouth to achieve cost savings and more efficient wastewater collection, treatment and disposal. The Dennis Comprehensive Wastewater Management Task Force will decide on the phasing of the recommended plan during the summer of 2016 and develop their Comprehensive Wastewater Management Plan (CWMP) over the next year for submittal in the summer of 2017 to the Massachusetts Environmental Policy Act (MEPA) office and Cape Cod Commission for review.

Local efforts in these towns are described in Chapter 2.

Potential Watershed Scenarios

HYBRID (HARWICH)

The Town of Harwich submitted their final CWMP/SEIR and received approval in May 2016. The recommended program detailed in the CWMP was developed by the Wastewater Implementation Committee (WIC) and the Board of Selectmen (BOS) working closely with their consultant, CDM Smith, Inc.. Since 2007, the wastewater planning efforts have been coordinated predominantly by the WIC and BOS. The resultant recommended program for implementation by the community will be phased over the next 40 years. The chosen scenario was ultimately recommended as the preferred scenario because it allows for multiple effluent recharge sites in different watersheds, allows for easier phasing with adaptive management, presents a regional solution between the Towns of Harwich and Chatham (and potentially Dennis in the future), and reduces the overall size of the facilities in Harwich. It also allows infrastructure components to be implemented, results monitored and the later program phases adapted as needed. The plan includes recommended non-infrastructure program components which include fertilizer and stormwater management programs, potential land use changes, open space acquisition, and several community involved conservation and pollution reduction programs.

CREDITS

- Stormwater
 - ✪ None, implement Best Management Practices (BMPs) recommended in CWMP/SEIR
- Fertilizer
 - ✪ None, continue fertilizer education recommended in CWMP/SEIR

SCENARIO DETAILS (HERRING RIVER WATERSHED)

- Number of properties sewered: 2,340
- Flow collected (MGY): 230 (includes build-out and estimated I/I)
- Acres of effluent recharge: 20
- Pilot PRB: A portion of an effluent recharge basin could be used to pilot a PRB for enhanced nitrogen removal from treated WWTP effluent (not included in final recommended scenario costs). Based on groundwater flow in the area surrounding the effluent recharge site at HR-12, a mat style PRB may be suitable for a pilot application so that all flow into the recharge basin will be captured. Full analysis of potential pilot PRB siting at the HR-12 recharge basin still needs to be performed and was not conducted as part of the CWMP/SEIR.

COST (HARWICH)

