DRAFT Phase One Report:

Long-term Solid Waste Disposal Alternatives

DECEMBER 2007

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Cape Cod Solid Waste Contract Committee:

(Established by the Barnstable County Commissioners, Spring 2007)

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Brewster ..... Jim Foley

Chatham .....Dan Tobin, Jennifer Petit

Dennis..... David Johansen

Eastham..... Sheila Vanderhoef

Falmouth.....George Calise

Harwich .....James Merriam

Mashpee .....Catherine Laurent

Orleans.....Mark Carron

Provincetown..... Sharon Lynn

Sandwich ..... Paul Tilton

Truro .....Pam Nolan

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DRAFT Phase One Report

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Introduction

Between 1984 and 1985, 14 Cape Cod communities (not including Bourne[i]) signed 30-year contracts that provided reliable, low-cost, and long-term waste disposal with the SEMASS waste-to-energy facility in Rochester, Massachusetts. More than 20 years later, the Cape communities recognize the need to plan again for the long-term disposal of their municipal solid waste.

Cape Cod contracts with SEMASS are set to expire in 2015 and 2016.

Town	Date Contract Signed	Date Contract Expires
Wellfleet	November 5, 1984	December 31, 2016
13 Cape Towns	January 1, 1985	January 1, 2015
Bourne	1997	December 31, 2006

Since 1985, the solid waste industry has seen many market and regulatory changes that have resulted in significant increases in disposal costs, particularly in Massachusetts. As a result of these changes, it is very likely that future disposal costs will be much more expensive regardless of where and how the Cape's waste is responsibly disposed when the existing contracts expires in 2015/2016. Given this reality and the impact future waste disposal costs will have on municipal budgets, it is vital to begin evaluating all viable alternatives that will allow the Cape towns to make good decisions about the future of solid waste management.

Barnstable County's regional planning agency, the Cape Cod Commission, has undertaken a five-phase planning process to assist the 14 Cape towns in evaluating those feasible municipal solid waste disposal options that are currently available to the Cape communities. This *Phase One Report* outlines several potential disposal options located on Cape, off Cape, and out of state and includes more traditional as well as less traditional means of municipal solid waste disposal; the list is not necessarily inclusive of all disposal options available on the market at this time. This report concludes by recommending to the Contract Committee (an advisory committee established by the Barnstable County Commissioners in 2007 and hereafter referred to as the Committee) a series of viable disposal options for further analysis and consideration, one of which will likely be recommended as the most viable option for future solid waste disposal.

i. Bourne currently sends its municipal solid waste to the town-owned and operated Integrated Solid Waste Management Facility (ISWMF) located on MacArthur Boulevard and is no longer a SEMASS contract community.

This planning process has been undertaken with the assistance of Barnstable County staff at the behest and with the oversight of both the Barnstable County Commissioners and local Boards of Selectmen. Upon completion of the work outline submitted to each town in Spring 2007, the local Boards of Selectmen appointed a designee to serve on the Committee, with the responsibility of advising County staff on the recommendations made in this report and relating the findings of this *Phase One Report* (and subsequent phases) to the selectmen for their discussion and consent.

The ultimate goal of the Committee is to identify a viable long-term municipal solid waste (MSW) disposal option and, should town officials authorize it, to assist the towns in collectively preparing for and conducting negotiations for a new long-term, cost-effective waste disposal contract for MSW disposal with a permitted waste disposal facility.

As previously stated, a goal of the *Phase One Report* is to recommend to the Committee a short list of viable disposal options for the Cape towns to consider. The short list of alternatives, upon agreement from each town, will be narrowed to one viable disposal option in Phase Two (refer to the five-phase work outline in the **Appendix** for additional details).

A list of evaluation criteria has been developed to assist the Committee in evaluating the recommended short list of disposal options. At the present time, the criteria consists of the following:

- provide a cost-competitive tip fee;
- provide a long-term disposal contract (10 years minimum; 20 years preferable);
- provide adequate annual permitted disposal capacity for the Cape's waste stream;
- provide adequate long-term disposal capacity for a 20-year contract;
- provide a proven track record of environmental and financial performance;
- be geographically close to Cape Cod; and
- present minimum financial risk exposure to Cape communities.

Summary of Key Findings

Current Contract Tip Fees

Waste disposal costs for the Cape communities are extremely low by comparison to market rates for MSW disposal both in state and out of state. The current tip fee—the cost to "tip" or dispose of one ton of MSW at a disposal facility—for Cape communities is approximately $37.51 per ton (not including transportation costs). Wellfleet, due to its unique contract, is not subject to

change-in-law costs and has a tip fee of only $18.25 per ton (not including transportation costs).

Future Anticipated Disposal Costs

Many factors are causing an increase in the cost of MSW disposal, including a lack of new disposal capacity being created in Massachusetts, ever-increasing regulatory requirements, and the higher costs of transportation. These realities would indicate that the Cape communities should again negotiate a new disposal agreement collectively to get a lower-cost contract.

2006 Cape MSW Tonnages

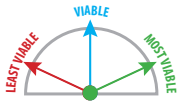
The 14 Cape communities currently sending their MSW to the SEMASS waste-to-energy facility generated approximately 133,000 tons of MSW in 2006. As such, the per-capita waste generation rate for Cape Cod in 2006 was 1.7 tons.

Transportation Opportunities for Waste Disposal

A new short-line railroad operator (MassCoastal, Inc.) is providing rail service on Cape Cod. MassCoastal has made additional service provision a high priority, thus making the railing of MSW off Cape to out-of-state destinations a viable option worthy of consideration.

Waste Disposal Options

Various disposal options exist both in state and out of state. These disposal options range from traditional (landfill, waste-to-energy, and transfer) to alternative (co-composting and gasification/pyrolysis). These disposal options are listed below according to their current viability when measured against the evaluation criteria listed on the previous page.



EVALUATION CRITERIA

Option	In State	Most Viable to Least Viable
SEMASS	Yes	Most Viable
Bourne ISWMF*	Yes	Most Viable
Seneca Meadows Landfill, Seneca, NY	No	Most Viable
Casella Waste Systems, Rochester, MA	Yes	Most Viable
Allied Waste/BFI out-of-state railing	No	Viable
Republic Services out-of-state railing	No	Viable
Waste Management out-of-state railing	No	Viable
Taunton, MA disposal technology	Yes	Least Viable
New Bedford, MA gasification pilot program	Yes	Least Viable

* The Bourne ISWMF may continue to accept MSW for disposal as currently permitted, or, pending the outcome of the town working group's recommendation to the Board of Selectmen, may opt for an alternative technology in the future. For the purposes of this report, consideration of the Bourne ISWMF as a viable option is based on the possibility that a co-composting technology will be implemented in the future.

Other Options for Consideration

The Cape communities should consider the benefits associated with negotiating a new long-term waste disposal contract with both South Shore Tier One and non-Tier One communities and Martha's Vineyard:

- There are 28 communities that have long-term contracts set to expire between 2013 and 2016. The contracts for Cape communities will expire in 2015 or 2016.
- The 28 communities generated approximately 225,194 tons of residential MSW in 2006 that were sent to the SEMASS waste-to-energy facility under long-term contract.
- Martha's Vineyard's two waste management districts generate approximately 30,000 tons of MSW annually that is disposed off island.
- The combined MSW tonnage of the Cape's 14 communities, the 27 South Shore communities, and Martha's Vineyard would exceed 388,000 tons.
- This combined tonnage would equal 36 percent of the permitted waste stream disposed at the SEMASS facility under the 2006 Massachusetts Department of Environmental Protection permit.

1. Cape Cod's Waste Stream

Introduction

Cape Cod is home to approximately 225,000 year-round residents, and the population swells to more than one-half million during the summer months. Along with the seasonal rise in population and the concurrent business activity associated with the Cape's tourism, considerable quantities of municipal solid waste (MSW) are generated. MSW, more commonly known as trash or garbage, consists of everyday items such as product packaging, clothing, food scraps, and other non-recyclable, non-hazardous materials.

On Cape Cod, MSW is collected in a number of ways. Each town operates a municipal transfer station, and homeowners may opt to bring their MSW to their town's transfer station after paying a sticker fee to cover the town's costs to dispose of the waste. Homeowners may also elect to hire a private hauler to collect the MSW from the curb (also referred to as curbside collection). For curbside collection, the MSW, once collected from a residence, is either transported directly to a permitted disposal facility or transferred from the packer truck into another larger container for delivery to a disposal facility (landfill or waste-to-energy facility). Transfer stations are used on Cape Cod to collect MSW and recyclables because unlined landfills are no longer in operation. Also, transporting MSW off Cape is less expensive if the waste is collected and aggregated from individual packer trucks to larger containers for shipping.

MSW Generation Rates: 1991 to the Present

Cape Cod Commission staff has compiled information to quantify the waste stream of the region. It is vital to document the amount of MSW being generated on Cape Cod so those companies proposing waste disposal services can provide realistic estimates. This in turn will help the Committee make accurate conceptual comparisons to better evaluate alternatives.

Several sources of information are currently available, including data provided by the Massachusetts Department of Environmental Protection (DEP) in Boston. The DEP's annual "report card" uses assumptions that DEP staff

members have developed for determining both the tons of MSW and recyclables that a community generates. A second source of information is provided by Covanta Energy, owner/operator of the SEMASS waste-to-energy facility in Rochester, Massachusetts. Covanta staff members track monthly tonnage figures received at the facility from Cape towns; however, this monthly listing does not accurately separate municipal solid waste from commercially generated solid waste. In fact, neither the DEP nor Covanta's information is entirely accurate and neither will serve to provide a reliable indicator of the amount of MSW generated for disposal by all 14 Cape communities.

Another suggested method for determining the annual tonnage would be to calculate the number of single-family households on Cape Cod and multiply that figure by 1.15 tons (the amount of waste that each Cape household, on average, generates per year). This calculation could provide a more proportional figure for the total amount of MSW being generated on Cape Cod annually, and also balance out the increases and subsequent decreases in waste generation due to the Cape's seasonal population. (Note that this per-household figure differs from the higher per-capita figure described on page 3.)

Using this method, it is estimated that in calendar year 2006, the Cape's 14 communities generated approximately 135,000 tons of MSW (**Table 1**). The MSW was delivered to the SEMASS facility in Rochester under the current

TABLE 1: CAPE COD (NOT INCLUDING BOURNE) MSW DELIVERED TO SEMASS, 2006

Towns	Annual Maximum Tonnage[a]	MSW Without Hauler Tons[b]	MSW With Hauler Tons[c]	Number of Households[d]	Households x 1.15 tons
Barnstable	44,284	10,183	31,871	20,809	23,930
Brewster	6,617	6,904	9,858	6,400	7,360
Chatham	6,793	7,098	7,088	5,713	6,570
Dennis	12,322	11,258	11,637	11,875	13,656
Eastham	4,000	3,166	4,121	5,128	5,697
Falmouth	18,500	15,873	17,194	18,247	20,984
Harwich	8,003	4,510	7,510	8,404	9,665
Mashpee	7,228	6,981	6,983	7,006	8,057
Orleans	5,497	2,680	3,832	7,502	8,627
Otis/MMR	n/a	n/a	1,323	n/a	n/a
Provincetown	4,800	4,250	4,250	1,097	1,262
Sandwich	10,519	9,377	11,911	8,183	9,410
Truro	2,002	1,774	1,774	1,316	1,513
Wellfleet	2,600	2,394	3,808	3,081	3,543
Yarmouth	27,538	10,085	16,492	13,045	15,002
Total:	**160,703**	**96,533**	**139,652**	**117,806**	**135,276**

Source: DEP Municipal Data Report, 2006 update

[a] Each contract community has an Annual Maximum Tonnage (AMT) that may not be exceeded without penalty. To contend with growth, each community may annually seek a growth factor adjustment to the AMT based upon documented increases in population. The growth factor adjusts the AMT to reflect population increases and avoid fiscal penalties for MSW overage deliveries.

[b] This figure does not include residential subscription hauler disposal tonnages (subscription service is contracted waste collection by a private hauler to collect MSW from a residence).

[c] This figure includes residential subscription hauler disposal tonnages.

[d] Household information is based on the most recently available assessors' information (2006).

Cape Cod delivered approximately 135,000 tons of residential MSW to SEMASS in 2006.

long-term solid waste disposal contract, which was signed in 1985 between the 14 Cape communities and Energy Answers, Inc., the original developer and owner of the SEMASS facility. Energy Answers negotiated the Tier One, 30-year disposal contracts under which the Cape towns continue to operate. At the present time, the Cape's MSW is delivered to SEMASS either by rail (formerly via the Bay Colony Rail Company from either the railhead facility in Yarmouth or the railhead facility on the Massachusetts Military Reservation in Falmouth) or by tractor trailer. **Tables 11 and 12** provide a snapshot of the means of delivery and approximate costs in 2006 of delivering MSW to the SEMASS facility.

Historic MSW Disposal Trends, 1991–2006

MSW tonnages have been compiled since 1991 (**Table 2**). Between 1991 and 1998, MSW increased by more than 66,000 tons (66 percent). However, MSW tonnages appear to have decreased significantly beginning in 1999 (due to a change in the way the DEP accounts for MSW) and has increased annually (35 percent) since 1999.

Forecasted Future Waste Generation Rates

Accurately anticipating the future population of Cape Cod is dependent on many factors and will, in part, determine how much MSW is generated annually in the future on Cape Cod. As such, it is important to look at future MSW generation rates when evaluating long-term disposal options. To do so, analyzing both population trends and MSW disposal trends provides an indicator of likely future MSW disposal. A population projection has been prepared based on past disposal trends (**Table 3 and Figure 1**). These population projections would indicate that the Cape's population will likely grow at 1.8 percent annually, depending on which set of assumptions in the Geometric Growth Rate table are determined to be best suited by the Committee.

According to DEP's Solid Waste Master Plan Update, it is estimated that each resident in Massachusetts generates approximately 7.5 to 7.8 pounds of MSW per day (1.4 tons per year). However, this figure is lower than the Cape's MSW per-capita generation rate of 1.7 tons in 2006. Using the figure of 1.7 tons, it is possible to calculate anticipated future MSW generation by multiplying annual per-capita MSW tons by the anticipated population on Cape Cod between 2007 and 2030. As shown in **Table 3 and Figure 1**, the estimated future MSW tons for Cape Cod may be approximately 282,913 tons in 2030.

Table 3 and Figure 1 show three estimates for future generation of MSW developed using different population growth scenarios. Each forecast assumes a constant annual growth rate from 2007 to 2030. The high forecast assumes 4.5 percent rate of growth in waste each year, whereas the middle forecast assumes 2.8 percent, and the low, 1.9 percent growth annually.

