



Final Report

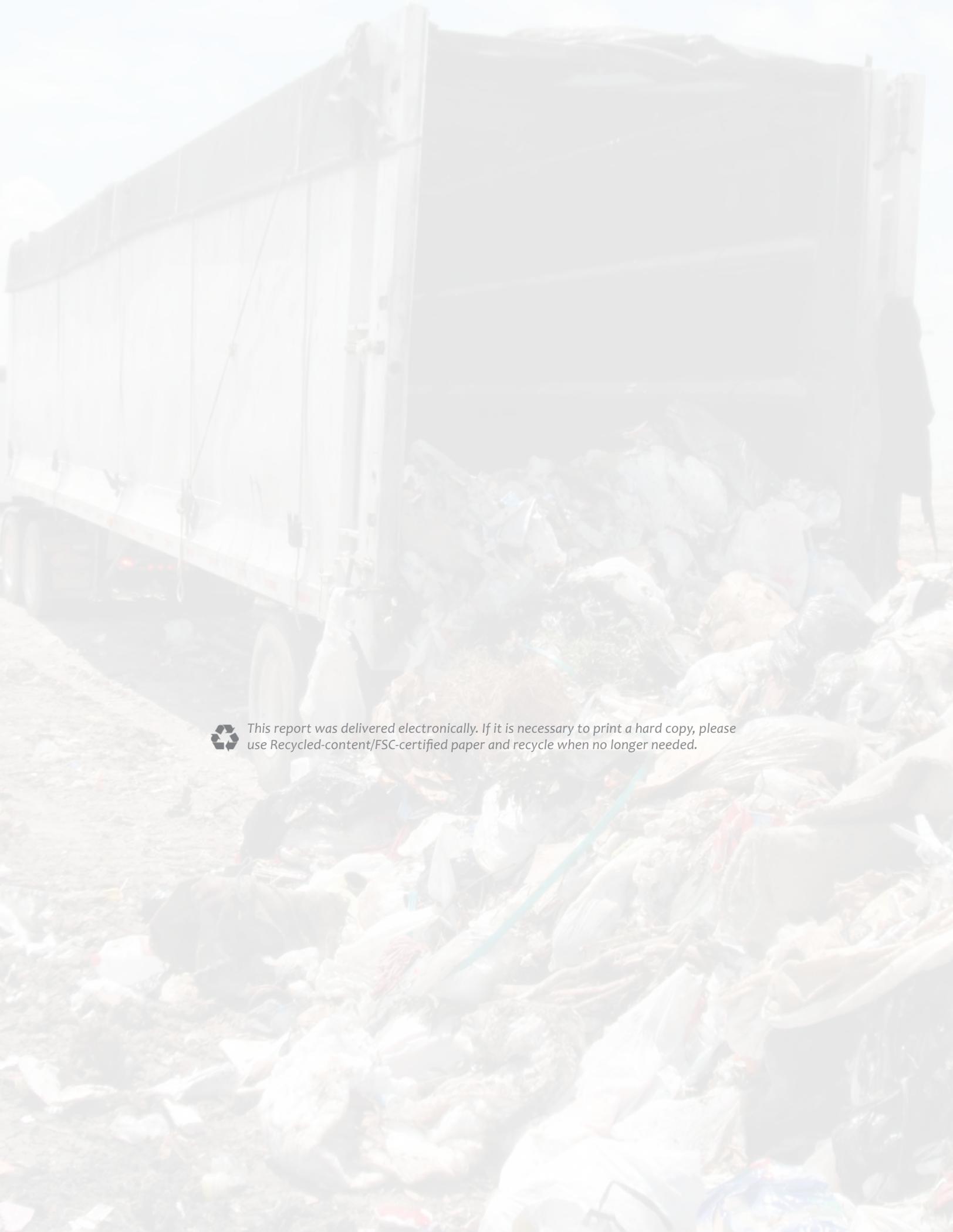
February 11, 2019

MASSACHUSETTS MATERIALS MANAGEMENT CAPACITY STUDY



MASSACHUSETTS





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1. INTRODUCTION

1.1 INTRODUCTION

The Massachusetts Department of Environmental Protection (MassDEP) is in the process of developing a new Solid Waste Master Plan (Plan). The Plan is intended to provide the overall policy framework for managing solid waste in Massachusetts. A key component of the Plan is ensuring that there is sufficient capacity in place to manage Massachusetts' waste materials both now and on a forward-looking basis. In the past, capacity analysis has focused primarily on disposal; however, MassDEP is interested in taking a broader view of materials management capacity and expanding its analysis beyond simple disposal capacity.

Accordingly, in anticipation of the Plan update, MassDEP undertook a study of the waste management system to assess the overall capacities of possible material endpoints including facilities involved in disposal (landfill and combustion), transfer, recycling, composting, anaerobic digestion, animal feed operations, food rescue, and materials reuse operations. While the study's primary focus was on facilities within Massachusetts, the study also included an assessment of the current and future material capacities of disposal and processing facilities in surrounding states.

The study objectives included:

- ◆ Compiling current annual capacity data for all facility types in Massachusetts that manage solid waste¹,
- ◆ Compiling current annual capacity data for all out-of-state disposal and processing facilities within a 30-mile radius of the Massachusetts border, as well as more distant facilities currently receiving a substantial quantity of waste generated within Massachusetts,
- ◆ Identifying qualitative trends for how this capacity is likely to change in the coming decade,
- ◆ Identifying disposal capacity trends in the states that currently import wastes from Massachusetts, and
- ◆ Providing information about the costs to transport waste materials from within Massachusetts to more distant disposal and processing facilities.

This report, prepared by MSW Consultants, summarizes the findings of this research effort.

1.2 SCOPE OF STUDY

The scope of this study included all in-state disposal, transfer, processing, and reuse facilities. This report also included a smaller subset of out-of-state facilities:

- ◆ All disposal, transfer, and processing facilities that were within 30 miles of the Massachusetts border, and
- ◆ All disposal facilities that accepted at least 5,000 tons of Massachusetts waste, regardless of their distance from Massachusetts.

Nine states, including Massachusetts, were identified as potentially hosting facilities meeting these conditions. These are shown in Figure 1-1.

¹ In this report, the term "solid waste" is used broadly to include mixed solid waste, as well as materials that are separated from mixed solid waste, such as recyclables, organics, and reusable items.

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Figure 1-1 States Included in the Study

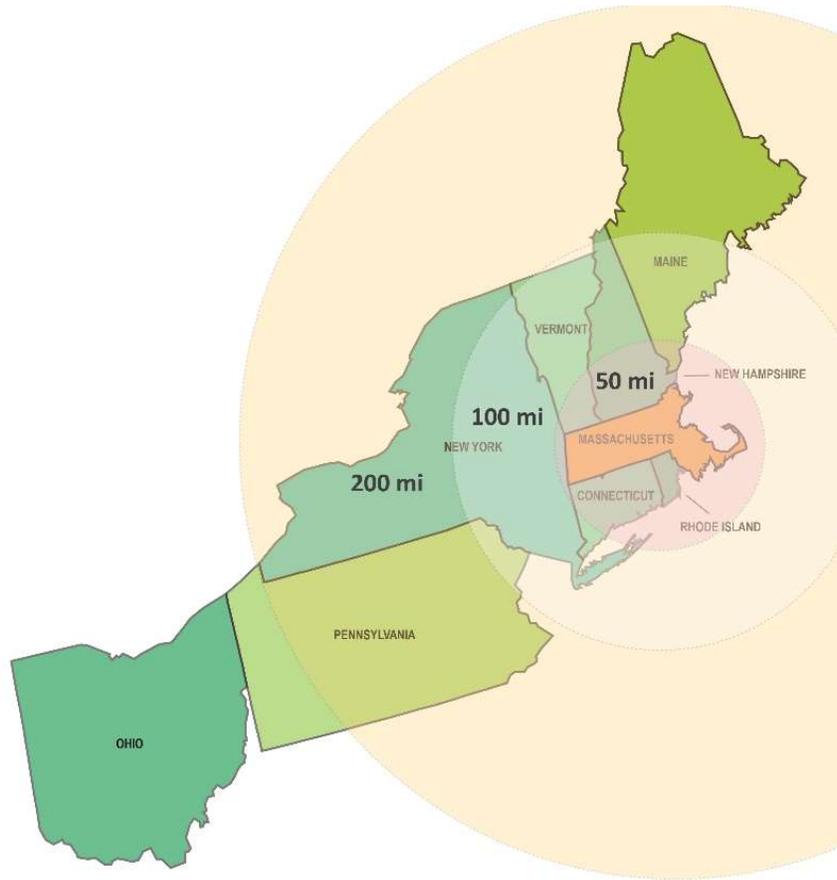


Figure 1-2 shows the primary geographic boundaries of this study in which all disposal, transfer, and processing facilities were identified and researched.

Figure 1-2 Primary Geographic Boundaries of Study



1.3 METHODOLOGY

Key elements of the study methodology are described in this section.

1.3.1 FACILITY TYPES

Table 1-1 lists the facility types that were included in this study.

Table 1-1 Targeted Facility Types

Category	Type	Description
Disposal	Landfill	Disposal and burial of solid wastes including MSW and C&D debris; ash and sludge landfills are listed, though not considered sources of solid waste capacity
	Waste to Energy (WTE)	Combustion of solid waste for energy recovery
Transfer	Transfer & Handling	Accumulation and aggregation of solid wastes for transportation to other facilities for disposal or processing
Processing	C&D Processor	Recovery of recyclable and compostable materials from construction and demolition wastes
	Material Recovery Facility (MRF)	Recovery of fiber, container and plastic recyclables from MSW
	Compost Site	Composting of yard trim, food scraps, and other organics
	Anaerobic Digestion Facility	Anaerobic digestion of organic materials
	Animal Feed Operation	Conversion of food scraps into feed for livestock
	Other Organics Processor	Other operations accepting organic materials, such as mulching and food waste depackaging
Reuse	Food Rescue Operation	Intercepting of edible food for re-delivery and consumption by other people
	Textiles & Household Goods	Donation of reusable clothing and other small household goods
	Building Materials & Household Furnishings	Donation of reusable furniture, bulky items, and building materials within the residential sector
	Institutional/Commercial Furniture & Equipment	Donation of furniture and equipment within the commercial/ institutional sector

The following facility types were specifically excluded from this study. Although these organizations may process some fraction of the State's waste stream, they were considered too specialized for inclusion in the analysis.

- ◆ Computer & electronic appliance remanufacturers,
- ◆ Motor vehicle parts (used),
- ◆ Tire retreaders,
- ◆ Pallet remanufacturing and reuse,
- ◆ Retail used merchandise sales including:
 - ◆ Surplus stores,

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- ◆ Used book dealers,
- ◆ Used household appliance stores,
- ◆ Secondhand sporting goods stores,
- ◆ Specialized industry secondhand stores,
- ◆ Flea markets,
- ◆ Antique stores, and
- ◆ Materials exchange services (virtual marketplaces).

Finally, this study also excluded the tonnage of beverage containers recovered in Massachusetts' container deposit program.

