

Tables

TABLE 2-1

SUMMARY OF I/A EFFLUENT LOADINGS⁽¹⁾

MAJOR WATERSHED AREAS	ESTIMATED EXISTING WW LOAD IN KG/D (TITLE 5 SYSTEMS (26.25 MG/L)) ⁽²⁾	ESTIMATED FUTURE WW LOAD IN KG/D (TITLE 5 SYSTEMS (26.25 MG/L))	EXISTING EFFLUENT WW NITROGEN LOADING IN KG/D ⁽⁵⁾				FUTURE EFFLUENT WW NITROGEN LOADING IN KG/D ⁽⁵⁾		
			WW LOADING GOAL (KG/D) ⁽³⁾⁽⁴⁾	I/A SYSTEMS (19 MG/L)	I/A SYSTEMS (10 MG/L)	I/A SYSTEMS (5 MG/L)	I/A SYSTEMS (19 MG/L)	I/A SYSTEMS (10 MG/L)	I/A SYSTEMS (5 MG/L)
Rock Harbor Estuary	1.05	1.27	0.22	0.76	0.40	0.20	0.92	0.48	0.24
Nauset Estuary / Town Cove	21.73	25.77	9.78	15.73	8.28	4.14	18.65	9.82	4.91

Notes:

- (1) Values in italics represent wastewater loading goals and the I/A systems which can meet the goals.
- (2) Load calculations are based on a GIS analysis of the Town Assessor's data based on MEP methodologies.
- (3) This loading goal is based on the estimated existing wastewater nitrogen for the Town of Eastham only. This does not reflect the threshold septic load for the entire watershed as shown on Table VII-2 of the MEP Rock Harbor Technical Report.
- (4) Based on a 79% removal of wastewater nitrogen (1.05 kg/d – 0.83 kg/d) = 0.22 kg/d; and on a 55% removal of wastewater nitrogen (21.73 kg/d – 11.95 kg/d) = 9.78 kg/d for Rock Harbor Estuary and Nauset-Town Cove Estuary, respectively.
- (5) Loading (kg/d) = Flow (mgd) x Effluent Concentration (mg/L) x 3.79. Where 8.345 / 2.2 lbs/kg = 3.79.

TABLE 2-2

TECHNOLOGY EFFLUENT NITROGEN CONCENTRATION COMPARISON

TECHNOLOGY	TYPICAL EFFLUENT NITROGEN CONCENTRATION RANGE (MEDIAN VALUES) MG/L ⁽³⁾	PERCENT OF MEDIAN VALUES BELOW 19 MG/L ⁽⁴⁾
JET	NA	-
RUCK	10 to 42	43
Bioclere	2 to 57	66
FAST	2 to 64	70
Amphidrome	1 to 68 ⁽²⁾	-
Waterloo Biofilter	12 to 48 ⁽²⁾	-
AdvanTex	9 to 32 ⁽²⁾	-
Nitrex™	1 to 7 ⁽²⁾	-
Nitrex™/Omni	NA	-
Norweco Singulair	2 to 62	60
Omni RSF	2 to 62	48
SeptiTech	8 to 76	13

Notes:

- (1) Systems where data was not available are identified as “NA”
- (2) Limited number of sites (less than 6)
- (3) Based on the report, “Performance of Innovative Alternative Onsite Septic Systems for the Removal of Nitrogen in Barnstable County, Massachusetts 1999-2007,” developed by the Barnstable County Department of Health and Environment.
- (4) Technologies with “Percent of Median Values Below 19 mg/L” with no data listed were either not reported in the County study or had an insufficient number of data points to accurately report.

TABLE 2-3

**TECHNOLOGY EFFLUENT NITROGEN CONCENTRATION
COMPARISON FOR I/A SYSTEMS INSTALLED IN EASTHAM⁽¹⁾**

TECHNOLOGY	# INSTALLED	TYPICAL EFFLUENT NITROGEN CONCENTRATION RANGE (MEDIAN VALUES) MG/L	PERCENT OF MEDIAN VALUES BELOW 19 MG/L ⁽⁷⁾
JET	-	NA ⁽²⁾	-
RUCK	-	NA ⁽²⁾	-
Bioclere	6	3 to 61	83
FAST	23	1 to 67	69
Amphidrome	1	17 ⁽³⁾	-
Waterloo Biofilter	3	8 to 27 ⁽⁴⁾	67
AdvanTex	4	Preliminary Results ⁽⁵⁾	-
Nitrex TM	1	2 ⁽³⁾	-
Nitrex TM /Omni	-	NA ⁽²⁾	-
Norweco Singular	-	- ⁽⁶⁾	-
Omni RSF		28 ⁽³⁾	-
SeptiTech	6	18 to 80	0

Notes:

- (1) Based on the presentation, "Eastham I/A System Performance, April 2008" developed by the Barnstable County Department of Health and Environment.
- (2) Systems where data was not available are identified as "NA".
- (3) Effluent median based on one system.
- (4) Effluent median based on three systems.
- (5) Of these four installed systems, one has been sampled twice and the other three have only been sampled once – too soon to draw conclusions about performance.
- (6) One system is permitted under General, only annual field test for pH, dissolved oxygen, turbidity required. One system out of compliance for sampling, County following up.
- (7) Technologies with "Percent of Median Values Below 19 mg/L" with no data listed were either not reported in the County study or had an insufficient number of data points to accurately report.