TABLE 2: HISTORIC MSW DISPOSAL TRENDS, 1991–2006

Towns	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991
Barnstable	31,871	31,330	31,605	29,940	8,959	11,800	20,981	21,188	46,483	45,644	46,079	46,167	42,293	40,700	34,435	10,537
Bourne	10,855	10,079	8,781	8,642	8,469	5,019	6,541	5,120	5,153	2,298	0	0	0	0	0	0
Brewster	6,904	5,147	6,446	6,333	6,713	7,418	6,553	6,921	5,695	7,235	7,105	5,937	4,487	3,649	4,325	4,745
Chatham	7,088	7,393	8,492	6,483	7,206	4,883	2,497	4,640	6,735	6,980	6,921	7,170	6,979	6,294	6,406	6,335
Dennis	11,258	13,155	11,791	6,045	12,421	7,334	15,059	9,233	12,475	12,594	12,146	10,641	11,935	11,942	12,370	12,752
Eastham	4,121	3,527	5,094	4,570	4,992	4,114	3,880	3,969	3,815	3,704	3,551	3,296	3,623	3,060	3,505	3,045
Falmouth	17,194	17,881	16,675	15,805	16,630	15,511	16,207	15,596	20,714	18,313	17,865	20,963	22,555	22,936	21,192	19,868
Harwich	5,086	4,876	4,870	4,879	4,738	4,305	3,973	3,811	7,343	7,753	6,795	6,710	7,071	6,938	7,005	6,865
Mashpee	6,983	6,819	6,692	6,614	6,237	10,721	8,946	7,243	7,143	6,586	6,662	6,245	6,544	6,039	5,738	5,721
Orleans	3,832	0	0	3,228	3,272	4,336	4,528	4,159	5,890	6,235	6,456	5,433	5,587	5,070	4,946	5,675
Otis/MMR	1,323	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Provincetown	4,250	4,382	4,575	4,630	4,584	4,999	2,768	2,523	5,154	4,889	4,748	4,482	4,365	1,767	1,548	546
Sandwich	11,912	12,161	10,145	11,061	9,706	8,390	7,948	7,779	10,435	10,261	10,231	10,155	10,447	9,644	9,603	10,303
Truro	1,774	2,009	2,071	2,004	2,020	2,155	1,914	2,112	2,111	1,948	1,920	1,727	2,133	1,918	1,765	1,749
Wellfleet	3,808	3,572	3,142	2,406	1,752	2,540	2,334	2,171	2,999	2,672	2,690	2,736	2,919	2,558	2,532	2,535
Yarmouth	16,493	15,951	15,756	15,201	8,871	8,975	7,478	9,397	24,508	27,119	24,909	24,444	26,009	23,025	19,067	9,897
Total:	**144,752**	**138,282**	**136,136**	**127,840**	**106,570**	**102,501**	**111,609**	**105,862**	**166,653**	**164,231**	**158,078**	**156,106**	**156,947**	**145,540**	**134,437**	**100,573**

Source: Cape Cod Commission/Barnstable County

TABLE 3: 2000–2006 TONNAGE PER CAPITA

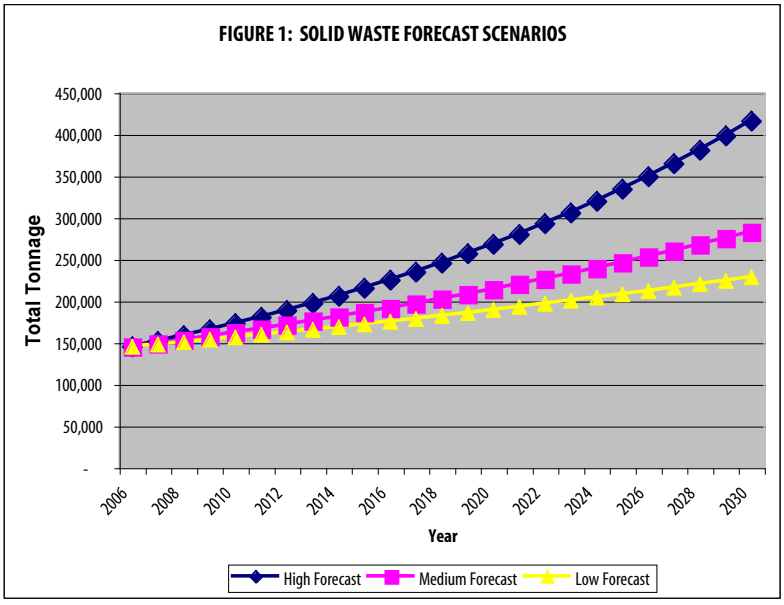
Geometric Growth Rates

Low Population Estimate	Medium Population Estimate	High Population Estimate
104.5%	102.8%	101.9%

Solid Waste

	Base Data	Tonnage Per Capita			Solid Waste Forecasts (Tonnage)		
	Total Tonnage	/Low Population	/Medium Population	/High Population	High Forecast	Medium Forecast	Low Forecast
2000	110,186	0.50	0.50	0.50			
2001	104,022	0.47	0.46	0.46			
2002	103,120	0.46	0.45	0.44			
2003	127,668	0.57	0.54	0.53			
2004	139,414	0.62	0.58	0.56			
2005	140,603	0.63	0.58	0.55			
2006	144,752	0.65	0.59	0.56			
2007					**151,591**	**149,171**	**147,855**
2008					158,397	153,380	150,687
2009					165,509	157,709	153,573
2010					172,941	162,159	156,514
2011					180,706	166,735	159,512
2012					188,819	171,440	162,567
2013					197,297	176,278	165,680
2014					206,156	181,252	168,853
2015					215,412	186,367	172,087
2016					225,084	191,626	175,383
2017					235,190	197,034	178,741
2018					245,750	202,594	182,165
2019					256,784	208,311	185,653
2020					268,314	214,189	189,209
2021					280,361	220,233	192,833
2022					292,949	226,448	196,526
2023					306,102	232,838	200,289
2024					319,846	239,409	204,125
2025					334,207	246,165	208,035
2026					349,213	253,111	212,019
2027					364,893	260,254	216,079
2028					381,276	267,598	220,218
2029					398,396	275,149	224,435
2030					416,283	282,913	228,733

FIGURE 1: SOLID WASTE FORECAST SCENARIOS



Each of the forecasts is based on the following assumptions:

a. MSW will grow at a linear rate in the future.
b. MSW generation in the future will be consistent with the actual generation between 2000 and 2006.

Methodology:

The growth rates used to prepare the three forecasts involve several steps:

The first step was to estimate population growth since the 2000 Census. Three possible growth scenarios were developed: low, medium, and high. The low population growth scenario was based on the average annual growth of the yearly Census population estimates for 2000–2006 (0.2 percent). The medium population growth scenario uses the 1990 Census and the 2000 Census to calculate an average annual growth (1.8 percent); this is the rate used by MISER/University of Massachusetts to prepare the population projections currently in use for 2010 and 2020. The highest population growth scenario uses an annual average growth rate (2.7 percent) over a longer period, 1990–2030. This is a forecast in and of itself and is based on the MISER forecast; however, this also takes into account the slower rate of population growth currently estimated for this decade.

The second step was to use these three population scenarios to calculate tonnages of MSW per capita from 2000 to 2006 using actual MSW generation data for that period. This allows waste generation to be compared and its growth averaged over time.

The third step was to calculate the average annual growth rates for the three estimates of MSW per capita for the period 2000–2006. These three rates are used to forecast the anticipated amount of MSW that would be generated in the future.

Projections:

The solid waste scenarios in **Table 3** (high, medium, and low forecasts) show a conservative (low), general (medium), and less conservative (high) solid waste projection. The high forecast results in a 287-percent increase in MSW between 2007 and 2030, while the medium and low forecasts result in a 95-percent and a 58-percent increase in MSW, respectively, between 2007 and 2030.

It is recommended that the general (medium) solid waste projection serve as an indicator of how much MSW the Cape may generate in the future, as the conservative estimate would seem to result in a projection that is too high, while the less conservative estimate results in a projection of MSW that appears to be too low.

Recycling

Recycling plays an important role in determining future MSW projections for Cape Cod. Recycling rates for Cape communities are shown in **Table 4** and indicate that, between 1995 and 2006, the recycling rate averaged 23.7 percent for all of the Cape towns. The overall average recycling rate for Cape Cod in 2006 was 27.7 percent. It is anticipated by the DEP that recycling rates will increase modestly due to the 56-percent recycling goal established by the DEP to be met by 2010. To assist in meeting this goal, the DEP is focusing on additional segments of the residential waste stream, including possibly banning the disposal of organic materials (leaves, yard waste, and food waste). As such, should new waste ban regulations be promulgated in the future, the recycling rate for Cape communities could increase. Furthermore, recycling rates may also increase if the costs for waste disposal make pay-as-you-throw a viable cost-control tool for the Cape municipalities to implement. Trying to anticipate future recycling rates will give a clearer indication of MSW tons the Cape will generate during the period of a new disposal contract.

TABLE 4: CAPE RECYCLING RATES (PERCENTAGES), 1995–2006

	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
Barnstable	12	13	11	12	32	29	13	19	17	6	8	16
Bourne	33	41	41	39	40	44	45	43	43	35	25	22
Brewster	18	20	22	0	0	0	13	16	17	14	14	24
Chatham	21	20	18	24	0	29	28	44	31	26	23	8
Dennis	23	22	17	35	22	0	25	0	45	49	37	17
Eastham	31	36	24	26	23	27	18	19	19	18	15	14
Falmouth	42	42	42	43	46	45	38	40	37	43	33	31
Harwich	46	45	48	49	48	45	58	55	50	51	34	26
Mashpee	24	26	26	31	22	16	11	9	13	11	12	18
Orleans	26	0	0	0	0	0	0	30	27	17	21	34
Provincetown	18	16	25	18	17	22	23	28	29	19	17	14
Sandwich	22	20	21	18	22	43	26	38	37	38	29	34
Truro	46	42	33	55	61	34	26	26	23	25	24	11
Wellfleet	26	28	30	0	38	34	0	26	30	32	25	18
Yarmouth	39	40	31	44	60	59	57	30	34	21	54	4
Average:	**27.7**	**26.5**	**25.2**	**25.5**	**26.6**	**26.6**	**24.5**	**30**	**29**	**26.6**	**24.2**	**18.3**

Source: Massachusetts Municipal Recycling Rates, Fiscal Years 1995–2001 and Calendar Years 2002–2006

Factors Affecting Waste Generation

As has been previously shown, the quantity of MSW that is generated on Cape Cod varies year to year. Several factors can have an impact on the amount of MSW that is generated, including each town's recycling rate, the national and regional economic climate, population fluctuations, and possible changes to state regulations governing solid waste. Understanding the interrelationship

of these factors on anticipated tons of MSW that the Cape communities will generate in the future will allow for a more accurate projection of MSW tonnages when a new disposal contract is negotiated.

Economy, Population, and Regulatory Requirements

As indicated above, recycling can have an impact on anticipated future waste tonnages. Other factors to consider when trying to anticipate future waste disposal trends include global and regional economic concerns. A national or regional economic downturn would likely impact the consumption of consumer goods. Consequently, there would likely be a decrease in the amount of MSW requiring disposal.

Closely linked with economic issues is the increase or decrease in population on Cape Cod. Population fluctuations often mirror the rise or downturn of regional economies. As a desirable destination for tourists, second-home buyers, and retirees, Cape Cod's population will likely increase by 2.8 percent in the future; thus MSW tonnages will likely continue to increase in the future (**Table 3**).

Regulatory changes include possible new solid waste bans on organic materials (including food wastes and other organic materials). As previously indicated, any new waste bans would likely increase recycling rates and reduce MSW tonnages.

In summary, economic issues, population changes, and new regulatory requirements can each play a unique role in determining the amount of MSW generated on Cape Cod in the future. As such, it is important to evaluate the impact of each indicator on future waste projections.

2. Current Waste Disposal System

National, State, and Regional Context

Over the last few decades, the use of landfills for the disposal of MSW has changed dramatically, primarily as a result of the promulgation of the US Environmental Protection Agency's (EPA) Subtitle D regulations in 1991.[ii] By requiring landfills to construct liners, monitor groundwater, and establish closure funding, landfill operations have become more sophisticated, complex, and, as a result, costly to operate. This has led to the closure of many small, municipally owned and operated landfills across the nation.

Largely as a result of these more stringent regulations and higher costs, the United States now has fewer landfills, which are, on average, getting larger in size. According to the EPA, the number of landfills in the United States decreased from 7,924 to 1,654 between 1988 and 2005 (a 79-percent decrease). As a result, the average landfill has increased in capacity over the past 17 years, handling from less than 70 tons per day to approximately 300 tons per day.

Given Subtitle D and the subsequent concerns about impacts to groundwater, the Cape began closing its unlined landfills in the early 1990s and to evaluate available options for waste disposal. Concurrent to the Cape towns dealing with the implications of Subtitle D, Energy Answers, Inc., contemplated a new waste-to-energy (WTE) facility in Rochester, Massachusetts, that could provide up to 1,800 tons per day of solid waste disposal capacity.

Ninety-eight waste-to-energy facilities operate in the United States, processing about 13 percent of the nation's solid waste.

SEMASS Waste-to-Energy Facility: History and Management

Currently, 600 WTE facilities are in operation around the world. According to the National Solid Wastes Management Association, the United States is home to 98 WTE facilities operating in 29 states. These facilities manage approximately 13 percent of America's total trash output (245 million tons in 2005, or approximately 4.5 pounds of per day).[iii]

ii. US Environmental Protection Agency, www.epa.gov/epaoswer/osw/laws-reg.htm
iii. US Environmental Protection Agency data, www.epa.gov/msw/facts.htm

In 1981, Energy Answers was formed and began focusing on the development of projects using processed refuse fuel technology. Several years later, this focus led to the development of the SEMASS waste-to-energy facility, which is located at 141 Cranberry Road in Rochester, Massachusetts. After considerable environmental review and contract negotiations with both the Cape and several South Shore communities, construction began on the SEMASS Resource Recovery Facility. In 1989, SEMASS commenced operations and soon after Energy Answers began planning to increase the facility's capacity to 2,700 tons per day.

In 1998, the SEMASS Resource Recovery Facility was sold to American Ref-Fuel. In 2005, American Ref-Fuel was purchased by Covanta Holdings, Inc. of Fairfield, New Jersey. Covanta is an owner and operator of waste-to-energy and power-generation projects. The acquisition of American Ref-Fuel provided Covanta with an additional six WTE facilities in the northeastern United States that have a total waste-processing capacity in excess of 13,000 tons per day, as well as a waste-procurement company and two transfer stations in Massachusetts. Covanta currently operates 25 WTE facilities in 14 states and processes approximately 31,000 tons of waste per day (**Table 5**).

Waste-to-energy facilities in Massachusetts processed 3.14 million tons of waste in 2005.

TABLE 5: ANNUAL PERMITTED PROCESSING CAPACITY, WTE FACILITIES IN MASSACHUSETTS

Facility Location	Annual Permitted Capacity (Tons)	Daily Permitted Capacity (Tons)
Agawam	116,099	360
Haverhill	555,333	1,650
Millbury	472,125	1,500
North Andover	442,341	1,500
Pittsfield	73,038	240
Rochester/SEMASS	**1,059,763**	**2,700**
Saugus	425,916	1,500
TOTAL:	3,144,615	9,450

Source: Massachusetts Department of Environmental Protection, www.mass.gov/dep/index.htm

According to the disposal contracts signed in 1985 (all similar, aside from the one for the Town of Wellfleet), the basic service tip fee for all Cape communities was $14.99 per ton. Per applicable articles in the contracts, change-in-law fees have been assessed and added to the basic fee at the time of their respective implementation. At this time, the basic tip fee and change-in-law fees are as follows:

Basic tip fee	$14.99
Maximum Achievable Control Technology (MACT) fee	$15.00
Acid gas fee	$7.00
Financial Assurance Mechanism (FAM) fee	$0.02
Sampling and testing fee	$0.50
TOTAL Tip fee with change-in-law costs:	**$37.51**

The total tip fee (not including transportation costs) in 2006 was $37.51. It is important to note that a credit has been issued to all towns subject to the

MACT surcharge from the Renewable Energy Trust Fund, which is overseen by the Massachusetts Technology Collaborative. This credit, which varies by town, has over the last few years served to reduce that particular fee assessed to each town.

TransRiver, a wholly owned subsidiary of Covanta Energy, provides waste procurement services to Covanta Energy's waste disposal and transfer facilities that have available capacity to receive waste. In doing so, TransRiver seeks to maximize Covanta Energy's revenue and ensures that Covanta Energy's facilities are being used most efficiently, taking into account maintenance schedules and operating restrictions that may exist from time to time at each facility. TransRiver also provides management and marketing of ferrous and non-ferrous metals recovered from waste-to-energy operations, as well as services related to non-hazardous special waste destruction and residue management for Covanta Energy's waste-to-energy projects.