1.3.2 RESEARCH PROTOCOL

The following research was performed for this study:

- ◆ **In-State Disposal Capacity:** Massachusetts disposal facility data was primarily obtained from multiple existing MassDEP data sources. Disposal facilities in Massachusetts are generally required to have specific permits and therefore it was not necessary to perform extensive primary research. For every currently operating landfill, WTE facility, and transfer & handling facility in Massachusetts, the following data was acquired and analyzed:
 - ◆ Facility name, type, location, and identification attributes,
 - ◆ Permitted annual capacity and actual throughput,
 - ◆ Estimated useful life (if applicable), and
 - ◆ Other relevant data, including identification of out-of-state facilities receiving waste from Massachusetts transfer stations.
- ◆ **In-State Processing Capacity:** MassDEP also maintains a significant amount of data on in-state processing facilities. Processing facilities that are receiving large volumes of material are required to have a permit specifying their allowable capacity, while smaller facilities (i.e., those receiving low volume) may operate under a general permit with the understanding they will not exceed a maximum quantity. Some internet research and direct surveying was also performed for in-state processing facilities, but direct research was relatively limited. For currently operating facilities that accept traditional recyclables, as well as construction and demolition debris, yard waste, or food waste, the following data was acquired and analyzed:
 - ◆ Facility name, type, location, and identification attributes,
 - ◆ Permitted and actual annual capacity (if applicable), and
 - ◆ Estimated quantity processed.
- ◆ **In-State Reuse Capacity:** MassDEP does not currently maintain detailed information about the universe of reuse organizations, which span donation centers, food rescue, and other reuse operations. A master list of these organization and their associated retail locations was assembled with input from MassDEP and supplemented with internet research. MassDEP alerted their contacts within a subset of these organization about this research and requested participation. Direct surveying via a combination of phone calls and emails were used to engage reuse organizations and estimate the quantity of material captured by these organizations. Up to 30 respondents were contacted within each type of reuse organization; these responses were used to estimate the total quantity within the universe of like respondents. The following data was acquired and analyzed from reuse facilities:
 - ◆ Facility name, type, location, and identification attributes,
 - ◆ Estimated quantity received for reuse, and

- ◆ Insight into the likelihood of expanding operations to accept additional materials for reuse.

Where possible, qualitative information about the visible supply of potential new in-state processing and reuse capacity was compiled. Based on this information and on existing data, an attempt was made to project capacity growth over 10 years.

- ◆ **Out-of-State Disposal Capacity:** Designated environmental agencies in the states included in this study generally maintain an inventory of solid waste disposal facilities. State agencies were contacted to obtain a list of disposal facilities and to investigate the statewide capacity for disposal at present and in the future. This study also specifically attempted to identify and compile every out-of-state landfill or WTE facility that accepts more than 5,000 tons per year of waste from Massachusetts, including the following information:
 - ◆ Facility name, type, location, and identification attributes,
 - ◆ Permitted capacity and actual annual throughput,
 - ◆ Estimated useful life,
 - ◆ A comparison of the recorded imports by the host state agency vs. recorded exports by MassDEP,
 - ◆ Likely trends in availability of out-of-state disposal capacity in states currently receiving Massachusetts waste based on phone interviews with public and private sector representatives in receiving states
 - ◆ Generic truck transport costs for hauling waste out of state, and
 - ◆ Estimated rail transportation cost per ton-mile based on generic rail freight pricing.
- ◆ **Out-of-State Processing Capacity:** It is assumed that the volume of materials exported from Massachusetts for processing diminishes as the distance increases. This study identified and researched currently operating facilities within 30 miles of the MA border that accept traditional recyclables, as well as construction and demolition debris, yard waste, and food materials. A combination of host state agency data, supplemented with internet research and direct surveying, was used to acquire and analyze the following data:
 - ◆ Facility name, type, location and identification attributes,
 - ◆ Permitted capacity and actual annual throughput (if applicable), and
 - ◆ Qualitative information about the visible forward supply of potential new out-of-state processing capacity within 30 miles.
- ◆ **Out-of-State Reuse Capacity:** No attempt was made to research out-of-state reuse capacity. It was assumed that most reuse activities occur within close proximity to the point of generation. Additionally, it was reported that many organizations involved in reuse are organized by state and tend to target their market accordingly. Finally, it was hypothesized that reuse capacity would be a relatively small contributor to overall materials management capacity and the available research budget was allocated to other facility types.

The facilities identified in this research have been compiled in a database and delivered to MassDEP as a supplement to this report. The database contains publicly available information about disposal and processing facilities known to state solid waste management agencies, as well as location information from reuse facilities in Massachusetts. Capacity information from surveyed facilities has been withheld from the database as this information may be considered confidential by the respondents.

It should be noted that not every facility identified was directly contacted. Rather, due to the number of certain facility types, a random sample was contacted and results from the random sample were applied to the universe of facilities identified. Random sampling sought to provide an estimated total capacity within an error range of 100,000 tons per facility type for disposal and processing facilities. Within the reuse

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sector, an attempt was made to survey every organization, except for the Small Textiles & Household Goods category where a random sample of 30 organizations was selected.

It should also be noted that the accounting of tonnage managed at Massachusetts-based facilities may include not only materials generated within the state, but also may contain imported materials. No attempt was made to differentiate imported materials by facility type in this study. However, MassDEP reports 432,839 tons of MSW and C&D were imported from surrounding states in 2016.

Appendix A provides a list of in-state and out-of-state data sources used in this research.

1.4 REPORT ORGANIZATION

The remaining sections of the report are described briefly below.

- ◆ **Section 2, In-state Capacity:** Presents the current and future projected capacity of materials management facilities located within Massachusetts.
- ◆ **Section 3, Out-of-State Capacity:** Presents the current capacity of disposal and processing (but not reuse) facilities in surrounding states which are located within 30 miles of the Massachusetts border, or which are more distant but are known to have accepted at least 5,000 tons of wastes generated within Massachusetts; and summarizes the current and future projected state-wide disposal capacity for all states included in this study based on available data from the respective state environmental agencies.
- ◆ **Section 4, Conclusions:** Analyzes the in-state and out-of-state capacity to identify capacity shortages; provides an overview of waste and recyclables transportation economics; and identifies likely Massachusetts and regional market dynamics in the coming years.
- ◆ **Appendices:** Provides supplemental data.

2. IN-STATE CAPACITY

2.1 INTRODUCTION

This section summarizes the results of the capacity research for Massachusetts facilities. In order to best describe the data sources and facility classifications within Massachusetts, there are separate subsections for the following facility types:

- ◆ Disposal facilities,
- ◆ Transfer facilities, which may aggregate and transport materials to other Massachusetts-based facilities or to out-of-state facilities,
- ◆ Recyclables processing facilities,
- ◆ Organics processing facilities, and
- ◆ Reuse organizations.

2.2 DISPOSAL CAPACITY

2.2.1 WASTE-TO-ENERGY FACILITIES

Table 2-1 shows the seven waste-to-energy (WTE) facilities in Massachusetts. Collectively, these facilities combust 3.25 million tons of solid waste, or 44.0% of the total solid waste managed in Massachusetts. The smallest of these WTE facilities was reported to potentially be closing by 2020.

Table 2-1 In-State WTE Facility Capacity (2016)

WTE Name	Permitted Capacity	Tons Received	% MA Tons Received	MA Tons Received	Residual Ash Tons Landfilled	Net Disposed ^[1]	Notes
Covanta Haverhill	602,250	597,563	90.4%	540,155	133,708	463,855	
Covanta Pittsfield	84,000	84,854	73.7%	62,534	1,246	83,608	May close in 2020
Covanta SEMASS	1,250,000	1,119,630	97.7%	1,093,490	195,914	923,716	
Covanta Springfield	131,400	125,937	81.7%	102,903	43,206	82,731	
Wheelabrator Millbury	529,575	463,422	90.4%	418,825	118,109	345,313	
Wheelabrator North Andover	460,500	445,288	86.1%	383,481	110,811	334,477	
Wheelabrator Saugus	460,500	417,795	99.9%	417,277	117,310	300,485	
GRAND TOTAL	3,518,225	3,254,449	92.5%	3,018,665	720,304	2,534,185	

[1] Net Disposed = Tons Received – Residual Ash Tons Landfilled

As shown, although the actual capacity does not quite reach the permitted capacity, Massachusetts’ WTE facilities are effectively operating at full capacity due to scheduled and unscheduled downtime. This study treats the “Tons Received” as a reasonable estimate of full capacity for WTE facilities. It should be noted that some metal is recovered from this amount; and that ash is generated as a result of the combustion. Most of the ash produced by these facilities is sent to Massachusetts ash-only landfills.

2. IN-STATE CAPACITY

With the exception of the Covanta Pittsfield plant which may close in 2020, the current WTE capacity in Massachusetts was assumed to remain operational for the foreseeable future.

2.2.2 LANDFILLS

Table 2-2 shows the active-permit landfills in Massachusetts. There are 18 total landfills: 10 MSW landfills, 7 ash landfills, and 1 sludge landfill. Because ash and sludge are not considered solid waste, only the MSW landfills were considered sources of solid waste capacity. Collectively, these landfills dispose of 1.26 million tons of solid waste, or 17.1% of the total solid waste managed in Massachusetts.

Table 2-2 In-State Landfill Capacity (2016)

Landfill Name	Permitted Capacity	Tons Received	% MA Tons Received	Expected Closure Year	% by Landfill Type
MSW Landfills					
Casella Southbridge	405,600	325,889	98.6%	2018	25.82%
Crapo Hill	115,000	102,106	100.00%	2026	8.09%
Fitchburg Westminster	538,200 ^[4]	417,465	64.3%	2024	33.08%
Hull	14,256	441	100.00%	2018	0.03%
Middleborough	60,000	58,040	100.00%	2031	4.60%
Nantucket	26,000	2,800	100.00%	2030	0.22%
Sturbridge	7,644	275	100.00%	2030	0.02%
Taunton	120,120	119,072	99.9%	2020	9.44%
Town of Bourne ^[2]	30,000	26,009	100.0%	2025	2.06%
WM Chicopee	365,000	209,850	89.9%	2019	16.63%
MSW SUBTOTAL	1,533,620	1,261,947			100.00%
Ash Landfills					
Bondi's Island	105,850	103,796	42.8%	2023	13.38%
Brayton Point Energy	0	0	0.0%	2020	0.00%
Carver Marion Wareham	101,125	55,280	100.0%	2020	7.13%
Peabody	0	0	0.0%	2024	0.00%
Shrewsbury	237,930 ^[3]	369,485	67.1%	2028	47.63%
Ward Hill Neck	172,050	133,708	100.0%	2022	17.24%
Wheelabrator Saugus	146,000	113,511	100.0%	2023	14.63%
ASH SUBTOTAL^[4]	683,985	775,780			100.00%
Sludge Landfills					
Specialty Minerals Combined Notch Rd	219,000	60,390	100.0%	2019	100.00%
SLUDGE SUBTOTAL	219,000	60,390			100.00%
GRAND TOTAL	2,436,605	2,098,117			

[1] Temporary permit increased capacity to 538,200 tons in 2016; facility now permitted at 520,000 tons.

