DRI Hearing – March 1, 2011

Orleans Comprehensive Wastewater Management Plan

Final/Single Environmental Impact Report

Overview

1. Recap project highlights
2. Describe Recommended Plan
3. Review MEPA results
4. Address public comments from January 18, 2011 public hearing
5. Provide further public input to Cape Cod Commission's DRI process

CWMP Phases

1. Needs Assessment
2. Develop/Screen Alternatives
3. Detailed Evaluation of Alternatives
4. Develop Recommended Plan
   - Draft CWMP (Filed with EENF)
   - Final CWMP (Part of S/FEIR)
5. MEPA and DRI review

Chronology of CWMP Development

Needs Assessment — PM: Feb 2006

Develop/Screen Alternatives — PM: Jan 2007

Detailed Evaluation of Alternatives
- Public Meeting: May 2008
- Workshops: Jul & Aug 2008

Develop Recommended Plan
- Public Meeting: Oct 2, 2008
- STM: Oct 27, 2008

Publication of Final CWMP — Dec 2010

Public Consultation Effort

Wastewater Management Steering Comm. — representatives of 6 boards
- Twice weekly meetings—2005 to 2009
- Over 500 hours of open meetings
- Compilation of consultant letters in Town office
- Weekly neighborhood workshops--2008

Citizens Advisory Comm.—adjunct to WMSC

Board of Selectmen
- Representative on WMSC
- Periodic presentations by WMSC

MEPA and DRI reviews

Chronology of Environmental Review

MEPA Expanded Environmental Notification Form (EENF) and draft CWMP
- *Environmental Monitor*: May 6, 2009
- Extended review period: May 6 to Jun 30, 2009
- MEPA/DRI hearing: Jul 10, 2009
- EOEEA Sec'y decision: Jul 18, 2009

MEPA Single/Final Environmental Impact Report (S/FEIR) and Final CWMP
- Response to Comments: Dec 15, 2010
- *Environmental Monitor*: Dec 22, 2010
- Review period: Dec 22, 2010 to Jan 21, 2011
- MEPA/DRI hearing: Jan 18, 2011
- EOEEA Sec'y decision: Jan 28, 2011

Summary of Needs Assessment

Reducing nitrogen load to embayments is the principal problem

(2,800 lots—52% of all parcels)

Other needs can be largely addressed by strategic sewering plans

- Sanitary needs
- Pond protection
- Water supply protection
- Affordable housing

Composite Plan Evaluation

9 composite plans

ranked against

16 evaluative criteria

results in

3 composite plans

detailed evaluation leads to

1 recommended plan

Three Plans Evaluated in Detail

Plan 1 — Decentralized system with 4 treatment sites and 11 disposal sites across Town

Plan 2 — "Centralized" treatment and disposal at Tri-Town site

Plan 3 — "Centralized" treatment in So. Orleans with disposal on Brewster/Harwich golf courses

Results of Summer 2008 Workshops

Most favored plan — Plan 2 by 70% of respondents

- $25 million lower cost
- Most appropriate site/watershed

Most frequent comments:

- consider town-wide sewers
- regionalization is important
- reuse is desirable

Plan Recommended by WMSC

"Centralized" treatment and disposal at site of Tri-Town septage facility

Plus……

- use of Title 5 systems for half of Town
- cluster systems in most threatened sub-watersheds
- potential for future So. Orleans treatment facility with irrigation
- option for future effluent reuse
- strong non-structural program

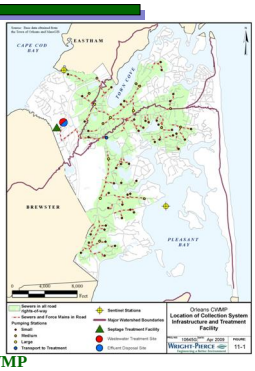
Two Types of Actions

1. Structural Elements (sewering)
   - Proven effectiveness
   - High cost
2. Non-Structural Elements (non-sewer)
   - Much lower cost
   - Less effective (not adequate alone)
   - Not fully proven or accepted by DEP