Service Area

SEMASS provides the communities of southeastern Massachusetts with an alternative to either landfilling MSW or disposing MSW out of state. The SEMASS service area primarily encompasses the geographic area south of Boston, west to Bellingham, east to Provincetown, and south to Martha's Vineyard. The majority of municipalities within those geographic boundaries have contracted with SEMASS for municipal solid waste disposal (**Table 6**). The population within this area is approximately one million people and represents over 300,000 households.

Long-term disposal contracts with SEMASS for 28 of the 60 Massachusetts communities are due to expire between 2014 and 2016.

TABLE 6: SEMASS CONTRACT COMMUNITIES AND CONTRACT EXPIRATION DATES

Abington – 2010	Acushnet – 2016	Attleboro – 2014	Avon – 2001	**Barnstable – 2015**
Bellingham – 2010	Berkley – 2009	**Bourne – n/a**	Braintree – 2015	**Brewster – 2015**
Canton – 2015	Carver – 2015	**Chatham – 2015**	Cohasset – 2008	**Dennis – 2015**
Dighton – 2010	Duxbury – 2015	**Eastham – 2015**	Fairhaven – 2015	**Falmouth – 2015**
Freetown – 2016	Halifax – 2009	Hanover – 2009	Hanson – 2015	**Harwich – 2015**
Hingham – 2009	Holbrook – 2009	Kingston – 2015	Lakeville – 2010	Marion – 2015
Martha's Vineyard – 2015	**Mashpee – 2015**	Mattapoisett – 2016	Middleboro – 2015	Norfolk – 2008
Norwell – 2015	**Orleans – 2015**	Otis MMR –2015	Pembroke – 2014	Plymouth – 2015
Plympton – 2009	**Provincetown – 2015**	Quincy – 2013	Randolph – 2012	Rochester – 2015
Rockland – 2010	**Sandwich – 2015**	Scituate – 2009	Sharon – 2015	Stoughton – 2015
Truro – 2015	Waltham – 2014	**Wellfleet – 2016**	West Bridgewater – 2015	Weymouth – 2009
Whitman – 2012	Wrentham – 2016	**Yarmouth – 2015**		

Permitted Operations

The SEMASS facility operates three boilers that processed 1,079,556 tons of MSW in 2006, or approximately 2,958 tons per day. The processed refuse fuel technology recovers recyclable materials from the waste and generates approximately 80 megawatts of electrical energy per year. This electricity, which is sold directly to the grid under contract with Commonwealth Electric

Company, meets the electrical energy needs of more than 75,000 homes.[iv] The facility has been in continuous operation since 1989 and, since that time, allowed more than 40 communities to close their unlined landfills. The WTE facility also recovered nearly 47,000 tons of recyclable metals from the waste stream in the pre- and post-combustion phases of plant operations in 2006.

As previously stated, the SEMASS facility processes more than 2,900 tons per day of municipal solid waste. One of the by-products of the combustion process is ash (both bottom ash and fly ash) that is currently commingled and landfilled at the Carver-Wareham-Marion (CMW) facility in Carver, Massachusetts. In 2006, 334,458 tons of ash were generated at the Rochester facility (**Table 7**). Of that amount, 176,757 tons of ash were disposed of at the CMW landfill in Carver, while 157,701 tons of ash were beneficially reused as daily cover and for a gas-venting layer at the CMW landfill. It is *estimated* that the costs for the disposal of ash at the CMW landfill as a percentage of the MSW disposal fee at the SEMASS facility are approximately 30 percent.

According to the DEP's 2005 Solid Waste Master Plan Update, the current operating permit for the CMW landfill will expire in 2013. There does not appear to be any additional capacity proposed at the landfill due to site constraints. As such, diverting the ash to another disposal site (either in-state or out-of-state) could result in increased costs to SEMASS's operations; consequently, this could impact future tip fees in the form of higher prices.

TABLE 7: ASH GENERATION AND METALS RECOVERY (IN TONS) AT THE SEMASS FACILITY, 1997–2006

	1997	1999	2001	2003	2005	2006
MSW per year	988,506	1,005,351	1,134,082	1,243,784	1,188,608	1,179,275
Total ash generated	235,588	213,728	241,308	223,129	237,705	334,458
Ash disposed in landfill	175,310	115,406	143,697	133,948	101,984	176,757
Metal recovered pre-burn	20,816	20,994	25,670	25,939	22,125	33,242
Metal recovered post-burn	21,750	20,207	24,539	21,017	27,108	13,626
Total metal recovered	42,566	41,201	50,209	46,956	49,233	46,868*

*Information provided by the Massachusetts Department of Environmental Protection's 2006 Annual Solid Waste Facility Report

SEMASS generated more than 334,000 tons of ash in 2006, landfilling nearly 177,000 tons of it in Carver, Massachusetts.

Revenue Streams

Tip Fees, Power Generation/Electricity, and Recovered Metals

As will be further elaborated below, the SEMASS waste-to-energy facility obtains revenue from three components of its operations: tip fees, power sales, and sales of recovered metals. These sources of income (revenue), when compared to anticipated expenses, are important to understanding what future tip fees might be. As outlined below, revenues associated with recovered metal sales and power sales have been compiled. Income associated with tip fees can be roughly estimated based on an average of tip fees paid by all contract

iv. Covanta Energy's Facilities web page, www.covantaholding.com/site/locations/covanta-semass.html

communities. At this time, the revenues associated with tip fees have not been fully calculated.

Significant tonnages of metals are recovered from the waste stream and recycled every year (**Table 8**). In 2006, 1,179,275 tons of municipal solid waste were processed by the SEMASS facility. Of that amount, 33,242 tons of metal were recovered before incineration, and 13,626 tons of metal were recovered after incineration (46,868 tons of metal recovered in total, or 4 percent of the total waste stream in 2006). This metal, a recyclable product, is sold as a commodity by TransRiver to a variety of local/regional and out-of-state recycling firms and is a component of the facility's overall revenue stream.

SEMASS recovered almost 47,000 tons of metal from the waste stream in 2006.

TABLE 8: METALS RECOVERY AT SEMASS FACILITY, 2006

	Facility Name and Location	Type of Metal	Tons
Scrap metal*	Mid-City Scrap/Westport	Scrap metal	840
	Interstate Refrigerant Recovery/Foxboro	Propane tanks	25
Pre-combust	Champion City/Brockton	Ferrous	25
	Poscor Mill Services/Ontario, Canada	Ferrous	42
	WTE, Greenfield, MA	Ferrous	32,335
Post-combust	WTE/Greenfield, MA	Ferrous	9,913
	Mid-City Scrap/Westport, MA	Ferrous	32
	MRC/Troy, NY	Non-ferrous	3,410
	Mid-City Scrap/Westport, MA	Non-ferrous	271
Total ferrous metals:			43,212
Total non-ferrous metals:			3,681
ESTIMATED revenue associated with sale of metals before transportation costs:			$7,360,000**

*The current market rate for recycling of ferrous metals is approximately $155–$175 per ton. Market rates for non-ferrous materials are dependent on the types of metals and may be as high as $200 per ton.
This estimated revenue **does not include the cost of transporting the metals to an intermediate processing facility. High transportation costs can reduce direct revenue by up to 50 percent.

Energy Production

As the owner/operator of a waste-to-energy facility, Covanta also derives revenue from the sale of electricity. The facility generates approximately 500,000 watts of power annually, which it sells to the Commonwealth Electric Company under a 10-year contract (**Table 9** provides an overview of revenues derived from power sales). The current agreement with Commonwealth Electric is due to expire in 2015.

Due to the passage of the Energy Policy Act of 2005, certain changes to the federal energy laws that are applicable to Covanta Energy's energy sales business have been implemented and are worthy of mention. The Energy Policy Act of 2005 amended certain provisions of the Public Utilities Regulatory Policies Act of 1978 (PURPA). PURPA, through regulation promulgated by the Federal Energy Regulatory Committee, exempted qualifying facilities (QFs) such as SEMASS from certain provisions of the Federal Power Act and

TABLE 9: ELECTRICAL GENERATION AND ESTIMATED REVENUES, SEMASS FACILITY

Facility	Unit Type	Net Capability		Fuel Type
		Summer	Winter	
SEMASS 1	ST	46.18	50.74	MSW
SEMASS 2	ST	20.85	24.32	MSW
	Totals:	**67.03**	**75.06**	

Estimated Average Summer and Winter (MW)	71
Estimated Average Annual Capacity Factor (%)	80
Estimated Annual Gross Generation (MWh)	500,062
Estimated Average Electric Sale Price ($/MWh)	$50
Estimated Gross Electric Sales Revenue ($)	**$25,003,080**

Source: Kevin Galligan, Energy Efficiency Program Manager, Cape Light Compact, 2006

certain state laws that regulated the rates charged by electric utilities. The PURPA exemptions to QFs were significant to Covanta Energy, as state public utility commissions approved the rates by which public utilities purchased power from QFs.

Since the Energy Policy Act of 2005, the mandatory purchase-and-sale obligation imposed on utilities for the benefit of QFs has been terminated. Any new power sale contracts are subject to the competitive power sales market and could result in less power sale revenues to Covanta. As such, this regulatory change *could* play a role in higher tip fees under a new long-term disposal contract with SEMASS.

Life Span of Waste-to-Energy Facilities

The anticipated life span of a waste-to-energy facility is dependent on many factors, primarily the schedule of required maintenance for each plant to keep it operational. Such information is not currently available for review; however, should the Committee and the Cape towns opt to consider a new waste disposal contract with Covanta Energy, assurances would be sought that the facility's life span will exceed the length of a new contract term.

Disposal Costs to Towns under Contract

As previously indicated, 60 communities have signed disposal contracts with the SEMASS facility. Not all 60 municipalities listed are Tier One communities, as many have more recently signed disposal contracts ranging from 5 to 15 years. For example, Rockland signed a 15-year contract with a 5-year extension on June 27, 1995. Unlike the Cape's Tier One contracts, Rockland's tip fee is not fixed. The contract rate began in 1995 at $46.00 per ton and increases annually until 2014, when the tip fee will be $98.00 per ton (see **Table 10** for a list of other off-Cape communities that have more recent disposal contracts with SEMASS). These contracts may provide some indication of the possible future costs of MSW disposal for those Tier One communities should those communities opt to wait until their existing contract expires to enter into a new disposal agreement with SEMASS.

TABLE 10: RECENT DISPOSAL CONTRACTS WITH COVANTA ENERGY/SEMASS

Town	Date Signed	Length of Term	Base Tip	Escalators (Yes/No)	Change in Law (Yes/No)
Natick	May 26, 2006	February 28, 2029	$63.00	Annual CPI adjustment	Yes
Rockland	July 1, 2005	June 30, 2015	$76.50	Approx. $2.00 annual	Yes
Attleboro	July 2004	June 2014 with 5-year extension	$68.00 to $75.50	No	Yes
Scituate	2005	3 years with 3-year extension option	$87.33 with haul	Annual CPI adjustment	Yes
Hingham	2003	10 years	$87.53 with haul	n/a	n/a
Weymouth	2003	5 years	$82.67	n/a	n/a

Source: Phone calls made to each community's Board of Health, DPW Department, or Town Manager's office

Transportation Costs

MSW from Cape Cod is transported to the SEMASS facility by either rail or tractor trailer. The hauling costs vary according to the mode of transportation, and are also determined by the party hauling waste via tractor trailer. For example, several Lower Cape communities have traditionally opted to haul their MSW in town-owned and operated vehicles. Other towns have contracted out this service to private haulers. As such, the pricing structure varies, and assumptions have been made in this report to allow a general comparison of transportation costs for those towns that haul waste by tractor trailer.

Over-the-Road Hauling

Nine of the Cape's 15 communities currently haul their MSW to SEMASS via tractor trailer.

Nine Lower Cape towns currently deliver MSW to SEMASS in tractor trailers: Brewster, Chatham, Dennis, Eastham, Harwich, Orleans, Provincetown, Truro, and Wellfleet (**Table 11**). Of those, five municipalities drive the MSW to SEMASS in town-owned tractor trailers. The remaining towns hire private hauling companies to deliver the MSW to SEMASS from the local transfer station. The costs associated with delivering MSW to SEMASS by tractor trailer vary and are summarized above.

TABLE 11: CAPE TOWNS HAULING MSW TO SEMASS

Town	Town Haul	Private Hauler	Cost per Ton	Cost per Trip	Cost per Year
Brewster	Yes	No	$25.00 (+/- 20 tons)	$500.00	
Chatham	No	JW Dubois	$16.50 (+/- 20 tons)	$330.00	$120,000
Dennis	Yes	No	$12.50 (+/- 25 tons)	$313.95	
Eastham	No	Daniels Recycling	—	$245.00	$55,000
Harwich	Yes	No	$5.14 (+/- 30 tons)	$154.25	
Orleans	No	Daniels Recycling	$14.95 (19 to 22 tons)	$299.00	
Provincetown	No	J and L	$15.29		$65,000
Truro	Yes	No	$1.50 to $2.00		
Wellfleet	Yes	No	$24.39		

The figures above are for 2006 and were gathered through a telephone survey in July 2007.

Table 11 also indicates that five towns drive their MSW to SEMASS in town-owned trucks, while four towns have contracted this service out to various private haulers. The average cost per ton for this service is $14.44 (this figure is derived by combining the costs per ton and dividing that total by the number of towns listed, not including Eastham). By comparison, Childs Inc. hauls MSW from the Yarmouth rail facility by tractor trailer when the SEMASS tipping mechanism is down, at a cost of $16.00 per ton. Similarly, Cavossa Inc. hauls MSW from the Upper Cape Regional Transfer Station to SEMASS for $8.00 per ton. Better understanding this cost structure is important should those nine towns wish to consider railing the MSW to SEMASS (see **Table 12** for the costs associated with using the Yarmouth railhead).

Also, should a decision be made in the future to deliver the Cape's MSW by rail to an out-of-state disposal facility, an indication of these transportation costs will be vital for budgetary purposes as the waste will likely have to be hauled from either Yarmouth or the Upper Cape Regional Transfer Station for shipment via short line to Middleboro, Massachusetts, and from Middleboro to an out-of-state destination.

Rail

At the present time, delivery of MSW to the SEMASS facility by rail is provided by MassCoastal (headquartered in Hyannis, Masachusetts), the newly designated short-line operator, which leases the state-owned rail line between Yarmouth and Middleboro from the Massachusetts Executive Office of Transportation. As previously stated, there are two railhead facilities located on Cape Cod. The Yarmouth railhead is located at the eastern terminus of the Cape's rail line and is staffed by Yarmouth town employees. The Otis railhead, located on the Massachusetts Military Reservation (MMR) in Falmouth and staffed by Falmouth town employees, operates under the oversight of a board of governors, which is made up of one representative from the towns of Falmouth, Mashpee, Bourne, Sandwich, and a representative from the Otis/Massachusetts Military Reservation. **Table 12** provides a listing of the tons of MSW that were railed from these two facilities in 2006, as well as the costs associated with hauling MSW from those facilities to SEMASS.

Yarmouth Rail Facility

The Yarmouth railhead facility, located off Station Avenue (Route 6, Exit 8), is permitted by the DEP to handle up to 190,000 tons of MSW annually (averaging 1,825 tons per week), or up to 525 tons per day. The facility transfers both residential and commercial MSW collected by private haulers, as well as Yarmouth's and Barnstable's MSW from the two towns' transfer stations. This waste is put into rail cars and hauled to the SEMASS waste-to-energy facility. The rail cars currently in use each carry 220 cubic yards (50 tons) of MSW. As such, approximately two loads of MSW hauled in a 110-yard container truck fit onto one rail car and provide environmental benefits due to fewer vehicle trips between Cape Cod and SEMASS.