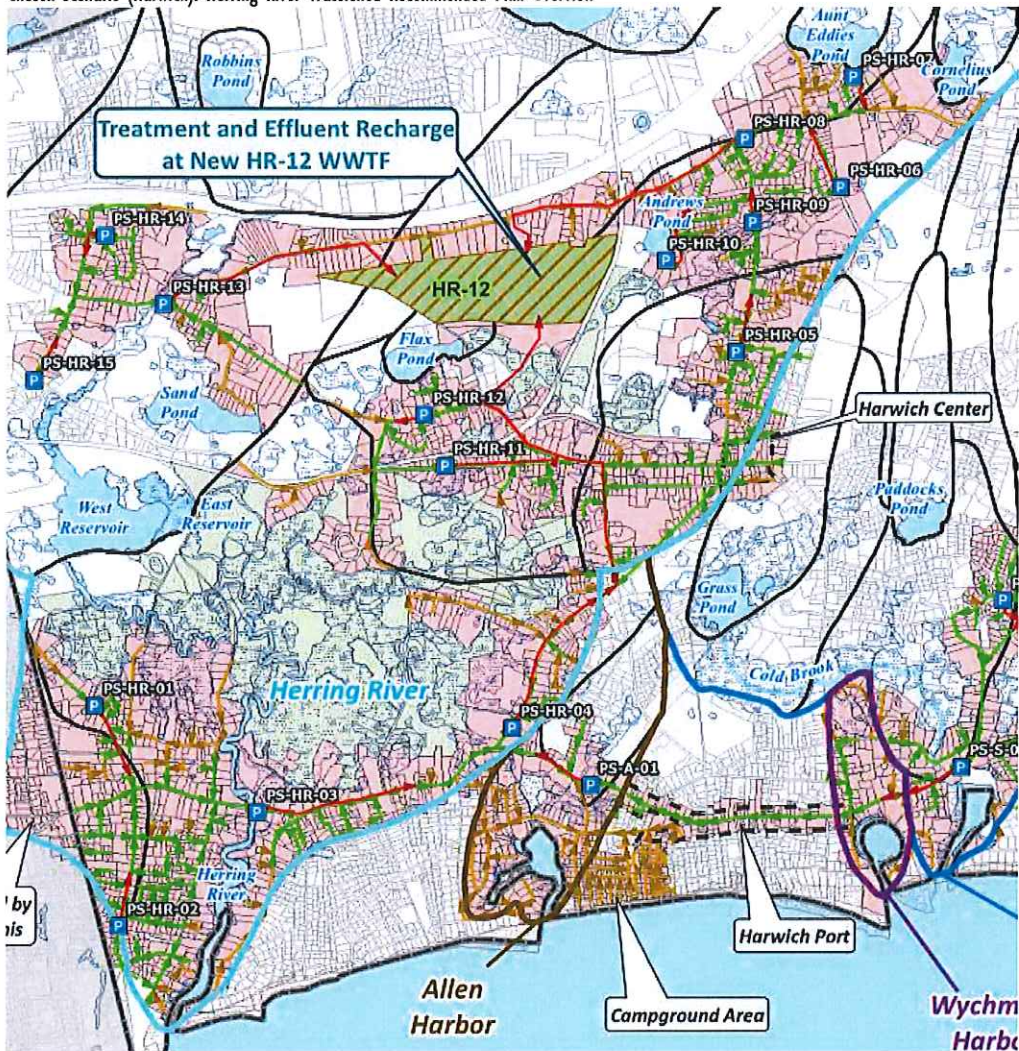
- Collection
 - Collection System Cost: \$154,400,000
 - Collection System Cost in Chatham (Harwich Share of System Developed by GHD): \$2,400,000
- Transport: Included in Operations and Maintenance costs, shown below
- Treatment and Disposal



- Chatham Treatment Facility Expansion Cost: \$9,200,000
- HR – 12 and PB-3 Facility Cost: \$56,300,000
- Annual Operations and Maintenance
 - Chatham Treatment Facility O&M Costs: \$ 260,000
 - Harwich Collection System O&M Costs: \$910,000
 - Treatment System O&M (HR-12 Facility): \$1,800,000



Chosen Scenario (Harwich): Herring River Watershed Recommended Plan Overview



Legend

- Force Main
- Pressure Sewer
- Gravity Sewer
- Pumping Station
- Treatment / Effluent Recharge
- Area to be Sewered
- Areas with Significant Wetlands
- Village Center
- Subwatershed Boundaries
- Coastal Wetlands
- Inland Wetlands



Watershed Report Figure_Harwich_Fig 13-1Recommended_Plan_Overview_20160324.pdf

WATERSHEDS: LOWER CAPE

Pleasant Bay

WATER THREAT LEVEL

HIGH

Pleasant Bay is the largest marine embayment on Cape Cod with shoreline located in the Towns of Orleans, Harwich and Chatham. The system is designated under state surface water regulations as Outstanding Resource Waters that should not be allowed to degrade. Pleasant Bay is comprised of a large basin rimmed by numerous sub-embayments, including Ryder's Cove, Muddy Creek, Quanset Pond and Pochet Neck.

The Problem

The Massachusetts Estuaries Project (MEP) technical report (available at: <http://www.oceansciences.net/estuaries/>) indicate that the nitrogen load from the Pleasant Bay watershed exceeds the thresholds and Total Maximum Daily Loads (TMDLs) for the water body, resulting in impaired water quality. There are sixteen Total Nitrogen TMDLs and three Pollution Prevention TMDLs for individual sub-embayments within the Pleasant Bay system. Pertinent milestones and data from the MEP are:

- MEP Technical Report Status: Final dated May 2006
- MEP Technical Memorandum on Muddy Creek” Dated June 2010
- TMDL Status: Final TMDL, issued May 2007
- Total Wastewater Flow: 272 MGY
 - Treated WW Flow: 17 MGY
 - Septic Flow: 255 MGY
- Unattenuated Total Nitrogen Load (MEP): 81,167 Kg/Y (kilograms per year)
- Attenuated Total Nitrogen Load (MEP): 78,001 Kg/Y
- Sources of Controllable Nitrogen (MEP):
 - 75% Wastewater
 - 16% Fertilizer
 - 9% Stormwater from Impervious Surfaces



CONTRIBUTING TOWNS

- Brewster
- Chatham
- Harwich
- Orleans
- Discussion: A portion of the land area in this watershed is within the boundaries of the Cape Cod National Seashore and any nitrogen load that results is not within control of the towns.

THE MEP RESTORATION SCENARIO

- Watershed Total Nitrogen Reduction Target: 36%
- Watershed Septic Reduction Target: 52%
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report. Percent removal targets vary from 0% to 100% by subembayment)

PLEASANT BAY ESTUARY

- Embayment Area: 6,162 acres
- Embayment Volume: 2,077 million cubic feet
- 2012 Integrated List Status: Category 4A for Total Nitrogen
 - Category 4A: TMDL is completed
 - www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf

PLEASANT BAY WATERSHED (TOTAL)

- Acres: 11,760
- Parcels: 5,796
- % Developed Residential Parcels: 79%
- Parcel Density: 2 acres per parcel (appx.)
- Wastewater Treatment Facilities: 3
 - Pleasant Bay Nursing Home, Brewster
 - Wequassett Inn, Harwich
 - Chatham Bars Inn, Chatham

Freshwater Sources

PONDS

- Identified Surface Waters: 77
- Number of Named Freshwater Ponds: 42
- Ponds With Preliminary Trophic Characterization: 24
(Listed In Appendix 4C, Ponds With Water Quality Data)
- 2012 Integrated List Status: 7 listed for fecal coliform only
- **DISCUSSION:** Water quality assessments have been critical to the 2010 implementation of alum treatments for Stillwater Pond and Lovers Lake, located in the Chatham portion of the Pleasant Bay watershed. Other detailed assessments include a water quality assessment and management recommendations for freshwater ponds in Brewster, some of which are located in the Pleasant Bay watershed, and a water quality assessment of Hawksnest Pond in Harwich, which contributes to Muddy Creek. Detailed assessments have also been conducted for Bakers Pond and Crystal and Pilgrim Lakes located in Orleans and within the Pleasant Bay watershed.

STREAMS

- Significant freshwater stream outlets: 3
 - Tar Kiln Stream:
 - Average Flow: 2,763 cubic meters per day (m³/d)
 - Average Nitrate Concentrations: 0.35 milligrams per liter (mg/L)
 - Kescayo Stream:
 - Average Flow: 981 m³/d
 - Average Nitrate Concentrations: 0.19 mg/L
 - Pah Wah Stream:
 - Average Flow: 388 m³/d
 - Average Nitrate Concentrations: 0.19 mg/L
- Discussion: 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 further 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: 3
 - Brewster Water Department
 - Harwich Water Department
 - Orleans Water Department
- Gravel Packed Wells: 15
(11 with available nitrate data)
 - 8 have nitrate concentrations less than 1 mg/L
 - 3 have concentrations between 1 and 2.5 mg/L
- Small Volume Transient Wells: 2
- Discussion: Each of the town water departments and land trusts have acquired significant portions of land within wellhead protection areas for water quality protection which, together with adopted land use controls recommended from the 1978 Section 208 water quality plan, has resulted in excellent drinking water quality.

Degree of Impairment and Areas of Need

For the purposes of the Section 208 Plan Update, areas of need are primarily defined by the amount of nitrogen reduction required as defined by the TMDL and/or MEP technical report. These are shown above as 36% of the total nitrogen load and 52% of the septic nitrogen load and, more specifically as the targeted amount of nitrogen reduction required by subwatershed in Figure 4-1 PB Subwatersheds with Total Nitrogen Removal Targets and Figure 4-2 PB Subwatersheds with Septic Nitrogen Removal Targets.