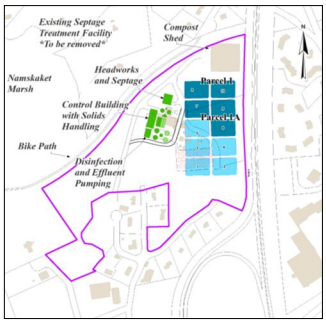
Structural (Sewering) Elements of Plan

- **Wastewater Collection** — sewers to eliminate 2,400 to 2,800 septic systems
- **Wastewater Treatment**
- **Effluent Disposal**
- **Septage Handling**
- **Sludge Handling**
- **Cluster Systems**

Proposed Collection System



Proposed Treatment and Disposal



Non-Sewering Elements of Plan

- **Fertilizer Controls**
- **Stormwater Management**
- **Water Conservation**
- **Nitrogen Load Reduction**
  - Garbage grinder ban
  - Urine-diverting toilets
- **Dredging to enhance tidal flushing**
- **Land Use Controls**

How Do You Mix Sewer and Non-Sewer ?

- **Build sewer system in phases**
- **Demonstrate effectiveness and feasibility of non-sewer elements**
- **Adjust later phases of sewering plan (location, timing)**
- **Goal—save $15 to $25 million in sewering cost**
- **The key "adaptive management"**

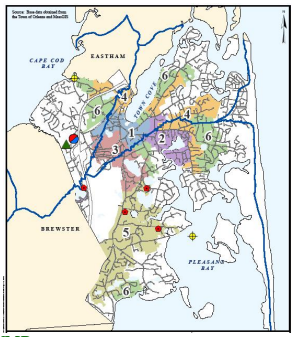
Town-Wide Sewers

Construction of town-wide sewers is not part of Recommended Plan, but planning for it is.

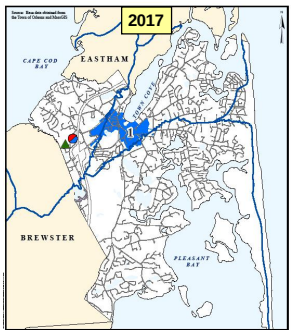
Core Program
- Address all mandated needs

Extended Program
- Sewer remainder of town if needed or desired

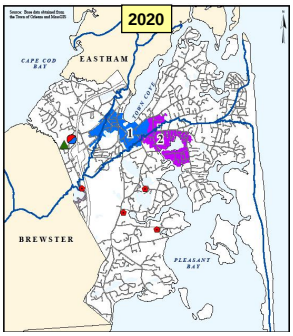
Preliminary (20-yr) Sewer Phasing Plan



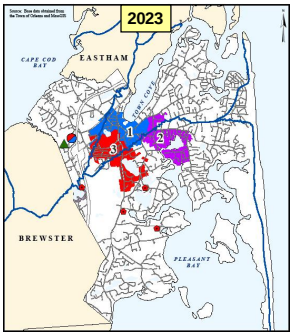
Preliminary Sewer Phasing Plan--Phase 1



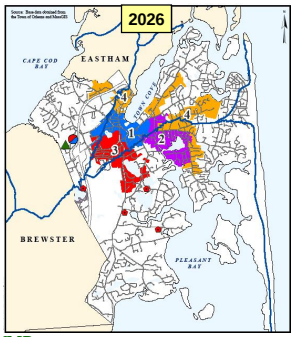
Preliminary Sewer Phasing Plan--Phase 2



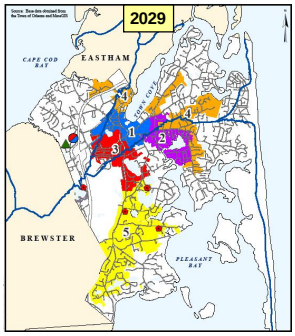
Preliminary Sewer Phasing Plan--Phase 3



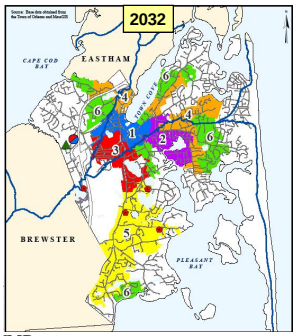
Preliminary Sewer Phasing Plan--Phase 4



Preliminary Sewer Phasing Plan--Phase 5



Preliminary Sewer Phasing Plan--Phase 6



Environmental Evaluation

Factors considered:

1. Surface water quality
2. Groundwater quality
3. Wetlands
4. Floodplains
5. Coastal resources
6. Open space and recreation
7. Generation of solid wastes

Environmental Evaluation

8. Rare and endangered species
9. Arch. and historic resources
10. Traffic
11. Air quality
12. Noise
13. Energy and greenhouse gases
14. Erosion control
15. Land use & community growth

Environmental Mitigations

- Avoid summer sewer construction
- Control dust and siltation at all sites
- Use natural buffers and constructed berms at treatment facility site
- Minimize box turtle habitat destruction
- Provide high level of odor, noise control
- Use high-efficiency equipment
- Implement energy management plan
- Document historic/archaeologic resources

Long-term Schedule

Task	Completion
Final CWMP	late 2010
Preliminary design	2013
Final design—Phase 1	2013--2014
Bidding—Phase 1	late 2014
TM appropriation—Phase 1	spring 2015
Phase 1 construction	2015--2017
Start-up of Phase 1 facilities	mid 2017
Complete all 6 phases	2032

Capital Costs—mid 2008 dollars

Component	Cost, million
Collection	102
Treatment	27
Disposal	8
Sludge/septage	3
Cluster systems	3
Land	5
Total	$148

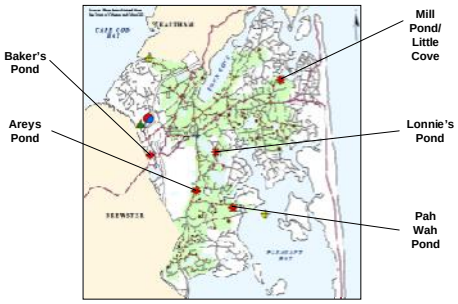
Costs for Operation & Maintenance

Component	Annual Cost
Labor	580,000
Energy	234,000
Sludge disposal	204,000
Maintenance & repair	192,000
Chemicals	50,000
Other	110,000
Total	$1,370,000

Focus of CWMP Update

1. Box turtle habitat
2. Cluster systems
3. Regionalization
4. Greenhouse gas emissions
5. Tri-Town site capacity
6. Independent technical review

Proposed Cluster Systems



Cluster Systems

1. Early nitrogen removal near "headwaters embayments"
2. Remove at least 60% of TMDL
3. Perhaps convert to Pump Stations in later phases
4. Each system serves 25 to 40 homes (124 home in total, 60,000 gpd)
5. Effluent quality: 5 to 8 mg/l N

Wastewater Regionalization Study

Options for Orleans, Eastham and Brewster:

1. Each town acts alone
2. Regional treatment facilities
   - Orleans and Eastham
   - Orleans and Brewster
   - All three towns
3. Orleans expands its sewer system to provide N removal for the region

Wastewater Regionalization Study

Preliminary findings:

- 6% to 9% savings in capital cost
- 18% to 25% savings in costs for operation and maintenance
- Cost allocation formulas evaluated to share savings
- Schedule will be dictated by Eastham and Brewster

Independent Technical Review

Funding from Cape Cod Water Protection Collaborative

Sept 2010 Report by CH2M--key conclusions:

- **Public consultation**: comprehensive, transparent, well documented, effective
- **Decentralized option**: may not be feasible due to site acquisition problems
- **Cost savings measures**: should be aggressively pursued, esp. regional
- **Recommended Plan**: sound, based on good science and engineering, and should be implemented expeditiously

Outcome of MEPA Review

See Jan 28, 2011 Certificate of the EOEEA Secretary:

"*The project adequately and properly complies with the Massachusetts Environmental Policy Act and its implementing regulations.*"