About 140,000 tons of residential and commercial solid waste were delivered to SEMASS by rail in 2006.

TABLE 12: RAILHEAD FACILITIES ON CAPE COD

Railheads and Towns Served	Tons Delivered, 2006 Residential	Commercial	Hauling Costs/Fees*
Yarmouth			
Barnstable	94,951**		$86.57/ton for
Yarmouth			commercial waste
Upper Cape Regional Transfer Station			
Bourne***	2,598	—	n/a
Falmouth	15,873	6,134	pending
Mashpee	6,981	2,875	n/a
Otis MMR	1,323	—	n/a
Sandwich	7,510	1,669	$106.80/truck/20 to 22 tons
Total:	129,236	10,678	
Total Residential and Commercial:	139,914 tons		

*Fees include tip fees, rail delivery fee, Upper Cape Regional Transfer Station O and M fee, and the costs to move the MSW from the transfer stations to the Upper Cape Regional Transfer Station.
**Yarmouth railhead tonnages include both municipal and commercial waste tonnages that are delivered to SEMASS.
***Bourne's contract with SEMASS has expired and the town does not use the Upper Cape Regional Transfer Station facility for MSW disposal at SEMASS. However, it remains a partial owner of the facility and is represented on the Board of Governors.
Source: Phone calls made to facilities or towns, 2007

Currently, per an intermunicipal agreement between Covanta Energy and both Barnstable and Yarmouth, Covanta provides both towns with a handling fee of $7.00 per ton for the first 59,000 tons of MSW handled at the Yarmouth railhead and $5.00 per ton for each ton above that amount. These monies are paid to the towns and are used to cover operation and maintenance costs at the Yarmouth rail facility. At the present time, the gate fee (the fee that all permitted haulers pay to tip their waste) at the Yarmouth railhead is $86.57 per ton.

Per the intermunicipal agreement, Barnstable and Yarmouth do not pay a rail transportation charge for their MSW that is collected at the transfer station and shipped via rail to SEMASS. The contract between Covanta Energy, Yarmouth, and Barnstable will expire in December 2014.

Covanta paid Bay Colony Railroad (the previous short-line operator) $70.00 per car to switch the rail cars into and out of the unloading facility in Rochester. This amounted to an annual fee of $450,000–$500,000 that Covanta paid to Bay Colony. As MassCoastal has very recently won the state contract to operate the short line, this switching fee agreement may be subject to change.

Upper Cape Regional Transfer Station (UCRTS) Facility

The UCRTS rail facility is located off Kitterich Road in Falmouth. The facility provides regional solid waste transfer of MSW for the towns of Bourne, Falmouth, Mashpee, and Sandwich and the Otis/Massachusetts Military Reservation. On average, six or seven rail cars of MSW are pulled from the

UCRTS facility to SEMASS daily. As of October 2007, the costs associated with using the transfer facility to ship MSW to SEMASS were estimated as:

$37.51	Contract tip fee at SEMASS
$10.71	Rail fee*
$6.00	Operations and maintenance fee at the UCRTS facility
$5.50	Average fee per ton to pull MSW from the transfer stations to UCRTS
$59.72	**Total**

*This rail fee may have changed due to MassCoastal being selected by the Massachusetts Executive Office of Transportation as the short-line rail operator.

It is important to note that each town accounts for the per-ton pull fee differently, as some towns pull the MSW from the transfer station using a private hauler as part of an annual management contract, while other towns use town trucks and town employees to haul the MSW to the UCRTS. Given the varied means of delivery of MSW to the UCRTS, it is estimated that the total fee for those municipalities using the UCRTS rail transfer facility is approximately $59.72 per ton.

3. Municipal Solid Waste Disposal Capacity in Massachusetts

Massachusetts generated more than 14 million tons of MSW in 2005.

More than 2 million tons were landfilled.

More than 3 million tons were incinerated.

1.35 million tons were exported out of state.

Massachusetts generated 14 million tons of solid waste in 2005 (**Table 13**). Of that amount, 7.6 million tons were diverted (recycled) from disposal. The remainder—6.5 million tons—was disposed of in one of three ways: landfills (32 percent), WTE facilities (47 percent), or exported out of state (21 percent).

TABLE 13: MASSACHUSETTS SOLID WASTE MANAGEMENT, 2000–2005

	Tons						% Change,
	2000	2001	2002	2003	2004	2005	2004–2005
Generation	12,960,000	12,780,000	13,240,000	13,210,000	13,930,000	14,140,000	1.5%
Diversion	6,500,000	6,440,000	6,790,000	6,860,000	7,580,000	7,620,000	0.5%
Disposal	6,460,000	6,340,000	6,450,000	6,340,000	6,360,000	6,520,000	2.5%
Landfill	1,760,000	1,710,000	1,790,000	1,710,000	1,720,000	2,070,000	20.3%
Combustion	3,070,000	3,130,000	3,090,000	3,130,000	3,080,000	3,090,000	0.3%
Net Export	1,630,000	1,500,000	1,570,000	1,510,000	1,560,000	1,350,000	-13.5%

Source: Massachusetts DEP Solid Waste Master Plan Update, 2005

According to information provided in the DEP's 2005 Solid Waste Master Plan Update, there has been little new disposal capacity coming online in Massachusetts in recent years (**Table 14**). While the reasons for this lack of new disposal capacity range from "not in my backyard" to various economic factors that make landfilling out of state more attractive, the reality of limited new disposal capacity in Massachusetts is potentially problematic for a number of reasons. First, it is estimated by the DEP that MSW generation will increase by 2 percent per year. Without new capacity coming online to take the place of landfills that are closing, the need to export waste or find other creative ways to manage waste within the state's borders will increase. While waste-to-energy currently disposes of almost 50 percent of the state's solid waste, no new WTE facilities (or expansions to existing facilities) will be permitted due to a moratorium in place since 2000. Furthermore, it is not anticipated that the moratorium will be lifted at any point in the foreseeable future.

The DEP anticipates that recycling will play a lead role in diverting more of the waste stream, thus assisting the state in managing solid waste disposal within its own borders. However, according to information provided in

the DEP Master Plan Update, it is anticipated that total diversion of MSW will slightly increase from 31 percent in 2005 to 32 percent by 2010. This slight increase in the rate of diversion will be accompanied by a decrease in permitted landfill capacity by 2010 (**Table 14**), necessitating the export of more waste out of state or a drastic increase in recycling rates through the implementation of new state-sponsored waste bans.

The implication of a projected decrease in landfill capacity within the state will require a sizeable percentage of the solid waste stream generated in Massachusetts to be disposed of out of state. Also, the costs associated with disposing of solid waste within Massachusetts will inevitably be higher, as limited disposal capacity, coupled with an increase in tons of waste to be disposed, will only serve to drive up the rates for in-state disposal. For those communities that have been accustomed to low tip fees for many years, the fiscal reality of solid waste management in Massachusetts will soon come as a major shock. Planning for this inevitability is the focus of this report and requires a management approach that includes close consideration of the costs—and potential opportunities—associated with a variety of waste disposal options.

TABLE 14: MASSACHUSETTS LANDFILL DISPOSAL CAPACITY, 2007–2013

Active Landfills	Life of Landfill	TONS						
		2007	2008	2009	2010	2011	2012	2013
Barre	2013	93,600	93,600	93,600	93,600	**93,600**	**93,600**	**93,600**
Bourne	2024	219,000	219,000	219,000	219,000	219,000	**219,000**	**219,000**
Carver	2013	97,982	97,982	97,982	97,982	97,982	97,982	97,982
Chicopee	2012	365,000	365,000	365,000	365,000	365,000	365,000	0
Dartmouth	2028	132,600	132,600	132,600	132,600	132,600	132,600	**132600**
Fall River	2011	468,000	468,000	**468,000**	**468,000**	**468,000**	0	0
Granby	2011	235,000	235,000	**235,000**	**235,000**	**235,000**	0	0
Hardwick	2006	0	0	0	0	0	0	0
Middleboro	2011	9,620	9,620	9,620	9,620	9,620	0	0
Nantucket	2017	**26,000**	**26,000**	**26,000**	**26,000**	**26,000**	**26,000**	**26,000**
Northampton	2009	50,000	50000	50,000	0	0	0	0
South Hadley	2011	**156,000**	**156,000**	**156,000**	**156,000**	**156,000**	0	
Southbridge	2019	180,960	180,960	180,960	180,960	180,960	180,960	180,960
Sturbridge	2016	410	410	410	410	410	410	410
Taunton	2013	120,120	120,120	120,120	120,120	120,120	**120,120**	**120,120**
Warren	2012	2,000	2,000	2000	2,000	2,000	2,000	0
Wayland	2008	2,345	2,345	0	0	0	0	0
Westminster	2025	296,400	**296,400**	**296,400**	**296,400**	**296,400**	**296,400**	**296,400**
Total permitted capacity:		2,537,837	**2,355,037**	**1,271,292**	**1,221,292**	**1,127,692**	**413,952**	**279,352**
Total potential capacity:		2,537,837	**2,455,037**	**2,452692**	**2,402,692**	**2,402,692**	**1,534,072**	**1,167,072**

Source: Massachusetts DEP Solid Waste Master Plan Data Update, 2005
Permitted capacity is indicated with plain text. Potential additional capacity is indicated in **brown**.

4. Options Analysis

This section will detail the many solid waste disposal options that are available for the Cape communities to consider. To undertake this analysis, several major solid waste companies operating in the United States were contacted, including Allied Waste/BFI, Republic Services, Waste Management, and Veolia North America. Each of the companies provides a wide range of solid waste disposal operations, including owning and operating landfills and waste-to-energy facilities, and operating large-scale waste-hauling services. Cape Cod Commission staff also contacted many regional and local solid waste disposal companies, including Casella Waste Systems, Seneca Meadows Landfill in New York, We Care Environmental, and the Bourne Integrated Solid Waste Management Facility (ISWMF). After many conversations with representatives from these companies and other facilities, a list of disposal options has been compiled (**Table 15**).

It is important to note that not all of the disposal options identified in this section may be considered viable disposal options. It is the intent of this phase of the planning process only to recommend viable disposal alternatives. Due

TABLE 15: DISPOSAL OPTIONS

Company Name	Disposal Facility	Contact	Phone
Covanta Energy	Waste-to-energy	Thomas Demaio	508-291-4425
Bourne ISWMF	Landfill	Brent Goins	508-759-0651
Stearns and Wheler, LLC	Co-composting	Thomas Burkly	508-560-0388
Casella Waste Systems, Inc.	Landfill	Steve Wenzell	508-922-4825
Waste Management, Inc.	Landfill, waste-to-energy	John Wagman	978-697-7614
Allied Waste/BFI, Inc.	Landfill, waste-to-energy	Bruce Stanas	978-265-8296
Republic Services, Inc.	Landfill, waste-to-energy	Brian Bales	561-445-3618
Veolia North America	Waste-to-energy	David Blackmore	845-462-4650
Alternative Resources Inc.	Consultant/alternative	Jim Binder	978-371-2054
Seneca Meadows Landfill, NY	Landfill	Rocky Larocca	585-303-5881
ABC Disposal, Inc.	Hauler	Michael Camara	508-995-0544
We Care Environmental, Inc.	Composting/hauler	Chris Ravenscroft	508-480-9922
Patriot Recycling	Transfer facility/hauler	Chris Carney	508-726-7918
Cavossa Waste Disposal	Hauler	Carl Cavossa	508-274-8010
Za-Gen Technologies	Alternative	Bill Davis	
Civic Environmental System LTD	Alternative		
Environmental Developers Group	Alternative		
CSX	Rail haul		
Transload, Inc. (Pawtucket, RI)	Rail haul		

to the Cape's geographic proximity to a range of WTE facilities, in-state and out-of-state landfills, and several alternative technology waste disposal facilities, a wide range of alternatives may require a fair amount of future analysis.

It is also important to note that three methods could be used to transport the Cape's waste to other disposal facilities: tractor trailer, railroad, and barge. Nationally, truck transport has been the primary method of transporting solid waste over relatively short distances (less than 300 miles one way). Transporting waste by rail becomes cost competitive as distances to disposal sites increase; beyond a one-way distance of approximately 300–400 miles, rail transport provides beneficial economies of scale. Transport by barge is another alternative, given the Cape communities' proximity to the Cape Cod Canal. This method of transport is cost effective for transporting large quantities of waste over very large distances, but is often more expensive than truck or rail transport because of the capital costs involved with loading and unloading the waste. Also, the issues associated with permitting, designing, and constructing a facility to barge MSW to an out-of-state disposal site may make this alternative less attractive than more traditional forms of disposal.

Long List of Feasible Disposal Options

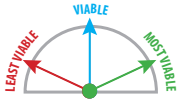
The Executive Summary reviews the set of criteria established to assist in the evaluation of all feasible disposal options. Those criteria will serve to assist the Contract Committee and Cape towns in narrowing the list of viable disposal options in Phase Two of this planning effort. The evaluation criteria consist of identifying a potential disposal facility providing a cost-effective tip fee, a willingness to provide a long-term disposal contract, feasible geographic proximity to Cape Cod, adequate annual permitted disposal capacity, adequate long-term disposal capacity, a proven performance track record (environmental and financial) of the potential disposal facility, and minimum financial risk exposure to the Cape communities.

Each waste disposal firm was contacted as it is involved in the transportation, handling and/or disposal of municipal solid waste. Through site visits, phone conversations, and/or emails, the companies provided information that will serve as a baseline in determining their viability as a provider of long-term waste disposal for the Cape communities.

A range of solid waste disposal options are grouped below into three distinct categories: **Most Viable**, **Viable**, and **Least Viable**. The most viable options, referred to as **green alternatives**, appear to meet all seven of the basic criteria for long-term waste disposal. The viable options, referred to as **blue alternatives**, appear to meet at least four of the seven basic criteria. The least viable options, referred to as **red alternatives**, appear to meet fewer than four of the seven basic criteria.

Evaluation Criteria:

- ***cost-competitive tip fee***
- ***long-term disposal contract (10-year minimum)***
- ***feasible geographic proximity to Cape Cod***
- ***adequate annual permitted disposal capacity***
- ***adequate long-term disposal capacity***
- ***demonstrated record of environmental and financial performance***
- ***minimum risk exposure to the Cape communities***



This section of the report groups the disposal options and makes recommendations to the Committee on which of the options should undergo further evaluation in Phase Two. ***The options are not listed in any particular order.***

Most Viable Options

SEMASS Waste-to-Energy Facility

The SEMASS waste-to-energy facility has, since 1989, provided the Cape communities with a viable, long-term solid waste disposal option. The anticipated life span of the facility would likely exceed an additional 20 years from the present time, making it a viable waste disposal option for the Cape to consider. Of benefit to the region is the facility's close geographic proximity to Cape Cod (approximately 10 miles from the Cape Cod Canal), and the fact that the facility's tip floor is served directly by the short-line rail line that delivers MSW collected from both the Yarmouth and UCRTS facilities.

Of note is the long-standing service that the SEMASS facility has provided to the Cape since the 1980s. The facility and its personnel are known to the Cape communities and its abilities to provide disposal service in the future remain without question.

Evaluation Criteria

Ability to provide a cost-competitive tip fee

As one of the primary disposal facilities in southeastern Massachusetts owned by a large national company, Covanta Energy/SEMASS will likely compete for the future disposal of Cape Cod's waste stream beyond the existing disposal contract (refer to Covanta Energy's Form 10-K, pages 5–9, for additional information about their business strategy).[v] In 2006, the Cape's MSW delivered to SEMASS comprised approximately 12 percent of the facility's permitted capacity. While future tip fees are not known, it is anticipated that a contracted tip fee will be very cost competitive with any of the other disposal options listed below. Phase Two will cover the specifics of possible future tip fees in more detail.