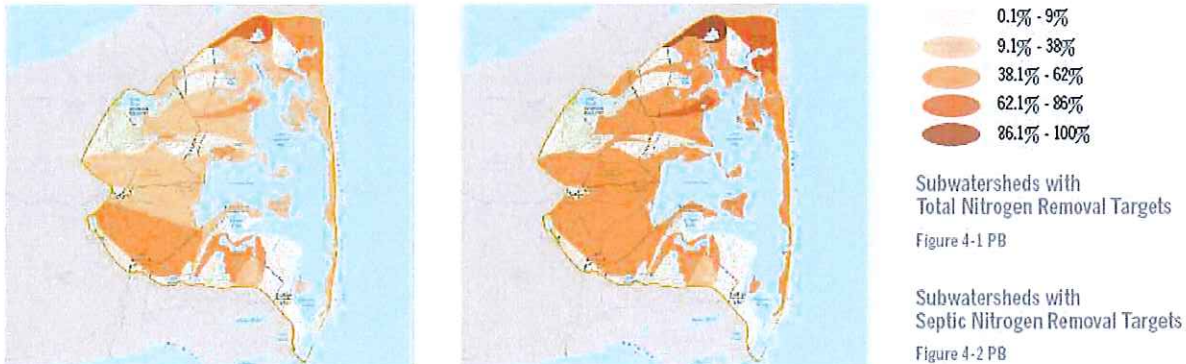
The nitrogen load from the watershed exceeds the nitrogen TMDL for Pleasant Bay, resulting in impaired water quality. The ecological health of a water body is determined from water quality, extent of eelgrass, assortment of benthic fauna, and dissolved oxygen and ranges from 1-severe degradation, 2-significantly impaired, 3-moderately impaired, 4- healthy habitat conditions. Headwater sub-embayments of Pleasant Bay are particularly impaired. Although well-flushed portions of the embayment system, such as Chatham Harbor, exhibit healthy habitat conditions, inland sub-embayments that receive less tidal flushing are experiencing moderate to severe habitat degradation.

MEP ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

- Overall Ecologic Condition: Healthy to Severely Degraded
- Meetinghouse Pond and Outlet: Significantly Impaired



- Lonnies Pond: Moderately to Significantly Impaired
- Areys Pond and Outlet: Significantly Impaired to Severely Degraded
- The River: Moderately Impaired
- Paw Wah Pond: Significantly Degraded
- Quanset Pond: Significantly Impaired
- Round Cove: Moderately to Significantly Impaired
- Upper Muddy Creek: Severely Degraded
- Lower Muddy Creek: Significantly Impaired
- Bassing Harbor – Ryders Cove: Moderately Impaired
- Bassing Harbor – Crows Pond: Moderately Impaired
- Bassing Harbor – Lower Basin: Healthy to Moderately Impaired
- Bassing Harbor – Frost Fish Creek: Significantly Impaired
- Pochet: Healthy
- Little Pleasant Bay: Moderately Impaired
- Pleasant Bay: Moderately Impaired
- Chatham Harbor: Healthy
- Sentinel Station:
 - Total Nitrogen Concentration Threshold: 0.16 mg/L
 - Total Nitrogen Concentration Existing: 0.18 mg/L
(As reported at the MEP sentinel water-quality monitoring station)



ALLOCATION OF RESPONSIBILITY

Consistent with the 208 Plan Update, the watershed analysis presented in this report is based on the assumption that each town's responsibility will be proportional to that town's share of its current attenuated watershed load, applied sub-embayment by sub-embayment. Shares of attenuated load are as follows:

- Brewster— 13% of total attenuated load
- Chatham— 34% of total attenuated load
- Harwich— 22% of total attenuated load
- Orleans— 30% of total attenuated load

SELECTION OF TRADITIONAL AND NON-TRADITIONAL TECHNOLOGIES



In developing their respective nutrient management plans, each of the four towns has gone through a thorough assessment of alternative approaches to meeting nutrient reduction targets through an expansive public engagement process. The resulting plans represent community consensus on nutrient management approaches, in view of competing municipal needs.