[2] 85% of annual capacity contracted to Covanta SEMASS for ash disposal until Dec. 2021; capacity shown represents MSW capacity only.

[3] Reflects an annual average rather than an annual maximum, which can vary from year to year.

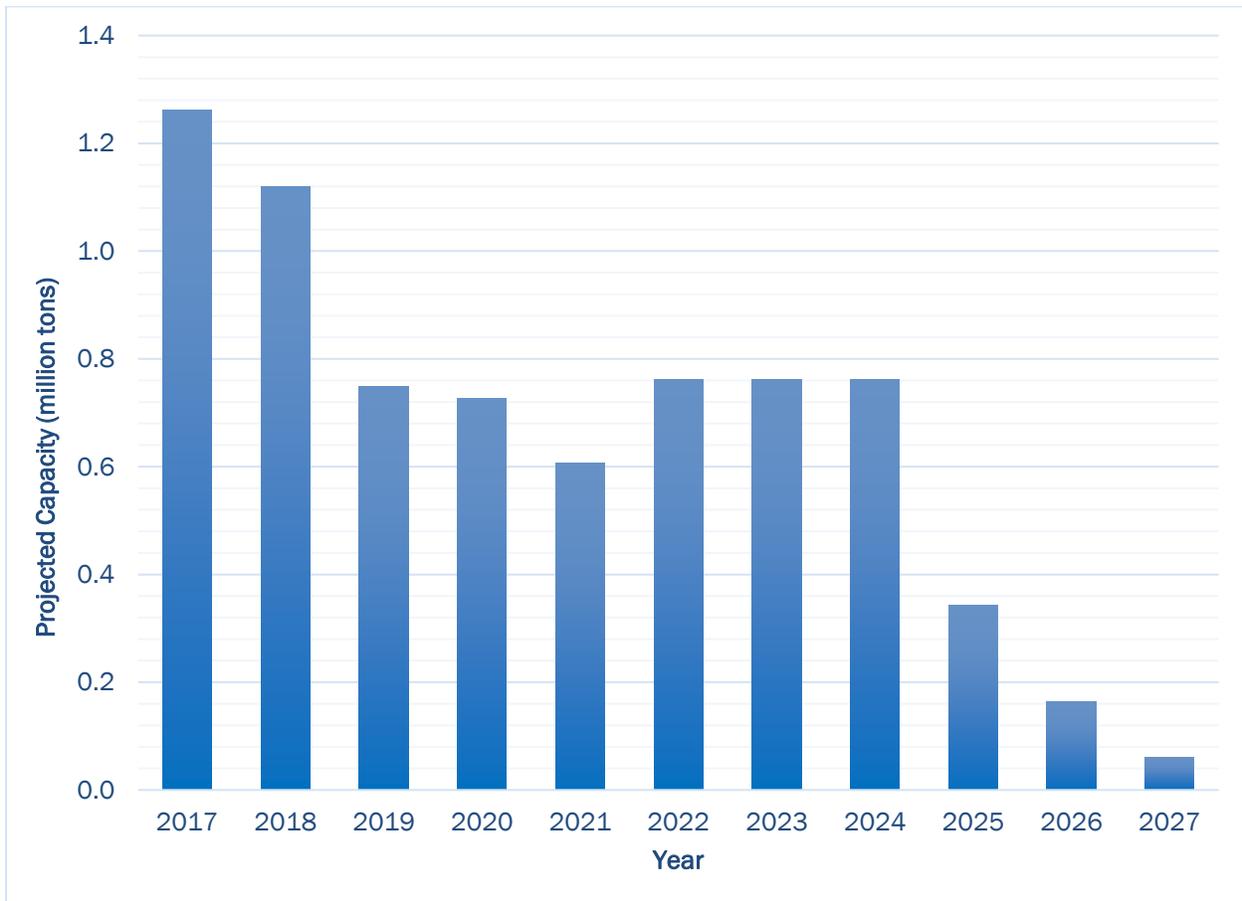
[4] Not including ash received at the Town of Bourne Landfill.

As shown in this table, there is an 18% difference between the permitted capacity and the actual tons received at these facilities. Despite the difference, it is believed that the state's landfills are operating at or close to full capacity.

2. IN-STATE CAPACITY

Expected useful life for all Massachusetts landfills was compiled and is shown in Figure 2-1 through 2027. Useful life estimates incorporate currently permitted capacity and proposed expansions expected to be permitted. As shown, landfill disposal capacity is expected to decline most years with the exception of a jump in 2022. At this time, the Town of Bourne’s ash disposal contract with Covanta expires. Because the Town of Bourne landfill is a permitted MSW landfill, it would be expected to have additional capacity for MSW starting in 2022. However, the reduction in landfill capacity still represents a loss of 16% of total solid waste managed in the state.

Figure 2-1 Projected In-State MSW Landfill Capacity



Note: The Town of Bourne Landfill is projected to be capable of an increase in MSW capacity after its ash disposal contract with Covanta SEMASS expires in Dec. 2021.

2.3 TRANSFER CAPACITY

Table 2-3 shows the in-state transfer & handling facility capacity. Collectively, these facilities export 1.02 million tons of solid waste, or 13.9% of the total solid waste managed in Massachusetts.

2. IN-STATE CAPACITY

Table 2-3 In-State Transfer & Handling Facilities Capacity (2009-16^[1])

Transfer Type	Data Type	No. of Facilities	Permitted Capacity	Tons Received	Tons Received Margin of Error	Tons Transferred Within MA	Tons Exported
Large Transfer & Handling	Confirmed	46	5,111,075 ^[2]	2,981,619	0	2,329,522	652,097
	Estimated	1	111,515	64,818	123,756	NA	NA
	SUBTOTAL	47	5,222,590	3,046,437	123,756	2,329,522	652,097
Small Transfer & Handling ^[3]	Confirmed	174	1,187,889 ^[4]	488,832	0	464,390 ^[5]	24,442 ^[5]
	Estimated	9	63,228	25,284	20,896	24,020 ^[5]	1,264 ^[5]
	SUBTOTAL	183	1,251,117	514,116	20,896	488,410	25,706
C&D Transfer & Handling ^[6]	Confirmed	7	738,919 ^[7]	412,789	0	66,062	346,727
	Estimated	0	0	0	0	0	0
	SUBTOTAL	7	738,919	412,789	0	66,062	346,727
GRAND TOTAL		237	7,212,626	3,973,342	144,651	2,883,994	1,024,530

[1] Data for large and C&D transfer & handling facilities is sourced from 2016 reports and is updated annually; data for small transfer & handling facilities is sourced from 2009 reports because this was the last year in which MassDEP collected data from these facilities.

[2] Permitted capacities were available for 33 of the 46 facilities; permitted capacities for the remaining 13 facilities were estimated based on the 33 known capacities.

[3] Small Transfer & Handling facilities are not considered sources of additional capacity.

[4] Permitted capacities were available for 145 of the 174 estimations; permitted capacities for the remaining 29 facilities were estimated based on the 145 known facilities.

[5] Data not available; it is estimated that 95% of waste brought to small transfer & handling facilities remains in-state based on MSW Consultants' professional judgment.

[6] Includes only facilities exclusively accepting C&D waste.

[7] Permitted capacities were available for 5 of the 7 facilities; permitted capacities for the remaining 2 facilities were estimated based on the 5 known facilities.

To achieve more accurate estimates and focus survey efforts, facilities were stratified into “Large” and “Small” groups based on MassDEP classifications. In general, the Large group consists of transfer & handling facilities capable of loading waste into containers suited for long-distance road or rail hauling. Capacity from Large transfer & handling facilities is generated from exporting solid waste out-of-state. Tons transferred within Massachusetts are not considered as available capacity because those tons are already counted at the disposal or combustion facility where they are received. The data suggests that the Large transfer & handling facilities have nearly 2.2 million tons of excess capacity, all of which would need to exit the state for disposal.

The “Small” transfer & handling group consists primarily of municipal convenience centers where materials are loaded into roll-off containers for local haul to a Large transfer station, WTE, or landfill; these facilities are not suited for long-distance hauling. Despite the apparent excess capacity at these facilities, none of the capacity is suitable for large-scale, commercial movement of materials and therefore cannot be considered a viable outlet for materials management.

A third group, “C&D Transfer & Handling,” consists of facilities exclusively accepting C&D waste; this does not include facilities accepting both MSW and C&D wastes. C&D transfer & handling facilities also have permitted capacity in excess of the tons received.

2. IN-STATE CAPACITY

Combining the Large and C&D transfer & handling facilities suggests there is an additional 2.5 million tons of capacity available for export of materials to surrounding states.

2.4 RECYCLABLES PROCESSING CAPACITY

2.4.1 MATERIAL RECOVERY FACILITIES

Table 2-4 shows the in-state material recovery facility (MRF) capacity. Collectively, these facilities process 0.63 million tons of solid waste, or 8.5% of the total solid waste managed in Massachusetts.

Table 2-4 In-State MRF Capacity (2017)

Data Type	No. of Facilities	Estimated		Residual Tons Disposed	Unique Tons Received ^[2]	Unique Tons Received Margin of Error
		Actual Capacity ^[1]	Tons Received			
Confirmed	8	758,678	689,707	60,361 ^[3]	629,346	9,221

[1] Estimated actual capacity calculated as 10% greater than the current tons received based on input from MassDEP and based on MSW Consultants' professional judgment.

[2] Unique Tons Received = Tons Received - Residual Tons Disposed

[3] The number of residual tons disposed were available for 6 of the 8 facilities; the number of residual tons disposed for the remaining 2 facilities were estimated based on the 6 known facilities.

MRFs in Massachusetts are required to have a general permit to accept up to 250 tons per day of plastic, glass, and metal containers, as well as an unlimited quantity of paper. Based on the assumption that commingled containers represent 45 percent of single-stream recyclables, the estimated permitted capacity of these general-permitted MRFs is 556 tons per day. This does not represent the actual capacity which may be constrained by facility, site, and market conditions. Capacity also changes as market conditions change impacting facility throughput.

In practice, MassDEP reported that these MRFs generally indicate an inability to accept incrementally more materials at the current time. It is possible that some of the MRFs in Massachusetts could expand their processing capacity by adding another shift; by upgrading processing equipment; or by making site improvements. However, it was beyond the scope of this study to investigate the potential for these actions (which may be considered confidential business decisions by MRF owners).

2.4.2 C&D PROCESSING FACILITIES

Table 2-5 shows the in-state C&D processing facility capacity. Collectively, these facilities process or export 0.67 million tons of solid waste, or 9.1% of the total solid waste managed in Massachusetts.

Table 2-5 In-State C&D Processing Facility Capacity (2016)

Data Type	No. of Facilities	Permitted Capacity	Tons Received	Tons Recycled	Tons Transferred within MA	Tons Exported	Unique Tons Received ^[1]	Unique Tons Received Margin of Error
Estimated	1	250,000	85,619	15,968	43,930	25,720	41,689	53,068
GRAND TOTAL	16	3,155,300	1,379,686	257,318	707,901	414,466	671,785	53,068

[1] Unique Tons Received = Tons Received - Tons Transferred within MA

Capacity from C&D processing facilities is generated from either recycling or exporting solid waste out-of-state. Tons transferred within Massachusetts are not considered a source of capacity because those tons are already counted at the disposal or processing facility where they are received.