Ability to provide a long-term disposal contract (minimum of 10 years)

A review of recent contracts that were negotiated between other municipalities and Covanta Energy indicate that a 10-year disposal contract is feasible.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

The SEMASS facility is located approximately 10 miles from the Bourne Bridge.

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v. Covanta Energy Form 10-K, http://investor.shareholder.com/cva/sec.cfm?DocType=Annual&Year=2007

Provide adequate annual permitted disposal capacity

The SEMASS facility is currently permitted by the DEP to process more than 1,059,000 tons of MSW annually. Given the facility's operations since 1989, it is anticipated that this capacity will remain available for disposal in the future.

Provide adequate long-term disposal capacity

While the long-term life of the facility is not known, it is anticipated that the SEMASS facility will be in operation for at least the next 20 years.

Possess a proven track record of reliable environmental and financial performance

SEMASS is owned by Covanta Energy, which is a subsidiary of the Covanta Holding Corporation. According to the Form 10-K filed with the Securities and Exchange Commission for the fiscal year ending December 31, 2005: *"Covanta's acquisition of ARC Holdings markedly increased the size and scale of its Waste and Energy Services segment, and thus Covanta's business. While Covanta's consolidated assets increased to $4.7 billion at December 31, 2005 from $1.9 billion at the end of 2004, its consolidated debt increased to $2.9 billion from $1.3 billion in the same respective periods. The acquisition of ARC Holdings also provided Covanta Energy with the opportunity to achieve cost savings by combining its businesses with those of ARC Holdings and the opportunity to refinance its existing recourse debt and thereby lower its cost of capital and obtain less restrictive covenants in the credit agreements. With the acquisition of ARC Holdings, Covanta's management is focused on: providing its customers with superior service by operating its existing businesses to historic high standards; generating sufficient cash to meet its liquidity needs; paying down Covanta Energy's new debt, as well as project and intermediate holding company debt, with a stated goal of paying down $700 million in debt (at all levels) between 2005 and the end of 2007; and investing in and growing its business in order to create additional value for shareholders."* Given this information and the facility's environmental record, it appears to demonstrate a proven record of reliable environmental and financial performance.

Means of disposal must present minimum risk exposure to Cape communities

The Cape communities have disposed of MSW at the SEMASS facility under a long-term contract since the mid 1980s. This form of solid waste disposal presents minimal financial risk to the Cape communities.

Recommendation

It is not possible to estimate a future tip fee at the SEMASS facility accurately, as there are many variables to consider when negotiating a new waste disposal contract. Length of term, the amount of material to be delivered to the facility, determining who will provide transportation delivery services, and other concerns must be considered. Although it is useful to have (as an indicator) a listing of other communities that have signed disposal contracts

with SEMASS, this list should not be used solely to estimate the tip fees that the Cape communities would face if they were to re-negotiate a long-term disposal contract with Covanta Energy.

However, given the SEMASS facility's geographic proximity to all of the Cape communities, that it has all applicable permits in hand from the DEP and the towns of Rochester and Carver, and has the technical capabilities of the Covanta and TransRiver staff to oversee proper handling and disposal of MSW at the facility, **the SEMASS waste-to-energy facility should be considered one of the most viable disposal options for the Cape communities**.

Bourne Integrated Solid Waste Management Facility

The Bourne Integrated Solid Waste Management Facility (ISWMF) has been permitted by the DEP and the Cape Cod Commission for the disposal of various non-hazardous wastes, including MSW (up to 825 tons per day of non-hazardous solid wastes, or a maximum of 219,000 tons of non-recyclable materials per year).[vi] At the present time, the anticipated life span of the facility is difficult to estimate, as there are ongoing discussions between the Town Manager, Board of Selectmen, Board of Health, and ISWMF staff regarding the role the facility might play for both the town's and the region's solid waste management. A working group has been established by the Bourne selectmen to evaluate the needs and desires of the community and the future role that the ISWMF may play. It is anticipated the working group will make a recommendation in the near future on the long-term use of the facility.

Even with the future role of the facility being debated, the facility is a viable option for long-term disposal of the Cape's MSW. According to information prepared by Camp Dresser McKee, Inc. (*Final Report on Evaluation of Future Business Plan for Bourne Landfill*, September 2003), a total of more than 5 million cubic yards of capacity remains available for permitted waste disposal at the facility. As stated in Alternative Scenario Two of the Camp Dresser McKee report, should the facility accept 126,000 tons of MSW per year, the anticipated life expectancy of the landfill would extend until 2026. This scenario reflects landfilling of MSW. Should the town and ISWMF staff determine that processing MSW in some capacity (for example, co-composting) and landfilling residuals would be a more suitable activity, the life of the landfill could extend well beyond that time.

The working group recently met with representatives of Stearns and Wheler, a consulting firm that provided an overview of a co-composting technology for the working group's consideration. The working group and selectmen will evaluate this and other disposal proposals this year.

vi. Condition SW3, March 4, 2004, Major Modification #03021 to DRI Decision ENF #97031 dated February 17, 2000, and modified August 2001

Evaluation Criteria

Ability to provide a cost-competitive tip fee

The Bourne ISWMF is a town-owned and operated facility that was recently permitted to allow for the disposal of MSW. At the present time, the ISWMF provides regional disposal price competition. Depending on the wishes of the community and the decision of the selectmen, any future disposal alternatives will likely provide for cost-competitive disposal capacity.

Ability to provide a long-term disposal contract (minimum of 10 years)

The need to secure MSW for any waste disposal alternative is of considerable importance to the working group's current planning. It is anticipated that a long-term contract of at least 10 years is possible. It is not known if the ISWMF has any long-term disposal contracts in place with other communities at this time.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

The Bourne ISWMF is the only permitted MSW landfill on Cape Cod in operation at the present time. As it is located on the Cape peninsula and waste disposal vehicles would not have to cross the Cape Cod Canal bridges, its geographic proximity to the Cape towns makes it ideal.

Provide adequate annual permitted disposal capacity

The Bourne ISWMF is permitted by both the Massachusetts DEP and the Cape Cod Commission to handle up to 825 tons per day of non-hazardous materials. The current permitted capacity should be adequate to meet the Cape's anticipated solid waste stream (135,000 tons of Cape MSW divided by 365 days equals approximately 370 tons of MSW that would need to be managed daily at a permitted disposal facility).

Provide adequate long-term disposal capacity

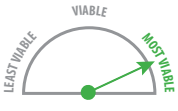
As previously noted, Camp Dresser McKee prepared the *Final Report on Evaluation of Future Business Plan for Bourne Landfill* (September 2003). The report noted a total of more than 5 million cubic yards of capacity remains available for permitted waste disposal at the ISWMF.

Possess a proven track record of reliable environmental and financial performance

The ISWMF has a good record of compliance with both the state and county permits allowing it to manage municipal solid waste for disposal. As a town-owned and operated facility, its financial performance is backed by the good credit of the Town of Bourne.

Means of disposal must present minimum risk exposure to Cape communities

As a municipally owned and operated facility, any solid waste disposal option would likely entail little risk to the host community and thus would likely present little risk exposure to the Cape communities. This issue will be better understood when the Bourne selectmen determine the future long-term use of the facility.



Recommendation

Given the Bourne facility's ideal geographic proximity to all Cape communities and that it has all applicable permits in hand from the DEP and the Cape Cod Commission, as well as site assignment from the Bourne Board of Health, **the Bourne ISWMF should be considered one of the most viable disposal options for the Cape communities.**

Transporting MSW to an Out-of-State Landfill by Tractor Trailer: Seneca Meadows Landfill, New York

The exporting of MSW to other states has long raised concerns and at one time prompted state officials to attempt to regulate this form of commerce. The imposition of barriers has been declared unconstitutional by federal courts as a violation of the right of interstate commerce laws. Congress has long considered granting such authority to states;[vii] however, to date, no such laws have been passed by Congress and states have minimal authority to prohibit the import of MSW.

In 2006, Massachusetts imported 169,845 tons of MSW. However, exports of MSW to other states from Massachusetts totaled 1,986,945 tons, resulting in a net export of 1,817,100 tons. Massachusetts is one of 11 states exporting more than one million tons of MSW out of state. In 2005, South Carolina received more than 475,000 tons of MSW from Massachusetts, followed by Georgia (395,000 tons), Maine (300,00 tons), New Hampshire (281,000 tons), New York (216,000 tons), Ohio (168,000 tons), and Maryland (101,000 tons).[viii]

As of February 2006, New York State hosted 26 active MSW landfills. During 2004, New York State residents, institutions, commercial businesses, and industries generated approximately 37.2 million tons of solid waste. In addition, approximately 1.2 million tons of solid waste were imported from other states. In 2004, these MSW landfills accepted a total of 9.1 million tons of solid waste from both in state and out of state.

At the end of 2004, New York landfills had 93 million tons of capacity remaining, including both the capacity actually constructed and the capacity not yet constructed but permitted to be constructed. This equates to approximately 10 years of capacity at 9.1 million tons per year. The largest landfill in New York is the Seneca Meadows Landfill in Seneca, which is located approximately 400 miles from Cape Cod (**Table 16**).

Evaluation Criteria

Ability to provide a cost-competitive tip fee

Conversations with Seneca Meadows staff indicate that the New York landfill is cost competitive (as of August 2007) with other more local and traditional forms of MSW disposal.

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vii. The 104th US Congress passed Senate Bill 534, which would have granted states the authority to restrict new shipments of MSW from out of state, if requested by an affected local government.

viii. Interstate Shipment of Municipal Solid Waste, 2007 Update, CRS Report for Congress, June 13, 2007

TABLE 16: SENECA MEADOWS LANDFILL, NEW YORK

Facility Name and Location	2005 Wastes (Tons)	Annual Permit Limits	Existing/Entitled Capacity under Permit (Tons)	Estimated Disposal Fees	Rail Service
Seneca Meadows Landfill, Seneca, NY	1,837,170	6,000 tons per day	8,809,620	15 years, $30/ton, $1/ton escalator, $60/ton hauling fee	No, but direct rail spur being considered

Sources: *Waste News*, November 2006; New York Department of Environmental Management web site; Discussions with Seneca staff

Ability to provide a long-term disposal contract (minimum of 10 years)

The facility currently has approximately 8.8 million tons of permitted capacity remaining (**Table 16**). Seneca Meadows staff anticipates being able to offer a minimum 10-year disposal contract.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

Seneca Meadows is located approximately 405 miles from Cape Cod (a one-day, round-trip drive for a tractor trailer hauling waste from the Cape to the facility). At present several Massachusetts communities are either delivering their MSW to Seneca Meadows or having the MSW hauled directly to the landfill from their respective town transfer stations. (Marshfield, Massachusetts, has its MSW hauled to Seneca under contract with We Care Environmental's transportation unit.)

Provide adequate annual permitted disposal capacity

Seneca Meadows is currently permitted to dispose of approximately 6,000 tons per day of MSW. It is anticipated that the Cape communities will generate approximately 700 tons per day of MSW. As such, the Seneca Meadows Landfill easily meets the Cape communities' daily disposal requirements.

Provide adequate long-term disposal capacity

Refer to **Table 16**.

Possess a proven track record of reliable environmental and financial performance

Information provided to Cape Cod Commission staff by Seneca Meadows would initially indicate a proven track record of reliable environmental and financial performance. Additional information would be requested in Phase Two.

Means of disposal must present minimum risk exposure to Cape communities

According to Seneca staff, the Seneca Meadows Landfill is a Subtitle D facility that complies with all applicable federal, state, and local regulations governing the safe disposal of non-hazardous MSW.

Recommendation

Given that Seneca Meadows is located within a one-day (round-trip) hauling distance from the Cape communities, has all necessary operating permits

in hand from the federal, state, and local governments, and has adequate daily and annual disposal capacity for at least the next 10 years, **the Seneca Meadows Landfill should be considered one of the most viable disposal options for the Cape communities.**

Transferring MSW to an In-State Disposal Facility: Casella Waste Systems, Inc.

A number of transfer facilities are located in Massachusetts that could serve the Cape communities and provide access to alternative disposal facilities both in Massachusetts and out of state. **Table 17** describes the one transfer station in close geographic proximity to Cape Cod that could provide this alternative disposal option and serve to transfer the Cape's MSW to an out-of-state landfill by tractor trailer.

Casella Waste Systems, Inc. (Casella) is a regional, integrated solid waste services company that provides collection, transfer, disposal, and recycling services primarily throughout the eastern portion of the United States and parts of Canada. Casella operated 39 transfer stations as of July 21, 2000. The transfer stations receive, compact, and transfer solid waste collected primarily from the company's various collection operations to larger company-owned vehicles for transport to landfills.

TABLE 17: TRANSFER STATIONS IN MASSACHUSETTS

Facility	Owner's Name	Permitted Capacity	Daily Capacity	Miles from Cape Cod
Rochester Environmental, Rochester, MA	Casella Waste Systems, Inc.	n/a	890 tons per day (seeking 1,200 tons per day)	10 miles

Casella owns and operates a construction-and-demolition transfer facility located on the Cranberry Highway in Rochester, Massachusetts. At the present time, Casella is seeking to amend its DEP operating permit to allow the facility to transfer up to 1,200 tons per day of MSW from the facility to other disposal sites either in state or out of state. Casella is required to obtain a Massachusetts Environmental Policy Act (MEPA) certificate to allow it to handle that amount. The Casella staff anticipates the MEPA approval will be forthcoming in the spring of 2008.

According to Casella staff, the amended DEP permit allowing the Rochester facility to accept MSW for transfer to other disposal facilities would provide the Cape communities with another alternative for MSW disposal. The transfer option would also provide additional competition in the regional disposal market, which would serve to provide additional disposal options (and possible price competition) among the disposal providers. At the present time, it is anticipated that MSW being transferred from the Rochester facility could be sent to the town-owned and Casella-operated Southbridge landfill

(which is currently seeking a permit modification from the DEP to allow for the landfilling of up to 1,200 tons per day of MSW), or the waste-to-energy facility in Saco, Maine.

This option would require the total disposal cost to include the costs associated with getting the Cape's MSW to the Rochester transfer facility, paying a tip fee at the transfer facility, and incurring an additional fee (perhaps already included in the overall contract disposal fee) for both the hauling costs to the Southbridge landfill and a tip fee at Southbridge. While no price proposal has been submitted, Casella staff has expressed interest in discussing this option with the Contract Committee in the future.

Evaluation Criteria

Ability to provide a cost-competitive tip fee

According to Casella Waste Systems 2000 annual report, Casella competes with numerous solid waste management companies, several of which are significantly larger and have greater access to capital and greater financial, marketing, or technical resources. Certain competitors are large national companies that may be able to achieve greater economies of scale. Casella also competes with a number of regional and local companies. In addition, Casella competes with operators of alternative disposal facilities, including incinerators, and with certain municipalities, counties, and districts that operate their own solid waste collection and disposal facilities. As such, it is anticipated that Casella can provide a cost-competitive tip fee.

Ability to provide a long-term disposal contract (minimum of 10 years)

Casella Waste Systems currently owns four Subtitle D landfill operations and operates a fifth Subtitle D landfill under a 25-year lease arrangement. As previously mentioned, Casella operates the Southbridge landfill under a long-term operating agreement, and it is anticipated by Casella that the Southbridge landfill's permit modification to accept MSW will be approved in the spring of 2008.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

The Rochester transfer facility is located approximately 10 miles from the Cape Cod Canal. The Southbridge landfill is approximately 110 miles from the Cape.

Provide adequate annual permitted disposal capacity

The Casella-operated Southbridge landfill is anticipated to provide up to 1,200 tons per day of MSW disposal capacity for at least 20 years pending the receipt of the DEP permit modification.

Provide adequate long-term disposal capacity

See above.