TABLE 2-4**SUMMARY OF ESTIMATED COST**

WASTEWATER TREATMENT COMPONENT	PLAN 1 - ROACH PROPERTY WWTF ⁽⁴⁾			PLAN 2 – ORLEANS WWTF ⁽⁵⁾		
	NAUSET-TOWN COVE ESTUARY	ROCK HARBOR ESTUARY ⁽⁷⁾	TOTAL	NAUSET-TOWN COVE ESTUARY	ROCK HARBOR ESTUARY ⁽⁷⁾	TOTAL
Collection System ⁽¹⁾	\$17,600,000	\$1,700,000	\$19,300,000	\$17,600,000	\$1,700,000	\$19,300,000
PS & FM to Treatment ⁽¹⁾	\$4,100,000	\$900,000	\$5,000,000	\$2,300,000	\$900,000	\$3,200,000
Treatment & Recharge ^(1,2)	\$14,500,000	\$900,000	\$15,400,000	\$14,500,000	\$900,000	\$15,400,000
TOTAL CONSTRUCTION COSTS	\$36,200,000	\$3,500,000	\$39,700,000	\$34,400,000	\$3,500,000	\$37,900,000
Contingency (30%)	\$10,900,000	\$1,100,000	\$12,000,000	\$10,300,000	\$1,100,000	\$11,400,000
Fiscal, Legal, Engineering (25%)	\$9,100,000	\$900,000	\$10,000,000	\$8,600,000	\$900,000	\$9,500,000
TOTAL CAPITAL COSTS⁽³⁾	\$56,000,000	\$6,000,000	\$62,000,000	\$53,000,000	\$6,000,000	\$59,000,000
Total Capital Cost on a per Property Basis ⁽⁶⁾	\$62,000			\$59,000		
Annual O&M Costs ⁽³⁾	\$710,000			\$630,000		
<p>Notes:</p> <p>(1) Costs based on April 2009 ENR of 8548.</p> <p>(2) Costs for each area represent the flow-weighted total treatment cost. This does not necessarily represent the cost to construct an autonomous treatment facility for each area.</p> <p>(3) Additional basis on cost development is provided in Chapter 2 of this report.</p> <p>(4) Plan 1 includes the Nauset-Town Cove Estuary Watershed Plan 1 and Rock Harbor Estuary Watershed Plan 1 at the potential Roach Property WWTF.</p> <p>(5) Plan 2 includes the Nauset-Town Cove Estuary Watershed Plan 2 and Rock Harbor Estuary Watershed Plan 2 at the proposed Orleans WWTF.</p> <p>(6) The two tentative sewer areas have approximately 1,007 properties.</p> <p>(7) This portion of the Plan may be needed if discussions / evaluations with MassDEP on nitrogen limit modification and alternative dredging are not successful.</p>						

TABLE 3-1

PRIORITY RANKING BASED ON AREA OF CONCERN

NEED		AREA OF CONCERN	PRIORITY RANKING			
			Public Water Supply	Wastewater Management	Aeration / Dredging	Pond Treatment
HUMAN HEALTH	<i>Water</i>	Town-Wide	1			
ENVIRONMENTAL	<i>Wastewater Nitrogen</i>	Nauset-Town Cove Estuary		2		
		Rock Harbor Estuary		3	3	
	<i>Wastewater Phosphorus</i>	Freshwater Pond System ⁽¹⁾		4		4

TABLE 3-2

SUMMARY OF ALTERNATIVE MANAGEMENT PLANS AND PRIMARY NEEDS

AREA OF CONCERN	ALTERNATIVE MANAGEMENT PLAN	PRIMARY NEED		
		DRINKING WATER	WW NITROGEN	WW PHOSPHORUS
<i>TOWN-WIDE (TW)</i>	<i>TW Drinking Water Supply Plan</i>	X		
<i>NAUSET-TOWN COVE ESTUARY (NE)</i>	<i>NE Watershed Plan 2</i>		X	
<i>ROCK HARBOR ESTUARY (RH)</i>	<i>RH Watershed Plan 2</i>		X	
<i>FRESHWATER POND SYSTEM⁽¹⁾ (FP)</i>	<i>FP Watershed Plan 3</i>			X