2. IN-STATE CAPACITY

As shown, there is excess capacity within C&D processing facilities based on this data. Nearly 1.8 million additional tons of C&D could be processed within the current infrastructure. However, based on the observed recycling rate, it is estimated that 18.7% of the additional available capacity would be recycled, while 81.3% would need to be exported to C&D landfills or other processing facilities out-of-state.

2.4.3 OTHER RECYCLABLES PROCESSING FACILITIES

Quantitative data of other recyclables processing facilities, such as scrap metal processors, pallet remanufacturers, and tire retreaders, is not included in this study. These facilities have well established sources of material that is not expected to enter the broader solid waste management system analyzed in this report, although some of their supply may come from MRFs, C&D processing facilities, and transfer & handling facilities which are already captured in this study.

One operation of note is the Massachusetts bottle bill program that recovered 2,104,268,787 bottles in 2017, or roughly 60,000 tons. This program is not represented further in this study, though is one example of capacity via other recyclables processing facilities.

2.5 ORGANICS PROCESSING CAPACITY

Table 2-6 shows the in-state organics processing facility capacity. Collectively, these facilities process 0.51 million tons of solid waste, or 6.8% of the total solid waste managed in Massachusetts.

Table 2-6 In-State Organics Processing Facility Capacity (2016-18^[1])

Facility Type	Data Type	No. of Facilities	Permitted Capacity	Tons Received	Tons Received Margin of Error
Large Compost	Confirmed	4	129,925 ^[2]	129,925	0
	Estimated	0	0 ^[2]	0	0
	<i>SUBTOTAL</i>	4	129,925	129,925	0
Small Compost	Confirmed	32	44,483 ^[2]	44,483	0
	Estimated	147	204,344 ^[2]	204,344	69,904
	<i>SUBTOTAL</i>	179	248,827	248,827	69,904
Agricultural Compost ^[3]	Confirmed	12	65,520	18,188	0
	Estimated	2	10,920	3,031	4,178
	Potential	43	234,780	0	NA
	<i>SUBTOTAL</i>	57	311,220	21,219	4,178
Anaerobic Digestion ^[4]	Confirmed	8	275,258 ^[5]	92,255	0
	Estimated	0	0	0	0
	<i>SUBTOTAL</i>	8	275,258	92,255	0
Animal Feed	Confirmed	5	141,025 ^{[2][6]}	13,275	0
	Estimated	2	20 ^[7]	20 ^[7]	NA ^[7]
	<i>SUBTOTAL</i>	7	141,045	13,295	NA
GRAND TOTAL		255	1,106,275	505,521	74,082

[1] Data aggregated from sources that vary in timeframe from 2016 to 2018.

[2] Tons received used in place of permitted capacity where not available.

[3] There are 14 agricultural compost facilities that actively accept off-site farm materials; there are an additional 43 agricultural compost facilities registered with the Department of Agricultural Resources that do not currently accept off-site farm materials, although potentially could.

[4] Anaerobic digestion numbers reflect the currently operational capacities; total permitted capacity is expected to increase to 659,075 upon the completion of facility expansions and the construction of five additional facilities.

[5] Tons received was used in place of permitted capacity for any facility that is not yet fully operational.

[6] One facility permitted for 136,875 tons; permitted capacities for other animal feed facilities were not available.

[7] Order of magnitude estimates based on MSW Consultants' professional judgment.

2.5.1 COMPOST FACILITIES

To achieve more accurate estimates and focus survey efforts, compost facilities were stratified into “Large” and “Small” groups based on their tons received, if known, or qualitatively based on facility size. In general, the Large group consists of facilities capable of processing more than 5,000 tons annually. The Small group mainly consists of municipal compost facilities expected to process less than 5,000 tons annually, such as a public works lot used for annual leaf composting.

A third group, “Agricultural Compost,” consists of facilities regulated by the Massachusetts Department of Agriculture Resources. The Agricultural Compost facilities each have a permitted capacity of 5,460 tons per year for off-site food and vegetative material. These facilities were given credit for having this capacity to handle source separated food wastes. Permitted capacities for other compost facilities were not available.

As shown, there appears to be limited excess capacity in the agricultural compost, anaerobic digestion, and animal feed facilities, although the Large and Small compost facilities are already at capacity. It is likely that some compost facilities do have additional capacity available, however exact quantities are unknown.

2.5.2 ANAEROBIC DIGESTION FACILITIES

Anaerobic digestion is a relatively new facility type in Massachusetts. Of the eight data points collected for currently operating facilities, four of the data points reflect the tons received before the facilities began operating at full scale.

These facilities currently can process up to 275,000 tons per year but are expected to increase to 660,000 tons per year due to facility expansions and the completion of five additional facilities currently under construction or awaiting permits.

2.5.3 ANIMAL FEED OPERATIONS

Animal feed operations that accept modest quantities of food have existed to serve local markets for some time. This study did not investigate these operations in detail, but it is believed that these operations will persist although may not offer potential for extensive future growth. However, Troiano Trucking Inc. received a permit to expand operations up to a permitted 136,875 tons per year. Only historical data up to 2016 was available for the tons received at this facility, and therefore may not reflect the quantity currently accepted. Additionally, some material received at animal feed operations may later be sent to anaerobic digestion facilities; this dynamic is not captured in the study.

2.5.4 OTHER ORGANICS PROCESSING FACILITIES

Quantitative data for other organics processing facilities, such as those involved in mulching and food waste depackaging, is not included in this study. These facilities have well-established sources of material that is not expected to enter the broader solid waste management system analyzed in this report, although some of their supply may come from MRFs, C&D processing facilities, and transfer & handling facilities which are already captured in this study.

One facility of note is the Pinetree Power Fitchburg biomass plant that combusts approximately 180,000 tons of clean wood waste to produce energy. This facility is not represented further in this study, though is a source of wood waste capacity.

2. IN-STATE CAPACITY

2.6 REUSE ORGANIZATIONS

Table 2-7 estimates the capacity of the 220 in-state reuse operations. Collectively, these facilities reuse 43,000 tons of material, or 0.6% of the total solid waste managed in Massachusetts.

Table 2-7 In-State Reuse Organization Capacity (2016-18^[1])

Facility Type	Data Type	No. of Facilities	Tons Received	Margin of Error
Food Rescue	Confirmed	17	17,456	0
	Estimated	2	2,054	5,077
	<i>SUBTOTAL</i>	19	19,510	5,077
Small Textiles & Household Goods	Confirmed	6	167	0
	Estimated	105	2,923	1,536
	<i>SUBTOTAL</i>	111	3,090	1,536
Large Textiles & Household Goods	Confirmed	8	3,874	0
	Estimated	65	11,467	NA ^[2]
	<i>SUBTOTAL</i>	73	15,340	NA
Building Materials & Household Furnishings	Confirmed	4	1,504	0
	Estimated	7	2,632	2,514
	<i>SUBTOTAL</i>	11	4,136	2,514
Institutional/Commercial Furniture & Equipment	Confirmed	4	549	0
	Estimated	2	275	895
	<i>SUBTOTAL</i>	6	824	895
GRAND TOTAL		220	42,899	NA

[1] Data aggregated from sources that vary in timeframe from 2016 to 2018.

[2] Not available due to the mixed variety of operations.

Data for reuse organizations was gathered primarily via phone surveys. Seventy-four organizations representing 133 facilities were contacted, and responses from 31 organizations representing 34 facilities were received. Respondents were asked about the quantity of material currently received, how that quantity is expected to change over the next 10 years, and what factors contribute to the expected change. Several respondents reported that the primary factors limiting growth are the storage capacities of the facilities, the number of locations they operate, and the presence of nearby competitors. Of the 25 facilities willing to provide a projection of how the quantity accepted may change, 13 projected an increase, 2 projected a decrease, and 10 projected no change. Capacity within the reuse sector is expected to expand modestly over time.

It is worth noting that, unlike the case for disposal and processing facilities, there are no significant permitting requirements or regulatory barriers to entry for reuse organizations. Should the volume of reusable materials increase with sufficient demand for such items, new reuse organizations could be launched efficiently to meet this demand. The growth of the reuse sector is limited only by the economics of the business.

2. IN-STATE CAPACITY

2.7 IN-STATE CAPACITY SUMMARY

Table 2-8 summarizes the solid waste capacity of facilities within Massachusetts.

Table 2-8 In-State Solid Waste Capacity Summary

Facility Type	No. of Facilities	Permitted Capacity	Tons Received ^[1]	Tons Transferred within MA	Unique Tons Received ^[2]	% of Total Unique Tons Received	Additional Internal Capacity Available	Additional Transfer Capacity Available	Total Capacity
Waste-to-Energy	7	3,518,225	3,254,489	0	3,254,489	44.0%	0 ^[3]	0	3,254,489
MSW Landfill	10	1,533,620	1,261,947	0	1,261,947	17.1%	0 ^[3]	0	1,261,947
Transfer & Handling	230	6,473,707	3,560,553	2,817,932	677,803	9.2%	0	2,176,153 ^[4]	2,853,956
C&D Transfer & Handling ^[5]	7	738,919	412,789	66,062	346,727	4.7%	0	326,130	672,857
MRF	8	758,678 ^[6]	689,707	60,361	629,346	8.5%	0 ^[3]	0	629,346
C&D Processing	16	3,155,300	1,379,686	707,901	671,785	9.1%	331,161	1,444,453	2,447,399
Compost	240	689,972 ^[7]	399,971	0	399,971	5.4%	290,001	0	689,972
Anaerobic Digestion	8	275,258	92,255	0	92,255	1.2%	183,003	0	275,258
Animal Feed	7	141,045 ^[7]	13,295	0	13,295	0.2%	127,750	0	141,045
Reuse Organization	220	42,899 ^[7]	42,899	0	42,899	0.6%	NA	NA	42,899
GRAND TOTAL	753	17,327,623	11,107,591	3,652,256	7,390,517	100%	931,915	3,946,737	12,269,168

[1] Includes double counting of tons received first at transfer facilities; "Unique Tons Received" excludes double counting.

[2] "Unique Tons Received" is the sum quantity of material received less the quantity transferred to another in-state facility; this represents the total quantity of solid waste managed by in-state facilities but does not include waste directly hauled to out-of-state facilities.

[3] Despite excess permitted capacity, facilities already operating at or near their actual capacities.

[4] Only Large Transfer & Facilities are considered sources of additional transfer capacity.

[5] Includes only facilities exclusively accepting C&D; facilities accepting both MSW and C&D are grouped in Transfer & Handling.

[6] Permitted capacity not representative of actual capacity; estimated actual capacity used in place of permitted capacity.