Possess a proven track record of reliable environmental and financial performance

As a major regional solid waste provider, it is anticipated that Casella Waste Systems, Inc., provides a record of reliable environmental and financial performance. Additional information can be provided in the future.

Means of disposal must present minimum risk exposure to Cape communities

The transfer of MSW from Cape Cod to Rochester and then to a permitted (Subtitle D) landfill or permitted out-of-state waste-to-energy facility presents minimal risk to the Cape communities.

Recommendation

Given that the Casella transfer facility in Rochester is located approximately 10 miles from the Cape communities, will have all necessary operating permits in hand from the DEP and local government by Spring 2008, and has adequate daily and annual disposal capacity for at least the next 10 years at the Southbridge, Massachusetts, landfill (by the spring of 2008), **the Casella Waste Systems transfer facility in Rochester, Massachusetts, should be considered one of the most viable disposal options for the Cape communities.**

Viable Options

Transporting by Rail to an Out-of-State Landfill: Allied Waste/BFI, Republic Services, and Waste Management

As previously stated, Cape Cod is uniquely positioned to take advantage of the possible economic benefits of out-of-state landfilling of MSW. CSX, Inc., a national freight rail carrier, provides rail service from Middleboro, Massachusetts, and this connection to the short-line rail provides the Cape with a host of viable waste disposal options worthy of consideration by the Committee.

Considerable research has been conducted to determine the shipping distances and modes of transport used to ship waste to disposal/processing sites. The research indicates that, at the present time, the primary mode of transport for MSW is through the use of diesel trucks. According to information provided by the Federal Highway Administration, total movement of waste in 2002 was estimated to be 490.7 million tons. Of that total, rail freight movement of waste was estimated to be 8.1 million tons. Truck movements for MSW disposal accounted for 479.9 million tons, with water movements (barging) accounting for 2.7 million tons.[ix] However, as landfill space becomes more

ix. Federal Highway Administration, Report No. S5, Municipal Solid Waste National Totals, Freight Management and Operations

limited, municipalities will likely explore the financial and environmental benefits associated with the use of rail transport for shipping waste over longer distances.

Rail transport has been shown to be more efficient than trucking (0.012 gallons/ton-mile for combination truck and 0.003 gallons/ton-mile for rail) in terms of diesel fuel consumption.[x] Consequently, the greenhouse gas (GHG) emissions levels associated with the movement of MSW from source to disposal site using rail are lower than trucking per ton-mile. Safety benefits are also associated with railing, as this mode results in fewer vehicles on the roads (rail cars carry 100 tons MSW versus 22 tons, on average, for tractor trailers).

By way of an example, it is estimated that 140 cars and 560 containers hauling 20 tons of MSW each would be required to deliver approximately 200,000 tons of MSW to a South Carolina landfill facility via rail per year. The rail infrastructure costs for delivery of MSW to a landfill in South Carolina that is served by a direct rail spur include either a lease or a purchase option, which would likely cost approximately $90,000 per car and $12,000 per container. (Under this example, the cost to lease this equipment is estimated to be $96.60 per ton for the Cape's annual waste and would be amortized per a long-term contract and rolled into the tip fee.)

To be cost competitive, the length of haul should not exceed 600 miles one way (variables should be noted when considering this figure, including the likely low tip fee at the target out-of-state landfill, and the subsequent tip fees at closer, regional disposal facilities, which may be considerably higher, making an out-of-state landfill served by rail financially viable by comparison). The receiving facility should have direct rail access (either flat-car access or tipping cars) and must be permitted to receive at least 600 tons per day to handle the disposal requirements for the Cape's MSW. Furthermore, it is vital to identify alternative disposal sites so that the MSW being generated on Cape can be responsibly disposed of in the event of a situation at the target landfill that would preclude delivery and disposal of the Cape's MSW (force majure, labor issues, etc).

Railing Opportunities

CSX Transportation, Inc., a Class I rail carrier (defined by the Association of American Railroads as a railway company with operating revenues in excess of $319 million) operates the largest railroad system in the eastern United States, with a rail network of approximately 21,000 route miles. According to information provided in CSX's Annual Report, Form R-1, emerging markets for CSX include "aggregates, processed materials, **waste**, military cargo, and machines." At the present time, the majority of CSX's revenues are generated through the movements associated with the transport of merchandise, coal/coke/ore, and automotive-related materials.[xi] However, according to information provided by CSX to the Northeast Association of Railshippers,

x. US Environmental Protection Agency/ Municipal and Industrial Solid Waste Division, Greenhouse Gas Emissions from the Management of Selected Materials, December 1998

xi. CSX Transportation, Inc., Class I Railroad Annual Report, December 29, 2006, page 18

CSX anticipates increased shipping by rail due to a host of factors, including a growing global and US economy, tight transportation capacity on US highways, increased trucking costs, as well as capacity investments that have reduced delay times in the Northeast. These capacity investments, along with technological advancements, have spurred productivity growth. As a result, the Federal Highway Administration projects a 78-percent growth rate (from 43 million tons to 77 million tons) in freight rail traffic of waste/scrap material between 1998 and 2020.[xii] Given this information and the fact that the new short-line rail operator (MassCoastal, Inc.) is inclined to want to work proactively with the Cape communities on future rail initiatives, rail could play a larger role in the Cape's long-term disposal of MSW.

Allied Waste/BFI, Inc.

Allied Waste purchased BFI 10 years ago and currently operates the largest rail-haul waste disposal operation in the United States. Allied uses CSX rail and currently hauls 2,000 tons per day of MSW from two rail transfer facilities (located in Peabody, Massachusetts, and Roxbury, Massachusetts) to its landfill in Bishopville, South Carolina (**Table 18**). Arrangement between Cape communities and Allied Waste could involve the outright purchase or lease of both rail cars and containers that would allow the shipping of MSW from the Middleboro terminus of the Cape's short-line rail to the South Carolina landfill. Allied currently leases this type of equipment from SIEX, Inc, which leases the majority of the nation's rail cars and containers.

TABLE 18: BISHOPVILLE LANDFILL, SOUTH CAROLINA

Landfill Location	FY2006 Wastes (Tons)	Annual Permit Limits (Tons)	Total Facility Capacity	Rail Service
Lee County/Allied Waste Bishopville, SC	1,410,054	1,944,939	26,821,107 tons; 13.8 years at permitted capacity; 19 years based on current annual disposal rates	Yes, direct spur

Evaluation Criteria

Ability to provide a cost-competitive tip fee

Contract tip fee at landfill unknown at this time; more information to be provided in Phase Two.

Ability to provide a long-term disposal contract (minimum of 10 years)

According to information provided by Allied Waste staff, it is feasible to do a minimum 10-year disposal contract for non-hazardous solid waste disposal. (It is important to note that CSX, Inc., may not be inclined to provide for more than a 10-year contract. CSX also currently assesses a monthly fuel surcharge that would need to be calculated into a disposal contract.)

xii. Congressional Budget Office projections from the Federal Highway Administration, "Freight Analysis Framework," October 2002

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

The Bishopville, South Carolina, landfill is located approximately 895 miles from Middleboro, Massachusetts. While the costs associated with rail hauling indicate that a rail haul of more than 300–400 miles one-way results in savings due to economies of scale, there are issues associated with this length of haul that must be considered (turn-around time and the additional number of rail cars and containers that would be required, as well as an increased fuel surcharge due to additional length of rail pull).

Provide adequate annual permitted disposal capacity

The Lee County landfill is permitted to accept approximately 1.9 million tons of MSW annually, which is more than adequate.

Provide adequate long-term disposal capacity

The Lee County landfill has between 14 and 19 years of capacity remaining.

Possess a proven track record of reliable environmental and financial performance

Will be provided by Allied Waste in Phase Two.

Means of disposal must present minimum risk exposure to Cape communities

The out-of-state railing and landfilling of MSW presents little risk exposure to the Cape communities given the number of communities both nationally and internationally that dispose of MSW in this manner.

Recommendation

Given that the Lee County landfill is located approximately 895 miles from the Cape communities and is served by a direct rail spur, has all necessary operating permits in hand from the state and local governments, and has adequate daily and annual disposal capacity for at least the next 13 years, **the railing of MSW to the Allied Waste landfill in South Carolina should be considered a viable disposal option for the Cape communities.**

Republic Services, Inc.

Republic Services, Inc. (Republic) is a leading provider of solid waste collection, transfer, and disposal services that owns or operates 93 transfer stations, 59 solid waste landfills, and 33 recycling facilities. As of December 31, 2006, the 59 landfills that Republic owned or operated had approximately 9,709 permitted acres for future disposal of solid waste.

Based on conversations with Republic staff, Republic owns and operates several landfills with rail delivery capability (locations not yet made public at Republic staff's request; that specific information serving as the basis for the following comments is not reflected in this report). Each disposal provider being considered at this phase of the planning process has a facility served by a rail spur that would allow for a direct haul to it from Middleboro, Massachusetts.

It is estimated that the costs associated with a direct haul from Middleboro to one of the potential landfills would be approximately $1.70–$1.80 per ton (based on a CSX, Inc., price estimate dated September 2007). This estimate does not include any fuel surcharges assessed by CSX, nor does it include the following: tip fee at a Republic landfill, the costs of the short-line rail haul between the Cape's railhead facilities and Middleboro, Massachusetts, and the transportation costs associated with moving MSW from each town to the rail facilities located on Cape Cod. This estimate also does not include the costs associated with the financing of both rail containers and rail cars to move the MSW from Middleboro to Republic's landfills. It is anticipated that these costs would be better estimated by Republic (as well as Allied Waste/ BFI and Waste Management) in the Committee's Phase Two report.

Staff has investigated other landfills that are owned or operated by Republic to gain information on the issues and costs associated with out-of-state MSW delivery. Carleton Farms, a 640-acre landfill in Michigan owned and operated by Republic, disposed of 4,385,000 tons of Type 2 (non-hazardous) waste in 2006 from both in state and out of state. Carleton Farms has approximately 56,519,000 cubic yards of capacity remaining (**Table 19**). Michigan imported 16,389,000 tons of Type 2 waste from out of state in 2006. Of that amount, 13,805 tons were sent from Massachusetts.[xiii]

TABLE 19: CARLETON FARMS LANDFILL, MICHIGAN

Landfill Location	2005 Tons Disposed	Annual Permit Limits (Tons)	Remaining Capacity	Total Facility Capacity	Rail Service
Carleton Farms, Sumpter, MI	4,385,000	Not available	22 years	56,519,000 cubic yards	No, but CSX rail spur close by

According to the Michigan Department of Environmental Quality, this disposal facility has 22 years of remaining capacity. The Carleton Farms Landfill is not served by a railhead that would allow a direct load/tip of solid waste from Cape Cod to the facility. However, CSX does own and operate a railhead transfer facility in Rockwood, Michigan (Mr. Dorsel Cobb, 734-654-3615) that is located close to the landfill. According to a representative at Carleton Farms, approximately 250,000 tons of MSW is delivered to the rail transfer facility in Rockwood that is then trans-loaded and delivered to Carleton Farms (MSW containers are unloaded from rail cars at the rail spur and those containers are then delivered to the landfill by tractor trailer for unloading). This type of operation is not as cost effective at a direct rail spur, as the trans-load operation adds additional costs to the overall disposal fee.

xiii. Report of Solid Waste Landfills in Michigan, October 1, 2005 to September 31, 2006, Michigan Department of Environmental Quality, Waste and Hazardous Materials Division

Evaluation Criteria

Ability to provide a cost-competitive tip fee

Under this scenario, the trans-loading of MSW from the rail spur to the landfill adds an additional expense that may make this option less viable than other forms of rail transport to an out-of-state landfill that is served by a direct rail spur into a landfill. The contract tip fee is unknown and would be provided by Republic in Phase Two.

Ability to provide a long-term disposal contract (minimum of 10 years)

According to staff at Republic, the company would be able to provide at least a 10-year disposal contract for MSW (this time frame is dependent upon the length of contract available from the national rail provider, which at the present time would not exceed 10 years).

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

The Carleton Farms Landfill is located approximately 850 miles from Cape Cod. As such, a round-trip movement of MSW of 1,700 miles is longer than the literature recommends regarding cost-efficient rail movement of solid waste. However, the cost effectiveness is dependent on a host of other factors that would need to be evaluated in Phase Two.

Provide adequate annual permitted disposal capacity

Information requested of Michigan Department of Environmental Quality pending.

Provide adequate long-term disposal capacity

According to information provided by the Michigan Department of Environmental Quality, the Carleton Farms Landfill has approximately 22 years of disposal capacity remaining.

Possess a proven track record of reliable environmental and financial performance

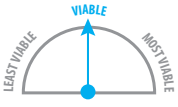
Pending from Republic in Phase Two.

Means of disposal must present minimum risk exposure to Cape communities

The out-of-state railing and landfilling of MSW presents little risk exposure to the Cape communities given the number of communities both nationally and internationally that dispose of MSW in this manner.

Recommendation

Railing MSW to the Carleton Farms Landfill is a viable option but may not be cost competitive with other out-of-state disposal facilities due to the trans-loading required between the CSX terminus in Rockwood, Michigan, and the landfill. This trans-loading would require an additional expense (unknown at this point) that likely will not make it as viable as other out-of-state disposal alternatives. Information regarding the disposal at other Republic landfills served by a direct spur is pending in Phase Two. **Due to its ability to rail MSW out of state, Republic Services should be considered a viable disposal option for Cape Cod.**



Waste Management, Inc.

Waste Management, Inc., headquartered in Houston, Texas, is one of the largest waste management companies in the United States and operates more than 300 active landfill disposal sites and transfer stations, approximately 85 landfill gas-to-energy and waste-to-energy facilities, nearly 200 recycling plants, and more than 450 hauling companies. According to information provided by Mr. Jim Macella, Waste Management currently rails very little MSW out of Massachusetts for disposal. However, Waste Management does own two landfills that are served by direct rail spurs (**Table 20**). Both landfills are located in Virginia and are approximately 600 miles from Middleboro, Massachusetts.

TABLE 20: VIRGINIA LANDFILLS OWNED BY WASTE MANAGEMENT, INC.

Landfills	Tons MSW Accepted	Annual Permit Limits (Tons)	Total Facility Capacity	Tip Fees	Rail Service
Amelia/Maplewood Landfill	386,210 (in 2006)	No annual limits	18,822,000 tons (82.9 years)	n/a	Yes, direct
Atlantic Waste Disposal Landfill	2,717,000 (in 2005)	No annual limits	47,810,000 tons (40 years)	n/a	Yes, direct

Evaluation Criteria

Ability to provide a cost-competitive tip fee

Contract tip fee at either landfill is unknown at this time; more information to be provided in Phase Two.

Ability to provide a long-term disposal contract (minimum of 10 years)

Subject to information provided in Phase Two.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

Both the Amelia and Atlantic Waste landfills are located approximately 600 miles from Cape Cod and are direct served by a rail spur at the landfill.

Provide adequate annual permitted disposal capacity

Information is pending from the Virginia Department of Environmental Quality.

Provide adequate long-term disposal capacity

Refer to **Table 20**.

Possess a proven track record of reliable environmental and financial performance

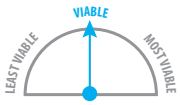
Pending information to be received in Phase Two.

Means of disposal must present minimum risk exposure to Cape communities

The out-of-state rail option and landfilling of MSW at a permitted disposal facility presents little risk exposure to the Cape communities.