State, regional and local agency review comments very favorable

Issues Raised at January 18, 2011 Hearing

Alternative sewer systems

Decentralized options

Science behind MEP technical reports

Trends in Pleasant Bay water quality

Moving water among watersheds

Impacts of groundwater mounding

Impacts on Namskaket Marsh

Alternative Sewer Systems

CWMP considered:

- Traditional gravity sewers and force mains
- Grinder pumps and low-pressure sewers
- Vacuum sewers
- STEP systems

Design process will focus on gravity sewers, supplemented by other systems as site conditions allow to effect lowest overall cost

Treatment and disposal elements of CWMP are not changed by choice of collection system

Decentralized Options

Town evaluated 3 plans in detail, one involving decentralized systems

- significantly more expensive
- not favored by public

Independent engineer

- raised doubts about the feasibility of the decentralized option
- strongly supported recommended plan

Barnstable County Wastewater Cost Report

- independently supports Orleans' analysis

Town Investigation of Estuarine "Science"

Validation and Design Committee

Expert consultant—Woods Hole Group

Important consultant finding:

"*MEP reports…represent strong foundation for developing a course of action to develop and comply with site-specific TMDL requirements*"

MEP science is not the subject of the DRI review

CWMP is based on the "science of record"

Trends in Pleasant Bay Water Quality

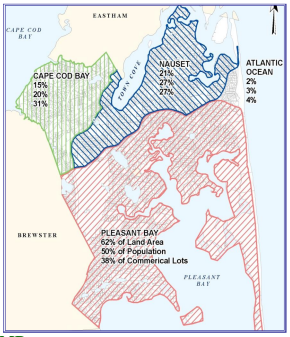
Cadmus Group (Oct 2010) reviewed 10 years of Pleasant Bay Water quality data

Since 2nd inlet formation in 2007:

- Most stations show no statistically significant change
- Some open-water stations some show improvement
- Headwaters embayments continue to decline
- Bioactive N concentrations continue to exceed MEP target restoration values

DEP's stance—the 2007 breach may not provide a long-term solution, and towns should plan for less favorable conditions

Major Watersheds



Regional Water Balance

Average recharge in million gallons per day

Watershed	Now	Change	Future
Pleasant Bay	31.38	-0.25	31.13
Atlantic Ocean	0.55	0	0.55
Nauset System	4.76	-0.19	4.57
Cape Cod Bay	7.67	+0.44	8.11
Town-wide	44.36	0	44.36

Wet-Year Increase = 10 million gallons per day

Evaluation of Tri-Town Site Capacity

Surficial soil permeability

6.7 gpd/sf needed, 7.7 gpd/sf estimated

Mounding

4-ft minimum separation, 25 feet predicted

Local Impacts

No negative impacts expected

Fate of residual nitrogen

Namsk. and Little Namsk. below thresholds

No impact on Rock Harbor, Town Cove

Hydrogeologic Investigations

USGS Cape-wide computer model

- Basis for MEP watershed boundaries
- Applied to Orleans project in 2006

Measurement of GW elevations and contaminant concentrations by USGS (1990s through 2004)

Large-scale loading test in 2007

Supplemental explorations in 2008

Fine-tuning of USGS model in 2008

Application of USGS Model to Site

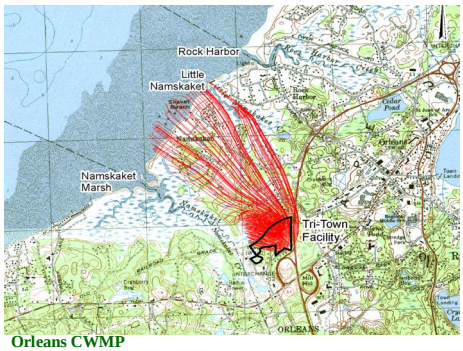
Model made more "fine-grained" in vicinity of site and down gradient

Local hydrology considered to a greater extent

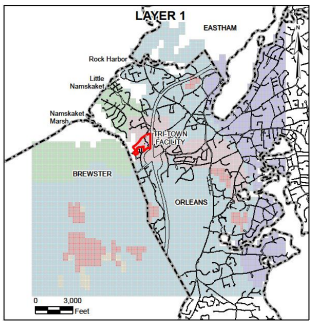
Soil layers at depth varied to reflect best available information