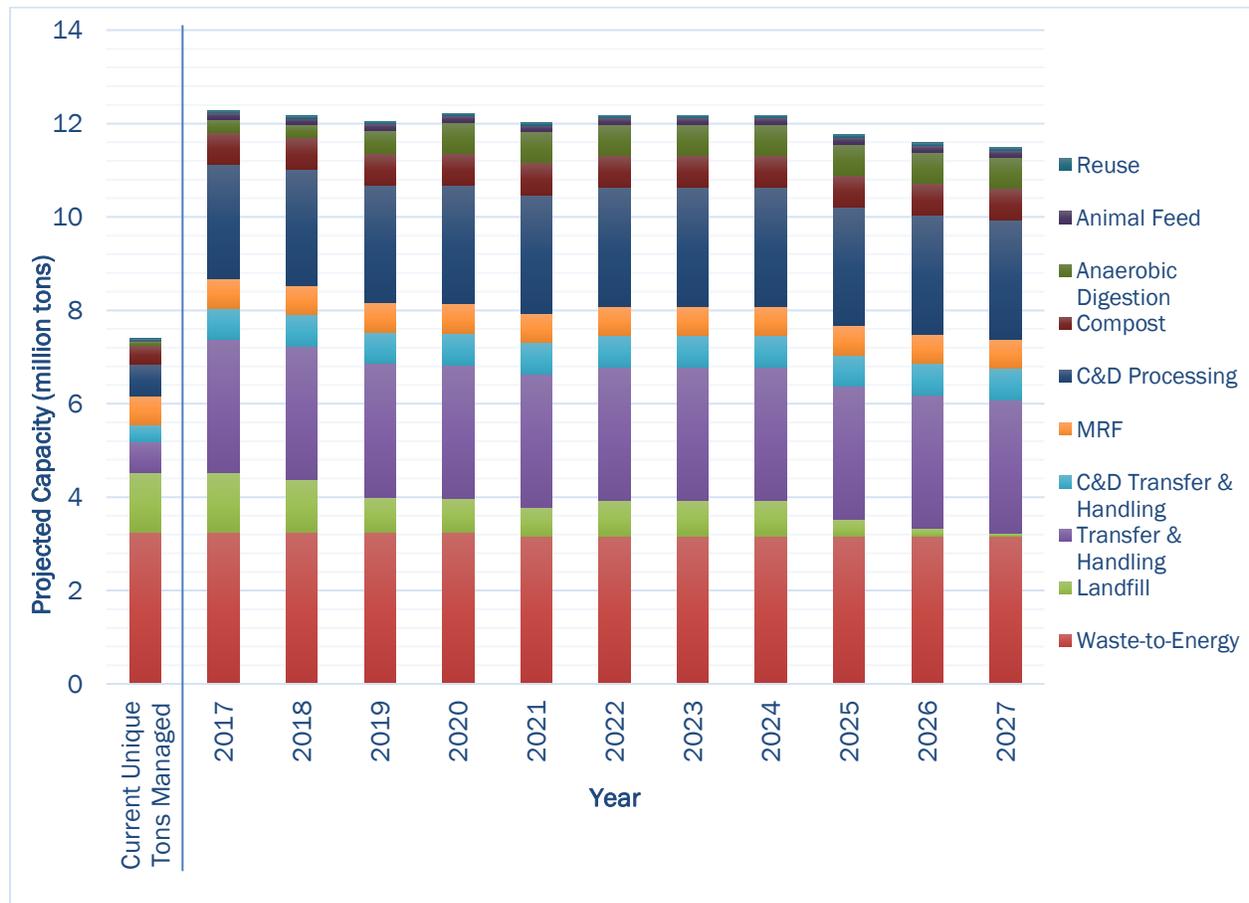
[7] Tons received used in place of permitted capacity where not available.

2. IN-STATE CAPACITY

- ◆ 7.39 million tons of solid waste are currently managed by Massachusetts facilities. This includes 3.65 million tons that pass through at least one processing or transfer & handling facility prior to arrival at a landfill or combustion facility for final disposal.
- ◆ There are approximately 932,000 tons of available internal capacity, primarily concentrated in C&D and organics processing.
- ◆ There are 3.95 million tons of transfer capacity available, made up of 1.77 million tons of C&D-only transfer capacity, and 2.18 million tons of MSW and C&D transfer capacity. It is important to note that these tons would have to be exported to out-of-state facilities.
- ◆ In total, 12.27 million tons of solid waste can be managed by Massachusetts facilities. This total capacity is the sum of the tons currently managed (60.2% of total capacity), the additional internal capacity available (7.6% of total capacity), and the additional transfer capacity available (32.2% of total capacity).

Figure 2-2 shows the total in-state solid waste capacity projected through 2027.

Figure 2-2 Projected In-State Solid Waste Capacity



Total in-state solid waste capacity is expected to decrease from 12.27 million tons to 11.49 million tons by 2027. This decrease is due to the closure of MSW landfills, though the significant increase in capacity of anaerobic digestion reduces the overall impact.

3. OUT-OF-STATE CAPACITY

3.1 INTRODUCTION

Out-of-state capacity is the sum amount of solid waste that non-Massachusetts facilities are able to combust, landfill, export, or process. The scope of this study included all facilities within 30 miles of the Massachusetts border, as well as all waste-to-energy facilities and landfills currently accepting at least 5,000 tons of Massachusetts waste annually.

A total of 1.65 million tons of solid waste are exported from Massachusetts. This represents 22.4% of the total solid waste managed in Massachusetts, and includes solid waste transferred from Massachusetts facilities and solid waste directly hauled to out-of-state facilities.

Transfer data at the facility-level was not available for out-of-state facilities, and thus some double counting may be present in the number of total tons received at each facility. This does not affect the number of Massachusetts tons received at each facility.

State agencies were the primary data sources for out-of-state facilities. Data was gathered from reports that varied in timeframes from 2014 to 2017. Web research and phone surveys were conducted to gather additional data not available from state agencies. The number of Massachusetts tons exported to each facility were gathered primarily from MassDEP reports. In cases where MassDEP data conflicted with other state agency data, the MassDEP data was preferred unless there was reason to suggest that the other source captured significant direct-hauled quantities.

3.2 DISPOSAL CAPACITY

3.2.1 WASTE-TO-ENERGY FACILITIES

Table 3-1 shows the three waste-to-energy (WTE) facilities identified within 30 miles of the Massachusetts border, or that accept at least 5,000 tons of Massachusetts waste. Collectively, these facilities dispose of 36,000 tons of Massachusetts solid waste, or 2.2% of the solid waste exported from Massachusetts. These facilities collected are permitted to receive 1.4 million tons, of which available data suggests 1.1 million are received.

Table 3-1 Out-of-State WTE Facilities (2016-17^[1])

(Includes facilities within 30 miles of the MA border or accepting \geq 5000 tons of MA waste)

WTE Name	State	Miles from MA	Permitted Capacity	Tons Received	MA Tons Received	% of Total MA Tons Exported
Mid-Connecticut Resource Recovery Facility	CT	19	888,888	580,337	9,482	0.6%
Covanta Bristol	CT	25	223,392	227,399	0	0.0%
Penobscot Energy Recovery Company	ME	163	304,000	310,444	26,704	1.6%
GRAND TOTAL			1,416,280	1,118,180	36,186	2.2%

[1] Data aggregated from sources that vary in timeframe from 2016 to 2017.

The Mid-Connecticut Resource Recovery Facility is approaching the end of its service life and is due for replacement or upgrade. The Penobscot Energy Recovery Company facility is planning to reduce the amount of MSW accepted from 304,000 to 210,000 per year.

3. OUT-OF-STATE CAPACITY

3.2.2 LANDFILLS

Table 3-2 shows the active-permit landfills identified within 30 miles of the Massachusetts border, or that accept at least 5,000 tons of Massachusetts waste. There are 17 total landfills: 10 MSW landfills, 3 ash landfills, and 4 C&D landfills. Because ash is not considered solid waste, only the MSW and C&D landfills are considered sources of solid waste capacity. Collectively, these landfills dispose of 954,000 tons of Massachusetts solid waste, or 57.6% of the solid waste exported from Massachusetts. Massachusetts waste represents 8.4% of the permitted solid waste capacity of these landfills.

Table 3-2 Out-of-State Landfills (2015-17^[1])

(Includes landfills within 30 miles of the MA border or accepting ≥5000 tons of MA waste)

Landfill Name	State	Miles from MA	Permitted Capacity	Tons Received	MA Tons Received	% of Total MA Tons Exported	Expected Closure Year
MSW Landfills							
Turnkey	NH	25	1,155,000	1,417,166	338,489	20.5%	2034
North Country Environmental Services	NH	102	249,574	371,928	53,494	3.2%	2021 ^[2]
Town of Colonie	NY	24	255,840	308,000	6,431	0.4%	2028
Rapp Road	NY	28	275,100	215,911	0	0.0%	2020
Seneca Meadows	NY	182	2,190,000	2,570,729	64,163	3.9%	2025
Allied Waste Niagara Falls	NY	291	800,000	605,639	37,762	2.3%	2025
Tunnel Hill Reclamation	OH	482	2,080,000	1,011,911	38,183	2.3%	2117
Town of Tiverton	RI	3	7,516 ^[3]	7,516	0	0.0%	2020
Rhode Island Resource Recovery	RI	11	1,123,104 ^[3]	1,123,104	0	0.0%	2038
New England Waste Services Vermont	VT	152	600,000	506,000	98 ^[4]	0.0%	2040
<i>MSW SUBTOTAL</i>			8,736,134	8,137,904	536,275	32.5%	
Ash Landfills							
Wheelabrator Putnam	CT	10	409,000	566,553	0	0.0%	2037
Four Hills	NH	2	80,000	90,563	0	0.0%	2034
Merrimack Station	NH	28	1,634	300	0	0.0%	2047
<i>ASH SUBTOTAL</i>			490,634	657,416	0	0.0%	
C&D Landfills							
Manchester	CT	18	197,709 ^[3]	197,709	167	0.0%	2025
Dunn	NY	21	490,000	497,100	66,742	4.0%	2028
Lafarge	OH	386	34,307 ^[3]	34,307 ^[5]	81,455	4.9%	2028
Sunny Farms	OH	517	1,950,000	1,132,707	266,829	16.1%	2036
<i>C&D SUBTOTAL</i>			2,672,016	1,861,823	415,193	25.1%	
GRAND TOTAL			11,898,784	10,657,143	953,813	57.6%	

[1] Data aggregated from sources that vary in timeframe from 2015 to 2017.

[2] Expansion proposed, though not yet approved.

[3] Tons received used in place of permitted capacity where not available.

[4] Received 116,657 MA tons of sludge, asbestos, contaminated soil, and other materials not considered solid waste.

[5] As reported by the Ohio Environmental Protection Agency for year 2016; data from other sources indicate that this is a reporting error and that the true quantity is approximately 600,000.