Recommendation

As with the other national disposal companies previously mentioned, Waste Management has the requisite facilities and operations to provide the Cape communities with a long-term disposal contract. **As such, Waste Management should be considered a viable disposal option for the Cape communities.**



Least Viable Options

Alternative Waste Disposal Technologies: Biological, Thermal, and Chemical Processes

As previously stated, the number of landfills that have been permitted in the United States has declined over the last few decades. This trend is likely to continue, and the remaining large landfills will continue functioning as the nation's primary disposal option. The decrease in the number of landfills has led to a classic case of supply and demand. The increased demand for disposal capacity at state-of-the-art landfills, combined with a decrease in the number of landfills being sited, permitted, and constructed, has led to higher prices. (This phenomenon is of particular concern in Massachusetts.) As landfill disposal fees continue to increase, there will be more interest from both municipalities and the private sector in proposing alternative forms of disposal, in particular those alternative technologies that can be successfully used for the safe disposal of solid wastes.

For the purposes of this *Phase One Report*, alternative waste disposal is defined as technologies (biological, thermal, and chemical processes) that are not widely used throughout the United States, or that have only recently become commercially operational. Technologies that are commercially operational in other countries, but only recently operating in the United States, on either a limited basis or as a pilot program, are defined as "new and emerging" with respect to their use.

There is significant interest in alternative technologies being used for the disposal of MSW. Many studies, pilot programs, and operational facilities have been planned and built in the last several years, including:

- a new MSW co-composting facility located in Rapid City, South Dakota;
- a new MSW co-composting facility located in Delaware County, New York;
- a proposed $425 million plasma arc facility to be built in St. Lucie County, Florida;
- a gasification pilot program located in New Bedford, Massachusetts; and

- two operational co-composting facilities: one located in Marlborough, Massachusetts, and the other on the island of Nantucket, Massachusetts.

Several alternative solid waste disposal technologies are either in use throughout the world today or in various stages of being approved by governmental entities. According to a comprehensive analysis undertaken by Alternative Resources, Inc., of Concord, Massachusetts, the range of these technologies includes (but is not limited to) biological, thermal, and chemical processing of MSW.

Biological Process

Biological process (digestion) for solid waste management is the reduction of solid organic waste materials through decomposition by microbes. Digestion may be aerobic or anaerobic, depending on whether oxygen is introduced into the process.

Anaerobic Digestion

Anaerobic digestion is a biological process that uses microorganisms to digest organic material in the absence of oxygen, producing both a solid by-product and biogas. The biogas is composed primarily of methane and carbon dioxide. In the biological process, biogas is typically burned in a combustion engine to generate electricity. After a period of aerobic stabilization, the digested material may be used as a soil amendment or sold as compost. The anaerobic digestion process may be either "wet" or "dry," depending on the percentage of solids in the reactor. Wet anaerobic digestion starts with the organic fraction of MSW, which is mixed with water and pulped. The pulp is fed into a reactor vessel, where optimal heat and moisture conditions are promoted to enhance microbial development and decomposition. In the dry anaerobic digestion process, no added water is used. Instead, the incoming shredded organic solid waste is "inoculated" with previously digested material before introduction into the reactor vessel. Material moves through the digester over a period of 15 to 17 days in a "plug flow" manner.

A range of anaerobic digesters exists; the two main types of operations are batch and continuous. Batch is the simplest, with the biomass added to the reactor at the beginning and sealed for the duration of the process. Batch reactors can produce odors that can be a severe problem during the emptying cycles. In the continuous process, which is the more common type, organic matter is constantly added to the reactor and the end products are constantly removed, resulting in a much more constant production of biogas.

For anaerobic digestion to be economically viable, there must be markets for both the biogas and liquids. Biogas can be sold as a supplement to fossil fuels, while the digester liquids are suitable for use as a fertilizer. The sludge component, even when dried and available as a soil conditioner, is not easily

disposed of. However, it can be used in non-agricultural areas, such as golf courses and as daily cover for landfills.

According to the Energy Justice Network (EJN), using anaerobic digesters for municipal solid waste can be problematic, as the resulting product (compost) cannot be clean enough to be useful. Using in-vessel composting or digestion to handle MSW causes the owners of these facilities to find markets for the resulting compost to defray the expenses involved in the digester's operations.[xiv] EJN states: "Most municipal solid waste composting projects have a hard time finding a market for their compost and give the material to farmers, or use the compost on public works projects or as landfill cover." In such instances, the desire to defray the costs of operating the digester are not met and the expense to dispose of MSW is that much higher.

Current operating facilities

• Williamsport, Pennsylvania

The City of Williamsport, Pennsylvania, has invested in this technology as a means of disposing of its MSW. In a metal tank called a Drygester, the MSW is broken down into organic wastes anaerobically. The technology is one of six systems Vanderbilt University researchers will be testing over the next several years. The tests will determine which system will be used in the community's pilot program. If the pilot program is successful, the plant would biodegrade up to 30 tons of MSW per day. According to the county engineer, it will cost roughly $3 million to $5 million to build the pilot plant.

Aerobic Digestion

In the aerobic digestion process, the organic fraction of MSW is metabolized by microorganisms in the presence of oxygen. Temperature and pH increase, carbon dioxide and water are liberated (reducing the mass of material), and pathogens are destroyed. Upon completion of the digestion process, the material may be used as a soil amendment or compost. Unlike in the anaerobic digestion process, no methane gas is produced. As with anaerobic digestion, aerobic digestion may be wet or dry. Dry aerobic digestion is similar to in-vessel aerobic composting. MSW is put through an enclosed aerobic digestion phase, screened to remove non-organic materials, and then further stabilized in aerated piles. The wet aerobic digestion process consists of the following three steps: pulping the organic fraction of MSW; mixing, heating, aerating, and inoculating the solid waste with microbes; and separating the digested material into fertilizer products. This process is generically comparable to that proposed by Stearns and Wheler to the Bourne working group.

Current operating facilities

• Alberta, Canada

In Alberta, the City of Edmonton owns its solid waste composting facility. The plant, the largest of its kind in North America, handles approximately 160,000–170,000 metric tons of solid waste per year. The solid waste is

xiv. Municipal Solid Waste (MSW) Digester, Energy Justice Network web site: www.energyjustice.net/digesters/MSW.html

blended with approximately 10,000–12,000 dry metric tons of de-watered bio-solids, resulting in an annual production of approximately 80,000 metric tons of compost. The construction cost of the facility has been estimated at $130 million.

• We Care Environmental, Marlborough, Massachusetts
We Care Environmental LLC operates the Marlborough Co-Composting Facility where MSW and bio-solids are transferred and/or recycled into WeCare Compost.

• Waste Options, Nantucket, Massachusetts
In 1997 Waste Options, Inc., signed a 25-year contract with the Town of Nantucket to operate the town's landfill, operate its constructed Materials Recycling Facility (MRF), and build a state-of-the-art co-composting facility. MSW, commercial solid waste, and de-watered sludge are delivered to the compost plant and recyclables are meticulously removed from the waste stream. Trash and sewage sludge are fed into the digester, and the household waste and sludge emerge from the digester as compost several days later. Residues are placed in the lined landfill adjacent to the composting facility. The resulting compost is cured for one month inside the facility and then removed from the site to be mixed and manufactured into loam and other beneficial products.

• Delaware County
The Delaware County facility was designed by Stearns and Wheler and handles approximately 120 tons per day of MSW. Upon completion of the co-composting process, a marketable compost is produced and sold to local landscape companies.

The components for the proposed Delaware County MSW Co-Composting Facility included the following:

- a three-acre processing building (totally enclosed);
- a waste-receiving area for both MSW and biosolids including a waste pit;
- a rotating bioreactor for accelerated decomposition of organics;
- a primary refining and sorting area for separation of inorganics (non-compost);
- a wind-row composting area with forced air for compost maturation;
- an advanced secondary refining system to finish the compost;
- a storage and curing area with 90 days of enclosed storage; and
- an extensive odor-control system including a performing biofilter.

Evaluation Criteria

Ability to provide a cost-competitive tip fee

A cost-competitive tip fee for this form of alternative technology is dependent on many factors that are not the subject of this *Phase One Report*. A better indication of costs would be provided through either the Request for

Information or Request for Proposal processes from companies providing this form of disposal technology.

Ability to provide a long-term disposal contract (minimum of 10 years)

It is not clear if alternative disposal facilities currently exist to accept the Cape's MSW. As such, an alternative disposal facility would likely have to be constructed. To obtain the necessary financing through general obligation bonds or Massachusetts State Revolving Loan Funds (SRF) for the construction of such a facility, long-term contracts would be required.

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

No alternative technology facilities permitted to accept 700 tons per day of non-hazardous solid waste are located in close proximity to Cape Cod at this time.

Provide adequate annual permitted disposal capacity

n/a

Provide adequate long-term disposal capacity

n/a

Possess a proven track record of reliable environmental and financial performance

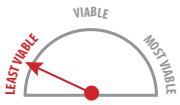
n/a

Means of disposal must present minimum risk exposure to Cape communities

This form of technology has been proved nationally and internationally. As such, it is a technology that meets all state and federal requirements. It is anticipated that the risk exposure to the Cape communities is low.

Recommendation

Biological processing is a safe, reliable means of solid waste disposal. However, unlike more traditional forms of MSW disposal, alternative technologies require time for extensive design, permitting, and construction. Furthermore, a municipality or private company would be required to lock up waste in order to obtain financing. This process of locking up waste is time intensive and requires considerable planning and negotiating. **Due to these factors, biological processing is one of the least viable forms of waste disposal for the Cape communities to consider.**



Thermal Process

Thermal processes for solid waste management use or produce heat to change the composition of MSW. Technologies include:

- gasification
- pyrolysis
- cracking
- plasma

These thermal technologies are similar in that a chemical reaction (either exothermic, which produces heat, or endothermic, which absorbs heat) occurs in a high-temperature reaction vessel that changes the composition of the organic fraction of MSW. Oxygen may or may not be added to the reactor to influence the composition of the resulting products. Inorganic materials in the waste stream may be sorted out before treatment or treated along with the organic fraction.

The processing of the organic portion of the MSW stream results in three by-products: syngas (synthesis gas composed of hydrogen gases, carbon monoxide, and carbon dioxide), char (a carbon-based solid residue), and organic liquids (for example, light hydrocarbons). If the inorganic fraction of MSW is also processed, additional by-products, including vitrified silica and mixed metals, are produced. Syngas may be used in boilers, reciprocating engines, and combustion turbines to produce energy. Some technologies pre-clean the syngas before combustion to remove sulfur compounds, chlorides, heavy metals, and other impurities. In cases where organic liquids are produced, these may also be used as fuels or as chemical feedstocks for specialty chemicals.

Evaluation Criteria

Ability to provide a cost-competitive tip fee

No permitted thermal processing facilities are currently in operation in New England. As such, it is currently not possible to assess the cost competitiveness of this technology against more traditional means of MSW disposal.

Ability to provide a long-term disposal contract (minimum of 10 years)

n/a

Permitted disposal facility located within reasonable geographic proximity to Cape Cod

n/a

Provide adequate annual permitted disposal capacity

n/a

Provide adequate long-term disposal capacity

n/a

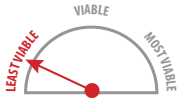
Possess a proven track record of reliable environmental and financial performance

Pilot programs are being constructed in Massachusetts. The results of the pilots will be tracked and reported in later phases of this planning process.

Means of disposal must present minimum risk exposure to Cape communities

n/a

Recommendation



As previously stated, no permitted thermal facilities for MSW disposal exist in the Northeast. **As such, thermal processing is presently regarded as one of the least viable forms of waste disposal.**

Chemical Process

Chemical process for solid waste management generally refers to technologies that use one or a combination of various chemical means to convert MSW into usable products, including:

- depolymerization
- gasification
- plasma gasification
- pyrolysis

Depolymerization

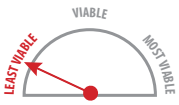
Depolymerization is an advanced thermal reforming process that uses water as a solvent, converting the organic components of the MSW stream into steam, electricity, oil, and specialty chemicals. The major steps of the process are:

- sorting organics and inorganics from the waste stream;
- slurrying the MSW with water;
- heating the slurried MSW under pressure;
- flashing the slurry pressure to release and recover gaseous products (which can be used to generate electricity);
- reheating the slurry to drive off both water and light oils from the solids; and
- separating the light oils from the water.

Further processing of the oils (for example, distillation, solvent extraction, cracking) can be used to produce higher-value oils. The process also generates carbon solids, which could be used as a soil amendment.

Current operating facilities

A demonstration plant was completed in 1999 in Philadelphia and the first full-scale commercial plant was constructed in Carthage, Missouri, to process approximately 200 tons of turkey waste into 500 barrels (21,000 US gallons) of oil per day. There are no other known operating facilities in the United States at this time utilizing this technology. **As such, depolymerization is not considered a viable disposal option for MSW at this time.**



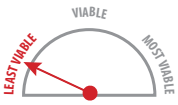
Gasification

Gasification is a high-temperature melting process that gasifies the feed material within a controlled and limited oxygen supply. Combustion is prevented by the limited oxygen supply. The temperature within the high temperature conversion reactor reaches 2,700°C, at which point molecular dissociation takes place. Pollutants such as dioxins, furans, and pathogens are completely cracked into harmless compounds.

Metal components in the waste stream are converted into a castable iron alloy/pig iron that may be recycled. The mineral fraction is reduced to a non-leaching vitrified glass and may be used for road construction and/or further processed into a mineral wool for insulation. All of the organic material is fully converted to a synthetic gas that can be used to produce electrical energy and heat. It has been determined that this technology may be suitable for the treatment of MSW.

Current operating facilities

Za-gen has been permitted by the DEP to operate a 40-ton per day demonstration project in New Bedford, Massachusetts. This facility's gasification process will use construction demolition (not MSW) to produce synthetic gas (syngas). The facility uses a "molten bath technology" that produces the syngas. The syngas is used to produce electricity (although the BTU of syngas is 30 percent that of natural gas and therefore may not be as marketable as a fuel for electrical generation). Another by-product of the process is slag. Depending on the materials being gasified, slag may be non-hazardous. While this technology has been in use for more than 50 years in the United States, there are no other known operating facilities in the country at this time using this technology. **As such, gasification is not considered a viable disposal option for MSW at this time.**

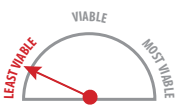


Plasma Gasification

Plasma gasification is a method of waste management that uses an electric arc to create temperatures of several thousand degrees Fahrenheit. At these very high temperatures, all waste is either melted or broken down into basic chemical elements. The resulting gas from this process can be burned to produce electricity. All inorganic material is melted into a vitreous slag that may be used as road base. With this method, there is no ash and potentially no need for a landfill. This technology is used primarily to process small-scale industrial waste, military, and biological wastes because the high electricity consumption required to achieve the high temperatures necessary for decomposition make it uneconomic for processing municipal wastes. **As such, plasma gasification is not considered a viable disposal option for MSW at this time.**

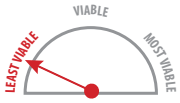
Pyrolysis

Pyrolysis is the process whereby solid biomass can be liquified by hydrothermal liquefaction or other thermochemical technologies. Pyrolysis and gasification are related processes of heating with limited oxygen. The application of pyrolysis to waste management has been gaining acceptance along with other advanced waste treatment technologies. Pyrolysis also can be used as a form of thermal treatment to reduce waste volumes and produce fuels as a by-product. **As with gasification, pyrolysis is not considered a viable disposal option for MSW at this time.**



Barging Waste Off Cape

As previously stated, barging may provide a means to transport MSW from Cape Cod to ports along the southeastern United States. Several ports, including Brunswick, Georgia, currently accept barges transporting MSW from the Northeast. However, major permitting hurdles would need to be overcome before a suitable barging facility could be constructed. Due to the anticipated complexities involved, **barging MSW is not considered a viable option for MSW disposal at this time.**



5. Other Issues

Legal Counsel

Solid waste contracts are complex documents that require considerable legal expertise to prepare properly and ensure the municipalities' interests are best served and protected. As such, the process of identifying a viable alternative and negotiating a new disposal contract should involve the assistance of legal counsel on an as-needed basis. It is important for both the Committee and the individual towns to consider retaining a legal firm with the appropriate background for this task. It is also vital for the Committee to agree upon a preliminary budget for legal services.