Source control approaches, such as traditional sewerage, prevent the nitrogen from reaching the environment. In contrast, remediation approaches address the nitrogen once it is in the groundwater or in the embayment to be protected. Remediation techniques, also referred to as non-traditional, rely on natural processes and their performance may vary due to environmental factors. For this reason, non-traditional approaches are subject to a regulatory requirement for traditional back-up in the event that they do not function as predicted. Remediation or non-traditional approaches will be piloted and monitored in the watershed by the towns to determine the appropriate degree of application of these approaches.

Individually, the plans differ in the degree to which they utilize traditional and non-traditional technologies. At one end of the spectrum, Chatham's, and Harwich's plans rely almost exclusively on sewerage, however together they did undertake the Muddy Creek restoration project, which is projected to reduce the amount of sewerage needed in both towns to meet nitrogen management goals. At the other end of the spectrum, the plans of Brewster and Orleans largely involve non-traditional nitrogen removal techniques, including remedial measures and fertilizer reduction. In combination, the four town plans provide a hybrid approach watershed wide, with non-traditional technologies accounting for about 30% of the estimated removal system-wide. The system-wide removal is comprised of 71% sewerage, 23% remedial methods, and 6% fertilizer reductions.

LOCAL PROGRESS

ORLEANS

The Town of Orleans contributes 30% of the attenuated wastewater nitrogen load to the Pleasant Bay watershed. The Town's Comprehensive Wastewater Management Plan (CWMP) was completed in 2010 and received MEPA and DRI approvals in 2011. The CWMP characterizes nitrogen reduction needs pursuant to the Massachusetts Estuaries Project (MEP) and Total Maximum Daily Load (TMDL) reports for Pleasant Bay. The Needs Assessment completed in 2009 identifies other wastewater needs to address Title 5 compliance and economic development. The Town's CWMP is a phase sewerage plan supplemented with non-traditional solutions that may obviate later sewerage phases. The Town has embarked on supplemental planning aimed at accelerating the use of non-traditional solutions to minimize sewerage.

BREWSTER

The Town of Brewster contributes approximately 13% of the attenuated wastewater nitrogen



load to the Pleasant Bay watershed. The Town has developed an Integrated Water Resources Management Plan (IWRMP). The IWRMP Phase II report was issued in final form in January 2013 with assessments and recommendations addressing nitrogen loading to Pleasant Bay, existing and future drinking water, and stormwater and freshwater pond needs. Nitrogen management alternatives are further discussed in a March 2015 report. The Brewster Plan includes significant fertilizer reductions that have already taken place at the Captain's Golf Course, fertigation at the golf course, and reductions in residential fertilizer loads. The current plan also includes shellfish propagation or aquaculture to meet the remaining nitrogen reduction for the Town. The Town is currently looking at new septic leachfield technologies for nitrogen reduction if a shellfish management option is not feasible and is investigating potential pilot projects to test this option. Sewering of a residential neighborhood has been identified as a backup option, but the proposed location is at the upper end of the watershed, meaning it would take decades for there to be water quality improvement in the Bay.

HARWICH

The Town of Harwich contributes approximately 22% of the attenuated wastewater nitrogen load to the Pleasant Bay watershed. The Town developed a recommended program to address that nitrogen removal and meet other town needs. That program, described in a draft CWMP, was submitted for review to MEPA and the CCC in February, 2013. Upon further refinement of infrastructure and non-infrastructure program components and review of the 208 Water Quality Plan, the Town filed the final CWMP in March 2016 with MEPA and the CCC. MEPA issued a Certificate of Approval on May 13, 2016.

The CWMP proposes wastewater collection in the Pleasant Bay watershed and recommends a community partnership with Chatham to treat wastewater generated and collected in the Pleasant Bay watershed at the existing Chatham treatment facility. Treated effluent would initially be recharged at the Chatham facility but may in the future be conveyed back to East Harwich for recharge depending on water quality results. The other watersheds in Harwich will mainly rely upon collection of wastewater to meet nitrogen removal requirements with sewers and conveyance to a Harwich-only treatment facility to be located at the DPW site in the Herring River watershed. Recharge of treated effluent would occur at that location. The Harwich CWMP also includes several nontraditional components such as natural nitrogen attenuation at the Cold Brook area and the Muddy Creek inlet widening, evaluation of a permeable reactive barrier at the recharge site at the DPW, and inclusion of stormwater best management practices (BMPs) throughout town. Several non-infrastructure components are included such as review of potential open space acquisition parcels to minimize buildout, and fertilizer education programs (instead of a fertilizer control ordinance).