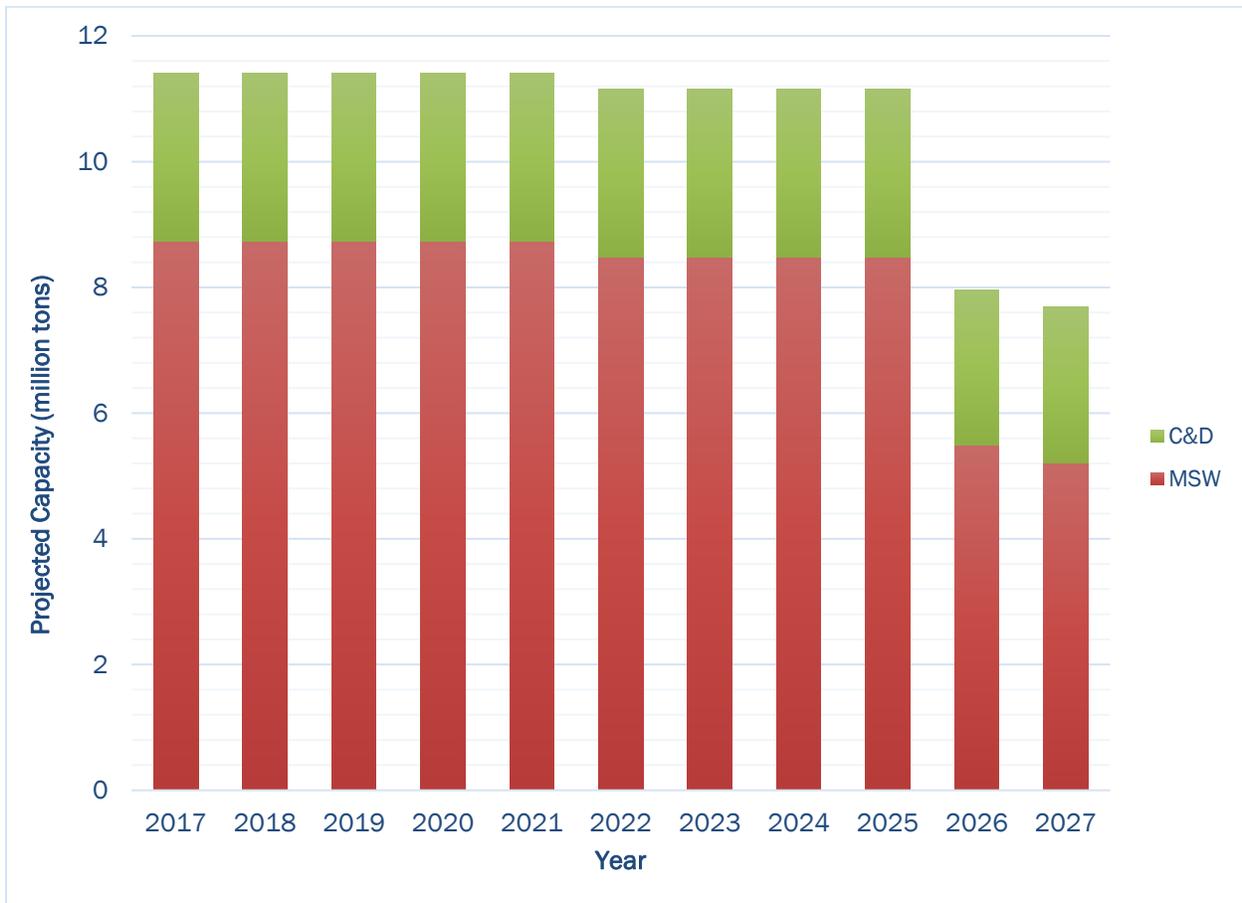
3. OUT-OF-STATE CAPACITY

A significant amount of the solid waste exported from Massachusetts is traveling long distances to reach a disposal site. A total of 540,000 tons (32.7% of total exported) are traveling more than 100 miles from the Massachusetts border; with 420,000 tons (25.6% of total exported) believed to be transported via rail.

Figure 3-1 shows the projected capacity of the out-of-state landfills listed in Table 3-2. Projections were calculated using the permitted capacities carried forward through the landfills' expected closure years.

Figure 3-1 Projected Out-of-State Solid Waste Landfill Capacity

(Includes landfills within 30 miles of the MA border or accepting ≥ 5000 tons of MA waste)



The significant decrease in projected MSW landfill capacity is due to the expected closure of two landfills, Seneca Meadows and Allied Waste Niagara Falls, which together provide a capacity of 2.99 million tons. Roughly 160,000 tons of Massachusetts solid waste (9.4% of total exported) are disposed at landfills expected to close by 2027.

3.3 TRANSFER CAPACITY

Table 3-3 shows the transfer & handling facilities identified within 30 miles of the Massachusetts border, aggregated by state. Collectively, these facilities receive 100,000 tons of Massachusetts solid waste, or 5.8% of the solid waste exported from Massachusetts. Massachusetts waste represents 3.5% of the permitted capacity at these facilities.

3. OUT-OF-STATE CAPACITY

Table 3-3 Out-of-State Transfer & Handling Facilities Within 30 Miles (2015-17^[1])

Transfer Type	State	Data Type	No. of Facilities	Tons Received	Tons Received Margin of Error	MA Tons Received	% of Total MA Tons Exported
Large Transfer & Handling	CT	Confirmed	7	216,380	0	0	0.00%
	CT	Estimated	5	260,414	114,258	0	0.00%
	ME	Confirmed	1	4,319	0	0	0.00%
	ME	Estimated	1	52,083	22,852	0	0.00%
	NH	Confirmed	3	264,350	0	0	0.00%
	NY	Confirmed	5	329,387	0	36,323	2.20%
	RI	Confirmed	4	277,134	0	37,641	2.27%
	RI	Estimated	4	208,331	91,407	0	0.00%
	VT	Confirmed	1	2,167	0	0	0.00%
	VT	Estimated	1	52,083	22,852	15,547	0.94%
		<i>SUBTOTAL</i>	32	1,666,648	251,368	89,511	5.41%
Small Transfer & Handling	CT	Confirmed	5	60,531	0	0	0.00%
	CT	Estimated	76	336,269	82,531	0	0.00%
	ME	Estimated	6	26,548	6,516	0	0.00%
	NH	Confirmed	50	265,627	0	0	0.00%
	NH	Estimated	36	159,285	39,094	0	0.00%
	NY	Confirmed	35	72,722	0	406	0.02%
	NY	Estimated	2	8,849	2,172	0	0.00%
	RI	Confirmed	2	12,404	0	3,826	0.23%
	RI	Estimated	17	75,218	18,461	0	0.00%
	VT	Confirmed	1	203	0	0	0.00%
VT	Estimated	17	75,218	18,461	2,478	0.15%	
		<i>SUBTOTAL</i>	247	1,092,874	167,234	6,710	0.41%
		GRAND TOTAL	279	2,759,522	418,603	96,221	5.81%

[1] Data aggregated from sources that vary in timeframe from 2015 to 2017.

To achieve more accurate estimates and focus survey efforts, facilities were stratified into “Large” and “Small” groups based on their tons received, if known, or qualitatively based on facility size. In general, the Large group consists of transfer & handling facilities capable of loading waste into containers suited for long-distance road or rail hauling. The Small group mainly consists of small municipal transfer & handling facilities not suited for long-distance hauling. Insufficient data was available to separate C&D-exclusive facilities from those accepting both MSW and C&D.

The majority of the Massachusetts waste brought to these facilities is directly hauled from municipalities near the state border. The added costs of transferring waste make it economically impractical to transfer waste from an in-state facility to an out-of-state transfer facility.

3. OUT-OF-STATE CAPACITY

3.4 RECYCLABLES PROCESSING CAPACITY

3.4.1 MATERIAL RECOVERY FACILITIES WITHIN 30 MILES

Table 3-4 shows the material recovery facilities (MRFs) identified within 30 miles of the Massachusetts border, aggregated by state. Collectively, these facilities process 6,400 tons of Massachusetts solid waste, or 0.4% of solid waste exported from Massachusetts. Massachusetts waste represents 1.2% of the tons received at these facilities.

Table 3-4 Out-of-State MRFs Within 30 Miles (2017-18^[1])

State	Data Type	No. of Facilities	Tons Received	MA Tons Received	% of Total MA Tons Exported
CT	Confirmed	2	93,082	0	0.0%
NH	Confirmed	2	17,608	0	0.0%
NY	Confirmed	6	283,563	0	0.0%
RI	Confirmed	1	112,933	4,617	0.3%
VT	Confirmed	1	8,000	1,815	0.1%
GRAND TOTAL		12	515,186	6,432	0.4%

[1] Data aggregated from sources that vary in timeframe from 2017 to 2018.

Permitted capacities (not shown in the table) were only available for three facilities, however, each of those three facilities showed permitted capacities that were approximately double their currently received quantities. It is unknown whether this is indicative of additional available capacity or is a permitting discrepancy akin to Massachusetts MRFs.

3.4.2 C&D PROCESSING FACILITIES WITHIN 30 MILES

Table 3-5 shows the C&D processing facilities identified within 30 miles of the Massachusetts border, aggregated by state. Collectively, these facilities receive 435,000 tons of Massachusetts solid waste, or 26.3% of solid waste exported from Massachusetts. Massachusetts waste represents 22.8% of the permitted capacity at these facilities.

Table 3-5 Out-of-State C&D Processing Facilities Within 30 Miles (2016-17^[1])

State	Data Type	No. of Facilities	Permitted Capacity	Tons Received	Tons Received Margin of Error	MA Tons Received	% of Total MA Tons Exported
ME	Confirmed	1 ^[2]	400,000 ^[3]	225,000	0	131,644	8.0%
ME	Estimated	1	257,270 ^[3]	113,704	123,229	0	0.0%
NH	Confirmed	2	426,280	221,196	0	43,938	2.7%
RI	Confirmed	2	826,800	526,583	0	259,468	15.7%
GRAND TOTAL		6	1,910,350	1,086,483	123,229	435,050	26.3%

[1] Data aggregated from sources that vary in timeframe from 2016 to 2017.

[2] Exception made for one facility beyond 30 miles of the MA border.

[3] Maine DEP does not regulate the quantity of material C&D processing facilities accept; numbers shown are estimates of feasible capacity.

Of the 440,000 tons of Massachusetts solid waste received, 390,000 tons (23.7% of total exported) were received at only two facilities. It is believed that at least 0.14 million (8.6% of total exported) of the tons were directly hauled to the facilities.

3. OUT-OF-STATE CAPACITY

3.4.3 OTHER RECYCLABLES PROCESSING FACILITIES

Quantitative data of other recyclables processing facilities, such as scrap metal processors, is not included in this study. It is MSW Consultants' professional judgment that much of the material handled by these facilities is already represented in other areas of this study, such as MRFs, C&D processing facilities, and transfer & handling facilities.

3.5 ORGANICS PROCESSING CAPACITY WITHIN 30 MILES

Table 3-6 shows the organics processors identified within 30 miles of the Massachusetts border, aggregated by state. Collectively, these facilities receive less than 5,000 tons of Massachusetts solid waste, or 0.3% of solid waste exported from Massachusetts.