Four legal firms and two consulting firms, each with extensive solid waste experience, are listed below for the Committee's consideration:

- Nutter, McClennan (Mike Leon);
- Copelman and Paige (John Giorgio);
- Rackman, Sawyer and Brewster (Michael Last);
- Mackey, Shea and O'Brien (Tom Mackey);
- Commonwealth Resource Management Corporation (George Aaronson); and
- HDR, Inc. (Sean Worcester)

Most attorneys in Massachusetts with solid waste expertise charge per hour for their services. It is anticipated that the cost would vary from $350 to $500 per hour. Under the current work outline (see **Appendix**), legal services would likely not be required until Phase Three, when a preferred alternative is recommended to the Committee. It is recommended that each firm be contacted to ascertain their pricing structure.

Aside from a general idea of the costs associated with the hiring of a qualified attorney, it is also necessary to provide the Committee with a feasible means to pay for this service. One idea may be implement a per-capita assessment for each town. This would serve to distribute the costs and ensure that each municipality was paying its fair share.

Benefits/Detriments of Including Off-Cape Towns into Analysis

Twenty-eight southeastern Massachusetts communities have existing contracts with SEMASS for long-term waste disposal that will expire between 2013 and 2016 (**Table 6**). Like the Cape communities, these municipalities will look to secure long-term waste disposal when their existing contracts expire. Given this common objective, there may be an opportunity to consider working with these 27 off-Cape communities and Martha's Vineyard to secure a new waste disposal contract. If this were deemed to be in the best interests of all communities, a forum for such a discussion would need to be put together. At the present time, the Council of SEMASS Communities (COSC) meets fairly regularly; this group consists of all communities in Massachusetts that currently deliver their MSW to SEMASS under contract. COSC could serve initially as the forum for such discussions. However, it is prudent to consider the benefits and possible detriments associated with this proposal. It is also important to reiterate that, at this stage of this planning process, the Cape towns are the sole decision makers of this option and will provide guidance on this issue in the near future.

Benefits of Including Off-Cape Communities

In reviewing the tons of MSW that were delivered by the 28 South Shore communities to SEMASS in 2006, the estimated waste stream of these communities would likely exceed 225,000 tons. Combined with the Cape's 133,000 tons of MSW and Martha's Vineyard's 30,000 tons of MSW generated in 2006, the total MSW for all involved communities would exceed 388,000 tons. This volume of waste is equal to approximately 36 percent of the total amount of waste that was disposed of at the SEMASS facility in 2006. Given that high percentage of MSW, this combined waste could offer considerable leverage to a contract negotiation with a waste disposal company. Furthermore, the legal costs associated with a regional contract could be spread out among these additional municipalities rather than just the Cape's 14 communities.

Detriments of Including Off-Cape Communities

Regional planning is challenging with 14 communities in close geographic proximity that have a history of working together on issues of common interest and benefit. Including 28 additional communities into this planning effort would provide enormous challenges to Cape Cod Commission staff with little familiarity of the personalities and political interests of off-Cape communities. Furthermore, it would need to be determined if there was significant economic benefit to all involved, and a forum for these discussions would need to be determined in the near future to discuss these issues.

Request for Information/Request for Expression of Interest

This *Phase One Report* has identified those waste disposal options that are most viable, viable, and least viable. It is important to note that there likely are other solid waste disposal providers that are unknown to staff and who may well provide viable, cost-competitive solid waste disposal service. It is recommended that the Committee and the Cape towns give consideration to the issuance of a Request for Information (RFI) or Request for Expression of Interest in the near future.

An RFI is a standard business process whose purpose is to collect written information about the capabilities of various interested suppliers of services. In this instance, an RFI would be used to solicit the level of interest in the solid waste disposal sector for providing to the Cape communities (and possibly including the South Shore communities and Martha's Vineyard) a viable long-term solid waste disposal option. An RFI also may provide the Committee with other solid waste disposal options that have not previously been considered. The costs of an RFI, publicized in any one of several trade magazines (for example, *Waste Age* or *Waste News*) would likely be negligible and could provide very useful information to the Committee.

Issues for Consideration

Given the Cape's unique access to a Class Two rail line, the opportunities to consider and plan for railing MSW out of state are ample. However, any increase in the volume of MSW railed off Cape will likely require serious consideration of how that waste will be transported. For example, the short-line rail operator currently operates 23 trash cars that are direct loaded from both Yarmouth and the UCRTS and hauled to SEMASS. The Yarmouth facility uses a maximum of 16 rail cars per day and may be able to handle two additional rail cars without modifications to the site. Should the Cape towns collectively decide to rail waste to an out-of-state landfill, rail containers may be the mode of choice and these containers would be loaded atop rail cars. The use of additional rail containers loaded onto rail cars for an out-of-state movement would likely necessitate building more track to stack cars.

Railing MSW out of state requires significant coordination between the short-line railroad operator, the out-of-state landfill operator, the national rail freight hauling company, and the company to be leasing the requisite rail cars and containers over the life of the disposal contract. Understanding these intricacies is vital, and working cooperatively with the many players involved should be well understood and thought through as a key to considering out-of-state railing as a viable disposal option.

6. Summary/Conclusion

After reviewing the list of traditional and alternative technologies that are identified in this *Phase One Report*, it is recommended that the following means of MSW disposal be given additional consideration by the Contract Committee at this time (**Table 21**):

- SEMASS/Covanta Energy, Inc.
- Bourne Integrated Solid Waste Management Facility
- Seneca Meadows Landfill
- Casella Waste Systems, Inc.
- Allied Waste/BFI, Inc.
- Republic Services, Inc.
- Waste Management, Inc.

This is not to preclude other forms of waste disposal from future consideration by the Committee. However, as many of the alternative technologies are unproved or are being operated only as pilot programs, it may not be prudent to recommend them as viable alternatives at this time.

TABLE 21: COMPARISON OF OPTIONS

Disposal Option	Criteria	Meets Criteria?
SEMASS Waste-to-Energy	• Cost-competitive tip fee	Pending
MOST VIABLE	• Long-term disposal contract	Likely
	• Reasonable geographic proximity to Cape	Meets criteria
	• Adequate annual permitted disposal capacity	Meets criteria
	• Adequate long-term disposal capacity	Meets criteria
	• Record of reliable environmental/financial performance	Meets criteria
	• Minimum risk exposure to Cape communities	Meets criteria
Bourne ISWMF	• Cost-competitive tip fee	Pending
MOST VIABLE	• Long-term disposal contract	Likely
	• Reasonable geographic proximity to Cape	Meets criteria
	• Adequate annual permitted disposal capacity	Meets criteria
	• Adequate long-term disposal capacity	Meets criteria
	• Record of reliable environmental/financial performance	Meets criteria
	• Minimum risk exposure to Cape communities	Meets criteria

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Seneca Meadows Landfill **Seneca, NY**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Pending Likely Meets criteria Meets criteria Meets criteria Meets criteria Meets criteria	MOST VIABLE
Casella Waste Systems **Rochester, MA**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Pending Likely Meets criteria Meets criteria Meets criteria Meets criteria Meets criteria	MOST VIABLE
Allied Waste/BFI **Out-of-State Railing**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Pending Likely Pending Likely Likely Meets criteria Meets criteria	VIABLE
Republic Services **Out-of-State Railing**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Pending Likely Pending Likely Likely Meets criteria Meets criteria	VIABLE
Waste Management **Out-of-State Railing**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Pending Likely Pending Likely Likely Meets criteria Meets criteria	VIABLE
New Bedford, MA **Gasification Pilot Program**	• Cost-competitive tip fee • Long-term disposal contract • Reasonable geographic proximity to Cape • Adequate annual permitted disposal capacity • Adequate long-term disposal capacity • Record of reliable environmental/financial performance • Minimum risk exposure to Cape communities	Unknown Unknown Unknown Unknown Unknown Unknown Unknown	LEAST VIABLE

Appendix

Contract Committee Work Outline

Objectives	Phase	Time Frame	Tasks	Tasking Responsibility
Define Existing Wasteshed **Evaluate Long List of Disposal Options** **Prepare Short List of Viable Disposal Options** **Retain Qualified Legal Counsel**	***Phase One***	**May-November 2007**	1) Prepare background information report • municipal solid waste (MSW) disposal trends (1990-2005) for 14 Cape towns • inventory municipal solid waste disposal operations for 14 Cape communities • overview benefits of including off-Cape towns' MSW in analysis • overview of existing SEMASS waste disposal contracts 2) Analyze waste capacity/disposal trends in Massachusetts (landfill/WTE) 3) Review recent municipal solid waste disposal contracts signed by MA communities • disposal fees, length of contracts, other contract stipulations, etc. 4) Prepare long list of all feasible waste disposal options, including: • waste to energy (SEMASS in Rochester and other WTE facilities in MA) • Bourne Integrated Solid Waste Management Facility • overview of Bourne Selectmen's Working Group on future of ISWMF • landfilling (in-state options) • landfilling (out-of-state options) • alternative technologies (co-composting, biomass, plasma gasification, refuse-derived fuel) • other possible disposal options (barging waste out of state, etc.) 5) Estimate transportation costs to identified long list of waste disposal options • over-the-road fees • anticipated rail fees • overview of rail infrastructure/issues and opportunities 6) Establish criteria for recommending short list of viable disposal options from long list, including: • permitted capacity of facilities • anticipated tip fees/transportation costs • geographic location from Cape • operating track record, etc. 7) Recommend short list of viable disposal options from long list 8) Recommend retaining legal counsel to assist in the review of contract issues 9) Contact qualified attorney's with experience in solid waste contracting • anticipated budget for legal services • outline funding alternatives of legal costs (per capita assessment per town?) 10) Prepare *Phase One* Report of Tasks 1-9 (above) for Committee/Selectmen's review and comment 11) Prepare *Phase Two* Activities Outline for Committee/Selectmen review • prepare regional waste disposal requirements for Committee review, including: • length of contract term, anticipated tonnages of waste to be delivered, etc.	County Staff and others
	Contract Committee Meeting	**December 2007**	12) Review and discuss findings from *Phase One* Report • identify selected waste disposal firms from short list of disposal options • review regional requirements/criteria for long-term waste disposal contract • review *Phase Two* Work Outline 13) Interview/hire appropriate legal counsel with solid waste background	County staff and Committee members

Objectives	Phase	Time Frame	Tasks	Tasking Responsibility
Evaluate Short List of Disposal Options and issue RFI	***Phase Two***	**January-April 2008**	14) Issue Request for Information 15) Prepare report on *Phase Two* findings for Committee/Selectmen's review 16) Prepare *Phase Three* Activities Outline for Committee/Selectmen review	County Staff and others
	Contract Committee Meetings	**May 2008 (may require multiple meetings for interviews)**	17) Review findings from *Phase Two* Report • identify preferred disposal facility based on comparison of cost estimates to regional disposal requirements 18) Recommend preferred disposal facility • committee representatives report preferred facility to respective selectmen for discussion/recommendation • garner regional consensus on identification of preferred facility • review *Phase Three* Work Outline	County staff, Committee members and legal counsel from towns (if necessary)

Objectives	Phase	Time Frame	Tasks	Tasking Responsibility
Analysis of Preferred Alternative	***Phase Three***	**June-September 2008**	19) Notify the preferred disposal facility representative of selection by Committee 20) Complete a detailed analysis of preferred facility 21) Prepare outline detailing alternative disposal contract scenarios, including (but not limited to): • time span of contract (five-year, ten-year, twenty-year) • tonnages of MSW to be delivered on annual basis, etc. 22) Prepare report on *Phase Three* findings for Committee/Selectmen's review 23) Prepare *Phase Four* Activities Outline for Committee/Selectmen review	County Staff and others
	Contract Committee Meeting	**October 2008**	24) Review findings from *Phase Three* Report 25) Review the outline detailing alternative contract scenarios with preferred disposal facility (time span of contract and tonnages of MSW, etc.) 26) Discuss legal issues; • committee representatives report to respective selectmen for discussion/recommendation on contract issues • regional consensus on legal issues and funding mechanism for legal costs	County staff, Committee members and legal counsel from towns (if necessary)

Objectives	Phase	Time Frame	Tasks	Tasking Responsibility
Alternative Waste Disposal Scenarios	***Phase Four***	**November 2008-March 2009**	27) Discuss alternative waste disposal contract scenarios with facility representative • Facility representative to provide County staff with requested contract scenarios 28) Provide analysis of the long-term costs of alternative contract scenarios against costs of current contract and what disposal costs may be in 2015 • Possible long-term cost savings per scenario will be analyzed 29) Consider legal issues associated with each contract scenario 30) Consider legal issues associated with possible new disposal contract prior to expiration of existing disposal contract with SEMASS 31) Prepare report of *Phase Four* findings for Committee/Selectmen's review 32) Prepare *Phase Five* Activities Outline for Committee/Selectmen review	County Staff
	Contract Committee Meeting	**April 2009**	33) Review alternative contract scenarios and staff analysis- pros and cons of each • cost comparison of each scenario and the potential savings to region of new disposal contract • recommend a preferred disposal contract scenario (ten year, twenty year contract?) 34) Report on each scenario to respective Selectmen • identify/recommend a preferred disposal contract scenario • seek regional consensus on preferred disposal contract scenario • seek regional consensus and authorization from all Selectmen to begin preparing new draft regional waste disposal contract	

Objectives	Phase	Time Frame	Tasks	Tasking Responsibility
Negotiate Contract	***Phase Five***	**May-September 2009**	35) Work with facility representative to draft a long-term regional waste disposal contract reflecting preferred disposal contract scenario 36) Review of draft waste disposal contract by legal counsel 37) Prepare draft regional solid waste disposal contract for Committee and Selectmen's review	County Staff
	Contract Committee Meetings	**October-December 2009**	38) Review draft waste disposal contract 39) Prepare further legal review/comment, as necessary • meet with facility representative (as necessary) regarding draft contract 40) Report to respective selectmen for discussion/recommendation on draft regional waste disposal contract 41) Seek regional consensus on draft contract 42) Pursue approval of new waste disposal contract at Town Meetings (this task may go beyond December 2009)	

TIMELINE OF KEY TASKS, PHASES ONE – FIVE

PHASE	MONTHS							
Phase One	**May 2007**	**June 2007**	**July-August 2007**	**Sept-October 2007**	**November 2007**	**December 2007**		
	Prepare background information report	Review recently signed MA solid waste contracts	Prepare long list of all feasible waste disposal options		Prepare specification for Committee review	Committee meeting		
Phase Two	**January 2008**		**February-March 2008**			**April 2008**	**May 2008**	
	Issue Request for Information		Elicit responses from respondents			Prepare report of Phase Two findings for Committee review	Committee meeting	
Phase Three	**June 2008**	**July 2008**	**August 2008**	**September 2008**	**October 2008**			
	Complete analysis of preferred alternative		Compile proposed waste disposal contract scenarios		Committee meeting			
Phase Four	**November 2008**	**December 2008**	**January 2009**	**February 2009**	**March 2009**	**April 2009**		
	Submit contract scenarios to facility representatives		Review contract scenarios submitted by facility representatives Legal review of contract scenarios		Prepare report of Phase Four findings for Committee review	Committee meeting		
Phase Five	**May 2009**	**June 2009**	**July 2009**	**August 2009**	**September 2009**	**October 2009**	**November 2009**	**December 2009**
	Work with facility representative on drafting new regional waste disposal contract		Legal review of draft contract Prepare report on draft regional solid waste disposal contract			Committee meetings to review draft contract		