Calibration to local data under both wet and dry conditions

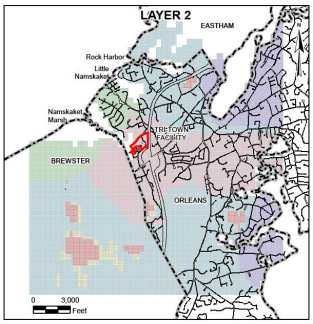
Regional Groundwater Flow



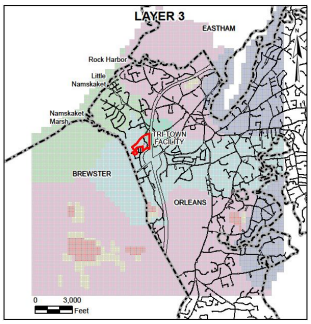
Groundwater Model—Layer 1



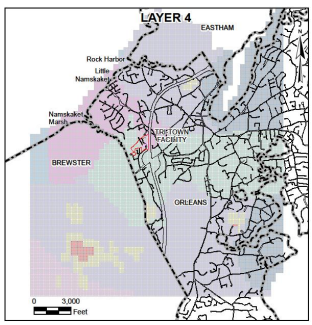
Groundwater Model—Layer 2



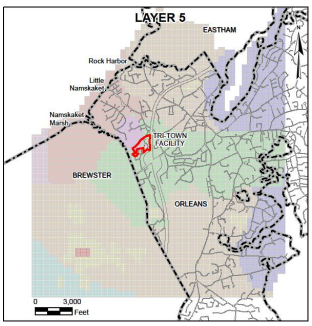
Groundwater Model—Layer 3



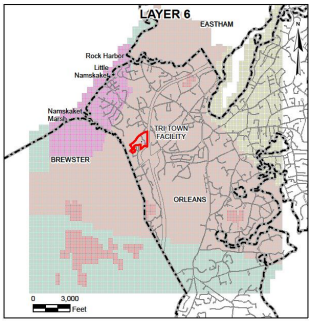
Groundwater Model—Layer 4



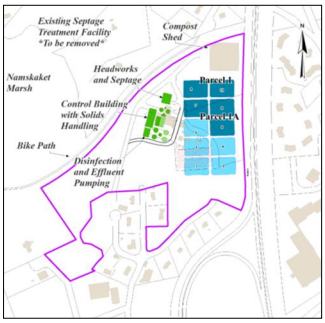
Groundwater Model—Layer 5



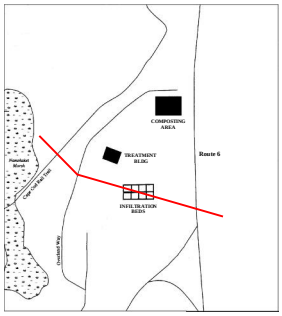
Groundwater Model—Layer 6



Proposed Treatment and Disposal

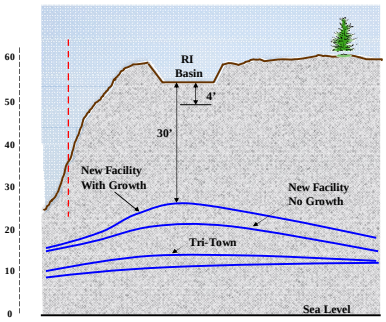


Mounding at Tri-Town Site

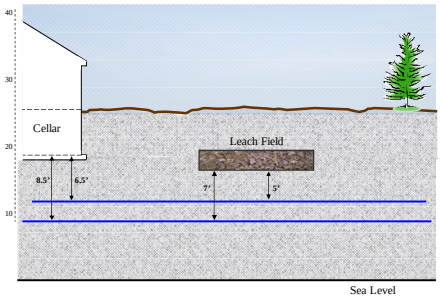


Location of Site Cross-Section

Mounding at Tri-Town Site



Mound Impact on Low-lying Home



Nitrogen Loads to Namskaket System

Effluent Nitrogen Loads

		With Proposed Project	
	No Action	No Growth	With Growth
Effluent Flow, gpd	32,000	470,000	640,000
Concentration, mg/l	32	3	3
Effluent Load, lb/yr	3,100	4,300	5,800
Portion to System	100%	70%	67%
Load to System, lb/yr	3,100	3,000	3,900