Table 3-6 Out-of-State Organics Processing Facilities Within 30 Miles (2015-17^[1])

Facility Type	State	Data Type	No. of Facilities	Permitted Capacity	Tons Received	Tons Received Margin of Error	MA Tons Received	% of MA Tons Exported
Large Compost ^[2]	CT	Confirmed	2	55,754	55,754	0	0	0.00%
	NY	Confirmed	2	42,611	42,611	0	0	0.00%
	RI	Confirmed	2	43,088	43,088	0	588	0.04%
	VT	Confirmed	1	5,700	5,700	0	0	0.00%
	<i>SUBTOTAL</i>			7	147,153	147,153	0	588
Small Compost ^[2]	CT	Confirmed	39	62,665	62,665	0	0	0.00%
	CT	Estimated	4	6,476	6,476	2,599	1,231	0.07%
	ME	Estimated	11	17,809	17,809	7,146	0	0.00%
	NH	Confirmed	1	3,900	3,900	0	0	0.00%
	NH	Estimated	2	3,238	3,238	1,299	0	0.00%
	NY	Confirmed	7	8,806	8,806	0	82	0.00%
	NY	Estimated	1	1,619	1,619	650	0	0.00%
	RI	Estimated	16	25,905	25,905	10,395	0	0.00%
	VT	Confirmed	1	2,343	2,343	0	0	0.00%
	VT	Estimated	1	1,619	1,619	650	170	0.01%
<i>SUBTOTAL</i>			83	134,380	134,380	22,739	1,483	0.09%
Anaerobic Digestion ^[3]	CT	Confirmed	1 ^[4]	104,832	40,000	0	0	0.00%
	ME	Confirmed	1 ^[5]	49,920	25,000	0	2,800	0.17%
	RI	Confirmed	1	78,000	70,000	0	0	0.00%
<i>SUBTOTAL</i>			3	232,752	135,000	0	3,500	0.17%
Animal Feed			0	0	0	0	0	0.00%
GRAND TOTAL			93	514,285	416,533	22,739	4,871	0.29%

[1] Data aggregated from sources that vary in timeframe from 2015 to 2017.

[2] Tons received used in place of permitted capacity where not available.

[3] Tons received for all anaerobic digestion facilities are approximations provided by data sources.

[4] Two facilities not yet operational that will provide a combined permitted capacity of 109,380 tons when completed.

[5] Exception made for one facility beyond 30 miles of the MA border.

3. OUT-OF-STATE CAPACITY

- ◆ **Compost Facilities:** To achieve more accurate estimates and focus survey efforts, compost facilities were stratified into “Large” and “Small” groups based on their tons received, if known, or qualitatively based on facility size. In general, the Large group consists of facilities capable of processing more than 5,000 tons annually. The Small group mainly consists of local-commercial and small-municipal compost facilities expected to process less than 5,000 tons annually. Neither group received a significant quantity of organics from Massachusetts.
- ◆ **Anaerobic Digestion Facilities:** There is 233,000 tons of permitted capacity among the out-of-state anaerobic digestion facilities captured in the study. This capacity is expected to increase to 340,000 tons upon the completion of two additional facilities currently under construction.
- ◆ **Animal Feed Operations:** No animal feed operations were identified within 30 miles of the Massachusetts border. It is possible that some operations do exist in this area, though they are not regularly reporting to state agencies. Based on the scale of the observed in-state animal feed operations, it is MSW Consultants’ professional judgment that out-of-state animal feed operations do not represent a significant source of capacity.
- ◆ **Other Organics Processing Facilities:** Quantitative data of other organics processing facilities, such as those involved in mulching and food waste depackaging, is not included in this study. It is MSW Consultants’ professional judgment that the quantity of material handled by these facilities does not represent a significant portion of the overall out-of-state capacity.

One other facility of note is the Plainfield Renewable Energy biomass plant that combusts 26,700 tons of Massachusetts clean wood waste to produce energy and has a permitted capacity of 690,000 tons per year. This facility is not shown in Table 3-6, though is a source of wood waste capacity.

3.6 REUSE ORGANIZATIONS WITHIN 30 MILES

It was beyond the scope of this study to research reuse organization outside of Massachusetts. It is believed that these organizations are often organized within state boundaries for the purpose of capturing reusable items from a relatively small radius.

3.7 OUT-OF-STATE CAPACITY SUMMARY

Table 3-7 shows a summary of out-of-state solid waste capacity encompassing all facilities within 30 miles of the Massachusetts border, as well as those more distant disposal and processing facilities that received more than 5,000 tons of material originating in Massachusetts. As shown, these facilities collective receive 1.65 million tons of Massachusetts wastes and recyclables. This includes an estimated 1.43 million tons transferred from Massachusetts facilities and 226,000 tons directly hauled to out-of-state facilities.

3. OUT-OF-STATE CAPACITY

Table 3-7 Out-of-State Solid Waste Capacity Summary

State	Facility Category ^{[1][2]}	No. of Facilities	Permitted Tons ^[3]	Tons Received	MA Tons Received	% of Total MA Tons Exported
CT	Disposal	96	2,183,583	1,879,039	9,649	0.58%
	Processing	48	322,809	257,977	1,231	0.07%
	Unidentified	NA	NA	NA	11,613	0.70%
	<i>SUBTOTAL</i>	144	2,506,392	2,137,016	22,493	1.36%
ME	Disposal	9	386,949	393,393	26,704	1.61%
	Processing	14	724,999	495,217	131,644	8.12%
	Unidentified	NA	NA	NA	32,649	1.97%
	<i>SUBTOTAL</i>	23	1,111,949	888,610	190,997	11.71%
NH	Disposal	91	2,093,836	2,478,356	389,638	23.69%
	Processing	7	451,026	245,942	43,938	2.66%
	Unidentified	NA	NA	NA	6,021	0.36%
	<i>SUBTOTAL</i>	98	2,544,862	2,724,298	439,597	26.71%
NY	Disposal	47	4,421,898	4,530,151	211,827	12.80%
	Processing	16	336,599	336,599	82	0.00%
	Unidentified	NA	NA	NA	8,725	0.53%
	<i>SUBTOTAL</i>	63	4,758,497	4,866,750	220,634	13.33%
OH	Disposal	3	4,064,307	2,178,925	386,467	23.35%
	Processing	0	0	0	0	0.00%
	Unidentified	NA	NA	NA	90	0.01%
	<i>SUBTOTAL</i>	3	4,064,307	2,178,925	386,557	23.36%
PA	Disposal	0	0	0	0	0.00%
	Processing	0	0	0	0	0.00%
	Unidentified	NA	NA	NA	1,078	0.07%
	<i>SUBTOTAL</i>	0	0	0	1,078	0.07%
RI	Disposal	29	1,703,707	1,703,707	41,467	2.51%
	Processing	22	1,086,726	778,509	264,673	15.99%
	Unidentified	NA	NA	NA	1,499	0.09%
	<i>SUBTOTAL</i>	51	2,790,433	2,482,216	307,639	18.59%
VT	Disposal	21	729,671	635,671	18,123	1.10%
	Processing	4	17,662	17,662	1,985	0.12%
	Unidentified	NA	NA	NA	0	0.00%
	<i>SUBTOTAL</i>	25	747,333	653,333	20,108	1.22%
QC ^[4]	Unidentified	NA	NA	NA	60,544	3.66%
GRAND TOTAL		407	18,523,773	15,931,148	1,654,792	100.00%

[1] Transfer & Handling facilities grouped in the “Disposal” category.

[2] The “Unidentified” category represents the MA tons exported to facilities that were either beyond the scope of this study or were unspecified.

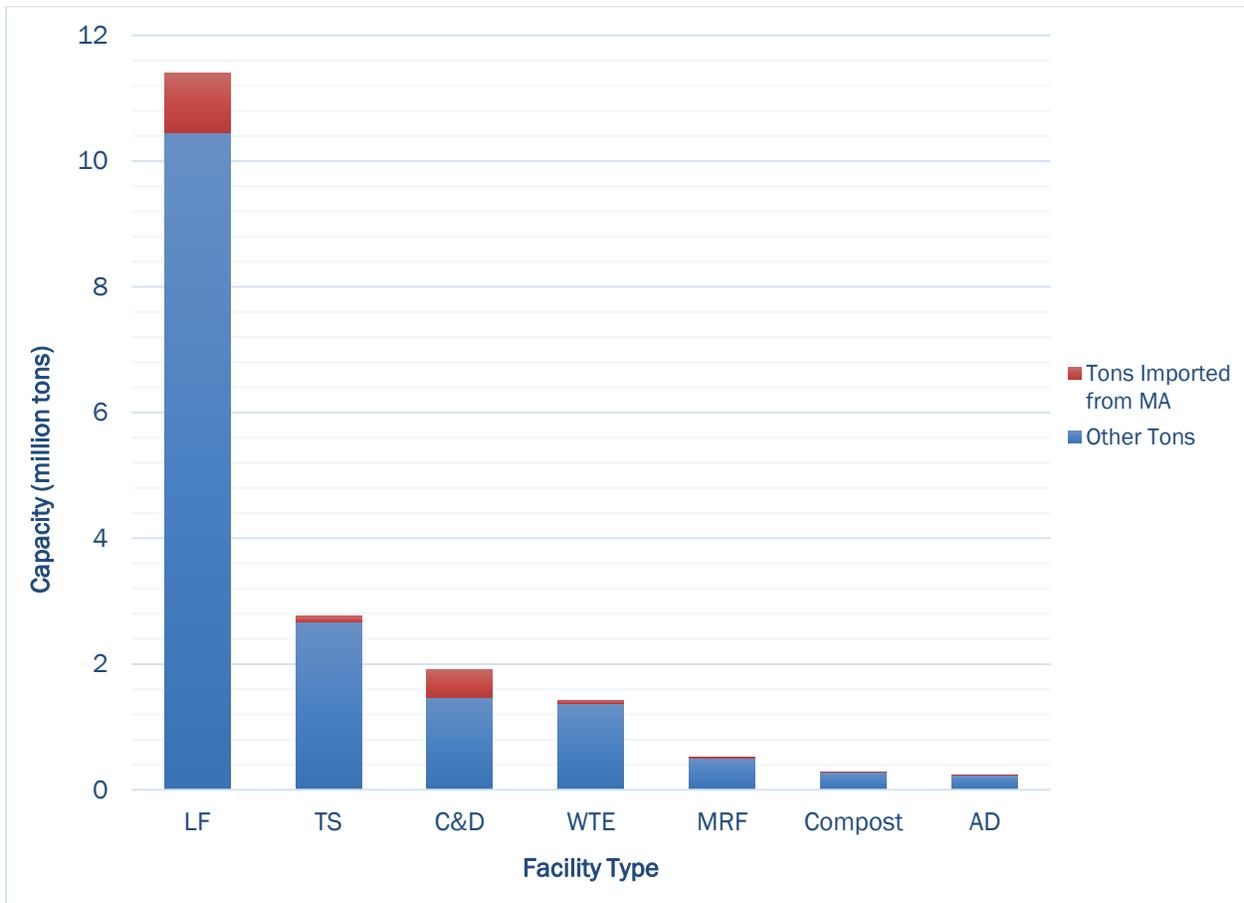
[3] Tons received used in place of permitted capacity where not available.

[4] 60,544 tons of wood waste are exported to facilities in Quebec that are beyond the scope of this study.

3. OUT-OF-STATE CAPACITY

The imports from Massachusetts represent only 8.9% of the overall disposal and processing capacity at these facilities. A detailed breakdown of the capacity consumed by Massachusetts imports is shown in Figure 3-2.