CHATHAM

The Town of Chatham contributes approximately 34% of the attenuated wastewater nitrogen load to the Pleasant Bay watershed. The Town began implementing its CWMP in 2010. The



CWMP includes the sewerage of the entire town, with the implementation of later sewerage phases being contingent upon results of on-going monitoring under the adaptive management plan. The Town of Chatham, in cooperation with the Town of Harwich, recently completed the construction of a new bridge to replace inadequate culverts that will provide increased tidal flushing and improved water quality in Muddy Creek.

REGIONAL COORDINATION

The Pleasant Bay Alliance, comprised of the four watershed towns through an Intermunicipal agreement, has integrated the Pleasant Bay portion of each town's plan into a watershed-wide composite. With the benefit of this information, each town may choose to modify its plan, pursue joint projects, or enter into negotiations with one or more towns to take advantage of efficiencies. All decision-making and responsibility for implementation remains with the towns.

Local efforts in these towns are described in Chapter 2.

Potential Watershed Scenarios

HYBRID (HARWICH)

The Town of Harwich has submitted their final CWMP/SEIR; as such an alternative was presented which was chosen working closely with the Wastewater Implementation Committee (WIC) and the Board of Selectmen (BOS). Since 2007, these efforts have been coordinated predominantly by the WIC and BOS. The resultant recommended program for implementation by the community will be phased over the next 40 years. The chosen scenario was ultimately recommended as the preferred scenario because it allows for multiple effluent recharge sites in different watersheds, allows for easier phasing with adaptive management, presents a regional solution between the Towns of Harwich and Chatham (and potentially Dennis in the future), and reduces the overall size of the facilities in Harwich. It also allows infrastructure components to be implemented, results monitored and the later program phases adapted as needed. The plan includes recommended non-infrastructure program components which include fertilizer and stormwater management programs, potential land use changes, open space acquisition, and several community involved conservation and pollution reduction programs. As proposed in the CWMP, wastewater collection in the Pleasant Bay watershed will be done through a community partnership with Chatham to treat wastewater generated and collected in the Pleasant Bay watershed at the existing Chatham treatment facility. Sewer system construction in the Pleasant Bay watershed is proposed to be completed over phases 2, 3 and 8, as defined in the CWMP.

CREDITS

- Stormwater
 - Implement Best Management Practices (BMPs) recommended in CWMP/SEIR
- Fertilizer
 - Continue fertilizer education recommended in CWMP/SEIR

