

To George Meservey, Director of Planning & Community Development  
 Michael Domenica, PE, Program Manager

CC Betsy Shreve, AICP, AECOM Project Director  
 Mark Owen, AECOM

Subject **Town of Orleans, MA**  
**Water Quality and Wastewater Planning**  
**Task Number 8.1 – Preplanning - Treatment and Disposal Site Investigations**  
**Deliverable 8.1.1.E – DRAFT Technical Memorandum – Town Cove and Rock Harbor - Composite Wastewater Management Analysis**

Project Number 60476644

From Thomas Parece, P.E., AECOM Project Manager

Date October 26, 2016

**1. Background**

This Technical Memorandum documents a summary of Composite Wastewater Management Analysis performed for the Town Cove and Rock Harbor Watersheds. The analysis summarizes the existing total nitrate load, target nitrate load and nitrate load reduction by technology (traditional and non-traditional) for each of Town Cove’s and Rock Harbor’s subwatersheds.

**2. Introduction**

The focus of this Composite Wastewater Management Analysis is to provide a summary of the nitrate load reduction by technology for each sub-estuary within the Town Cove and Rock Harbor Watersheds. The goal of the analysis is to list the Town’s nitrate load reduction by technology meeting the Town’s nitrate load responsibility.

**3. Composite Wastewater Management Analysis**

The Composite Wastewater Management Analysis spreadsheet summarizes the following watershed and subwatershed loads for the Town Cove and Rock Harbor Watersheds:

- Attenuated Watershed Load
- Threshold Watershed Load
- Orleans Removal Required

The analysis spreadsheet also summarizes the following nitrate load reduction technologies:

- Traditional (WWTF)
- Fertilizer Management
- Aquaculture
- Coastal Habitat Restoration
- Permeable Reactive Barriers (PRB)
- On Site I/A Technologies – i.e. nitrate reduction barrier (NRBs)

A copy of the completed Composite Wastewater Management Analysis spreadsheet summarizing the Town's proposed nitrate load reduction for Town Cove is provided in Attachment A.

A copy of the completed Composite Wastewater Management Analysis spreadsheet summarizing the Town's proposed nitrate load reduction for Rock Harbor is provided in Attachment B.

ATTACHMENT A

Summary of Nitrate Load Reduction by Subembayment  
 Composite Wastewater Management Analysis  
 Nauset Marsh - Hybrid Approach  
 Orleans, MA

Subembayment	Load Description	Technology	Estimated Load - Orleans (kg/yr)
Town Cove	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		4,816
		Traditional (WWTF)	3,024
		Fertilizer Management	126
		Aquaculture	600
		Coastal Habitat Restoration	500
		Permeable Reactive Reactor (PRB)	566
		On Site I/A Technologies (i.e. NRBs)	0
		Total Load Removal Remaining - Orleans	4,816 0
Mill Pond	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		626
		Traditional (WWTF)	0
		Fertilizer Management	34
		Aquaculture	0
		Coastal Habitat Restoration	300
		Permeable Reactive Reactor (PRB)	0
		On Site I/A Technologies (i.e. NRBs)	292
		Total Load Removal Remaining - Orleans	626 0
All Subembayments	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		5,442
		Traditional (WWTF)	3,024
		Fertilizer Management	160
		Aquaculture	600
		Coastal Habitat Restoration	800
		Permeable Reactive Reactor (PRB)	566
		On Site I/A Technologies (i.e. NRBs)	292
		Total Load Removal Remaining - Orleans	5,442 0

Notes: Technology nitrate load reductions are preliminary and subject to change based on demonstration project results and adaptive management.  
 Technology nitrate load reductions are based on OWQAP meeting presentation, proposed demonstration projects, and the draft ACWMP.

ATTACHMENT B

Summary of Nitrate Load Reduction by Subembayment  
 Composite Wastewater Management Analysis  
 Rock Harbor - Hybrid Approach  
 Orleans, MA

Subembayment	Load Description	Technology	Estimated Load - Orleans (kg/yr)
Rock Harbor	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		1,463
		Traditional (WWTF)	451
		Fertilizer Management	46
		Aquaculture	0
		Coastal Habitat Restoration	0
		Permeable Reactive Reactor (PRB)	634
		On Site I/A Technologies (i.e. NRBs)	332
	Total Load Removal Remaining - Orleans		1,463 0
Cedar Pond	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		0
		Traditional (WWTF)	976
		Fertilizer Management	2
		Aquaculture	0
		Coastal Habitat Restoration	0
		Permeable Reactive Reactor (PRB)	0
		On Site I/A Technologies (i.e. NRBs)	0
	Total Load Removal Remaining - Orleans		978 -978
All Subembayments	Attenuated Watershed Load		0
	Threshold Watershed Load		0
	Removal Required - Orleans		1,463
		Traditional (WWTF)	1,427
		Fertilizer Management	48
		Aquaculture	0
		Coastal Habitat Restoration	0
		Permeable Reactive Reactor (PRB)	634
		On Site I/A Technologies (i.e. NRBs)	332
	Total Load Removal Remaining - Orleans		2,441 -978

Notes: Technology nitrate load reductions are preliminary and subject to change based on demonstration project results and adaptive management. Technology nitrate load reductions are based on OWQAP meeting presentation, proposed demonstration projects, and the draft ACWMP.