Relative Magnitude of Tri-Town Load

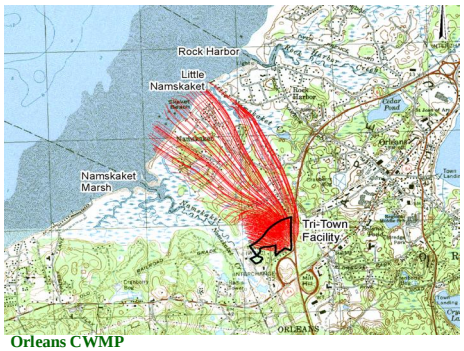
How much is 3,100 lb/yr of nitrogen?

- All of the average Tri-Town effluent
- Septic system discharge from 200 homes

Notes:

- there are now 500 homes (equiv.) in the Namskaket system
  - 300 in Brewster
  - 200 in Orleans
- expected growth—100 more homes

Regional Groundwater Flow



Flows to Namskaket

How much of effluent will eventually reach Namskaket system?

MEP	**100%**
CWMP	
➢ Full project—no growth	**70%**
➢ Full project—with growth	**67%**
USGS (Weiskel)	**20% ??**

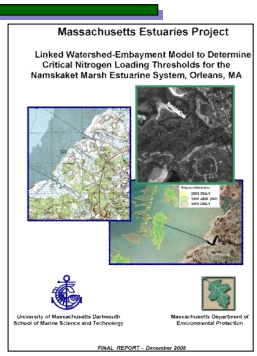
Namskaket System Nitrogen Loads

Nitrogen Loads in pounds per year

		With Proposed Project	
Source	No Action	No Growth	With Growth
Septic Systems (O+B)	7,900	7,900	9,600
Tri-Town Facility	3,100	0	0
New Wastewater Plant	0	3,000	3,900
Private Facilities	200	200	200
Total	11,200	11,100	13,700

System Assimilative Capacity = 37,000 lb/yr

MEP Technical Report—Namskaket System



Draft 2007
Final Dec. 2008

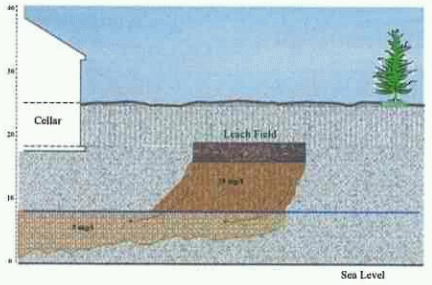
Namskaket System Assimilative Capacity

Nitrogen Loads as Percentage of Assimilative Capacity

		With Proposed Project	
Source	No Action	No Growth	With Growth
Septic Systems (O+B)	21.4%	21.4%	26.0%
Tri-Town Facility	8.5%	0.0%	0.0%
New Wastewater Plant	0.0%	8.1%	10.6%
Private Facilities	0.4%	0.4%	0.6%
Total	30.3%	29.9%	37.1%

Impact of On-site Septic Systems

Impact of On-Site Septic System



Namskaket System Watershed

2,236 Acres
87% in Brewster
13% in Orleans

Nitrogen Assimilation in Namskaket System

- The assimilative capacity of Namskaket Marsh is largely within the tidal portion of Namskaket Creek which forms the boundary between Orleans and Brewster
- Of the nitrogen assimilation that now occurs:
  - 32% applies to Brewster septic systems
  - 24% applies to Orleans septic systems

Groundwater Discharge Permit Program

- Regulated pursuant to 314 CMR 5.00
- Requires hydrogeological evaluation (mostly completed in CWMP)
- DEP considers down-gradient sensitive receptors and sets limits to protect them
- Review of design plans
- Permitting process involves opportunity for public comment
- Permit will specify monitoring program

Questions?