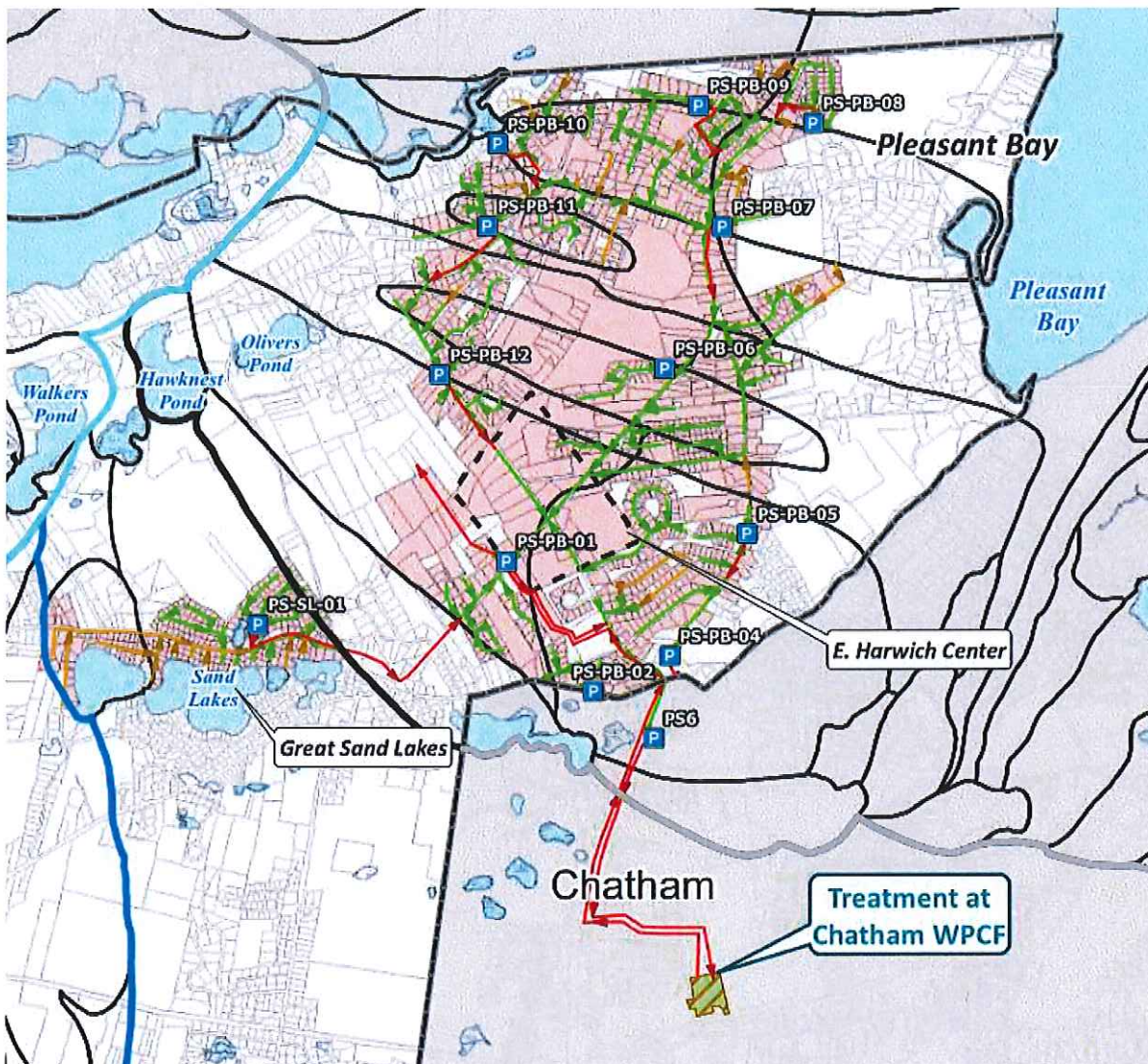
SCENARIO DETAILS (PLEASANT BAY WATERSHED)

- Number of properties sewered: 1,205
- Flow collected (MGY): 119 (includes build-out and estimated I/I)

COST (PLEASANT BAY)

- Collection
 - Collection System Cost (Phases 2, 3, & 8): \$70,000,000 (Phases 2 and 3 are Pleasant Bay only, Phase 8 includes costs for sewerage the remaining portion of Pleasant Bay and some other areas)
- Transport: Included in Operations and Maintenance costs, shown below
- Treatment and Disposal
 - Chatham Treatment Facility Expansion Cost: \$9,200,000
 - HR – 12 and PB-3 Facility Cost: \$56,300,000
- Annual Operations and Maintenance (Harwich)
 - Chatham Treatment Facility O&M Costs: \$ 260,000
 - Harwich Collection System O&M Costs: \$910,000
 - Treatment System O&M (HR-12 Facility): \$1,800,000

Chosen Scenario (Harwich): Pleasant Bay Watershed Recommended Plan Overview



Legend

-  Force Main
-  Pressure Sewer
-  Gravity Sewer
-  Pumping Station
-  Treatment / Effluent Recharge
-  Area to be Sewered
-  Areas with Significant Wetlands
-  Village Center
-  Subwatershed Boundaries
-  Coastal Wetlands
-  Inland Wetlands

 Harwich Plan.pdf