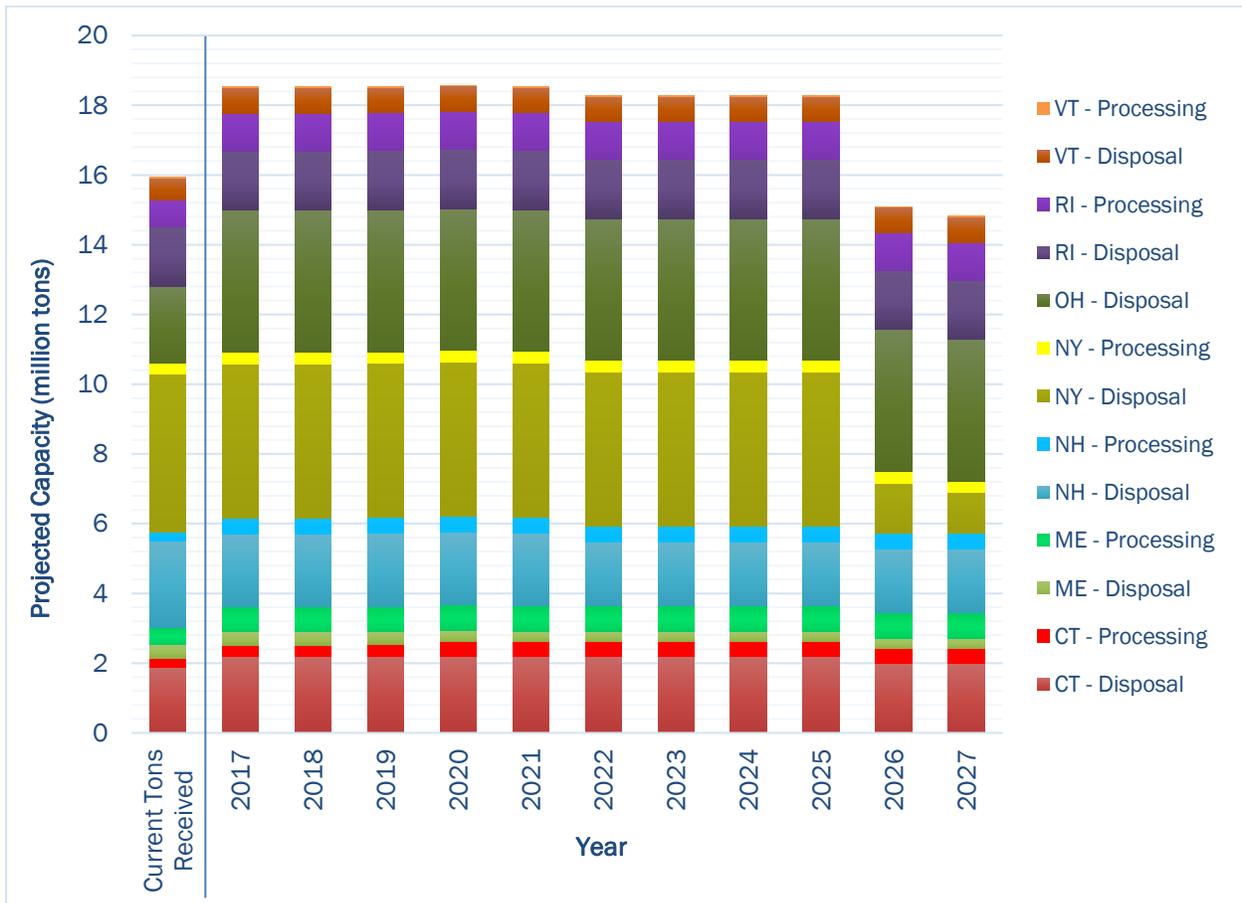
Figure 3-2 Out-of-State Capacity by Facility Type



Finally, Figure 3-3 shows the out-of-state solid waste capacity projected through 2027. Capacity at these facilities was found to be relatively level until 2026, at which time two large landfills are expected to close.

3. OUT-OF-STATE CAPACITY

Figure 3-3 Projected Out-of-State Solid Waste Capacity



This research also investigated the differences in the quantity of exports reported by MassDEP with the quantity of Massachusetts-based imports reported by importing state agencies. Table 3-8 shows the total number of tons imported from Massachusetts as reported by receiving state agencies compared to the total number of tons exported from Massachusetts as reported by MassDEP data sources. The tons reported by MassDEP are sourced from 2016 reports. Same year data was not always available from importing states.

3. OUT-OF-STATE CAPACITY

Table 3-8 Export-Import Comparison Between MassDEP and Other State Agencies (Inclusive of Disposal and Processing)

Host State	Host Reporting Year	Host Reported Tons	MassDEP Reported Tons ^[1]	Notes
CT	2016-2017	124,796	22,321	CT DEEP reports that the Plainfield biomass plant received 118,694 tons from 7/2016 through 6/2017, while MassDEP reports only 3,201 tons at this facility for the 2016 calendar year
ME	2016	54,204	29,504	Import data from Maine DEP only available for the Penobscot WTE facility; numbers shown represent only tons reported at this facility
NH	2017	NA	439,597	NH DES annual reports do not breakdown waste imports by state
NY	2014-2017	319,534	176,776	NY DEC reports show Seneca Meadows and Dunn C&D landfills accepting about double the quantity of waste reported by MassDEP
OH	2016	492,622	445,988	Individual facility import data not available from Ohio EPA
PA	2016	487	591	
RI	2016	301,726	126,556	Significant direct hauling not captured in MassDEP reports
VT	2017	20,556	175	Significant direct hauling not captured in MassDEP reports

[1] Quantities were calculated from an aggregation of MassDEP data sources; these may not match the quantities published by MassDEP which consider the amounts reported by other state agencies and use the more inclusive estimate.

Discrepancies between the number of tons reported by MassDEP and the number of tons reported by other state agencies can be attributed to a variety of factors. Because MassDEP records waste at the facility-level, waste that is directly hauled to out-of-state facilities is not captured. Differing report timeframes, material definitions, and reporting requirements may also contribute to discrepancies.

3.8 REGIONAL DISPOSAL CONSIDERATIONS

3.8.1 REGIONAL DISPOSAL CAPACITY

Facility-specific research for this study focused only on facilities within 30 miles from the Massachusetts border, as well as more distant facilities receiving 5,000 tons or more materials. However, this research does not fully address the question of available disposal capacity within the geographic region that may be reachable by road and rail haulers originating in Massachusetts. Consequently, additional research was performed to document the disposal capacity within the regional disposal market. For each of the states included in this analysis, MSW Consultants conducted focused research into the state-wide capacity for disposal (including combustion) within the eight states outside of Massachusetts that were included in this analysis. This research involved a literature search, direct contact with state environmental agencies, and review of supplemental documents. State solid waste plans were initially targeted, and where they were not current or posted to the Internet, follow up with the appropriate state agency responsible for solid waste management was initiated.

Not all states are transparent with posting disposal capacity data. New York, however, was unique in posting detailed report summaries of landfill and WTE facilities including tons of waste received, permitted capacity limits, and in the case of landfills, proposed capacities. Agency staff from the states of Connecticut, Maine, New Hampshire, Pennsylvania, and Ohio were immediately responsive to capacity data requests, supplemental documentation, and follow-up discussion. Data on other states was compiled from available data.

3. OUT-OF-STATE CAPACITY

Table 3-9 shows existing disposal facility use, facility capacities, and projections of future capacities and trends within the targeted states. Permitted capacities are used to produce a total estimated annual capacity for all operating disposal facilities in each state. The capacity projection in the final column identifies the states that are most capable of receiving additional wastes in the future, including New York, Pennsylvania, and Ohio. Although the disposal capacity for Vermont is shown as increasing, it is assumed that disposal capacity savings resulting from diversion techniques employed by Vermont will be reserved for Vermont-generated waste.

3. OUT-OF-STATE CAPACITY

Table 3-9 Out-of-State Disposal Trends (2014-17^[1])

State	Tons Received			Permitted Capacity (annual tons)			Total Remaining Capacity (tons)	
	WTE	Landfill	Total	WTE Permitted Capacity	Estimated Landfill Permitted Capacity	Total Estimated Disposal Capacity	Landfill	Capacity Projection
CT	2,120,002	197,709	2,317,711	2,120,002 ^[2]	197,709 ^[2]	1,737,206	0	Level ^[3]
ME	330,540	846,625	1,177,165	544,000	846,625 ^[2]	1,224,740	7,803,122	Level ^[4]
NH	174,531	1,050,835	1,225,366	209,875	2,134,689	2,344,564	29,264,363	Decreasing ^[5]
NY	3,933,846	8,214,093	12,147,939	4,203,967	10,942,440	15,146,407	182,329,486	Increasing ^[6]
OH	0	18,193,381	18,193,381	0	73,425,820 ^[7]	73,425,820	603,466,363	Increasing ^[8]
PA	3,358,281	19,485,622	22,843,903	4,961,810	38,046,060	43,007,870	360,000,000	Increasing ^[9]
RI	0	1,130,620	1,130,620	0	1,130,620 ^[2]	1,130,620	16,500,000	Level ^[10]
VT	0	431,444	431,444	0	610,000	610,000	4,500,000	Increasing ^[11]
GRAND TOTAL	9,917,200	49,550,329	59,467,529	12,039,654	72,101,524	84,141,178	1,203,863,334	

[1] Data aggregated from sources that vary in timeframe from 2014 to 2017.

[2] Tons received used in place of permitted capacity.

[3] The Putnam Ash Landfill receives WTE-ash only; CT must rely on out-of-state disposal if WTE capacity is exceeded.

[4] Disposal capacity remains adequate due to decreased MSW and C&D disposal and slight increases in MSW generation and recycling in 2016.

[5] Landfill capacity was predicted to be reached by 2022, however recycling, composting, waste exports, and combustion have extended that timeframe.

[6] Additional proposed disposal capacity, not yet permitted, of five existing landfills totals 65,871,927 tons.

[7] Annual permitted capacity calculated as daily permitted capacity estimated for 260 days per year; true annual permitted capacity may exceed this estimate.

[8] Ohio waste generation declined by 3 million tons between 2000 and 2016; MSW generation decreased from 10.9 million tons to 9.6 million tons; three landfills have rail sidings; a permitted but unconstructed landfill would add 181,057,219 tons and 2.9 years of capacity.

[9] 42 landfills and 6 WTE facilities receive waste from 19 states, DC, and Canada; a decline in 2016 waste receipts extended landfill life by 6.2 years.

[10] Central Landfill, Johnston RI, will reach capacity by 2038 at current rate; the 2015 Solid Waste Management Plan offered diversion strategies to extend landfill life.

[11] Progress towards a 50% diversion goal is extending disposal capacity through waste reduction, recycling and composting; a new 20,000 ton per year landfill is permitted but not constructed.

3. OUT-OF-STATE CAPACITY

3.8.2 WASTE TRANSPORTATION COSTS

As capacity diminishes in Massachusetts, transportation logistics become more important as waste and recyclable materials must travel longer distances to reach disposal and processing facilities. The disposal or processing cost for any material becomes the sum of:

- ◆ The disposal or processing facility tip fee;
- ◆ The transportation cost; and (if applicable)
- ◆ The cost to aggregate and compact the material from direct haul vehicles into larger containers at a transfer station.
- ◆ For rail haul, the cost associated with the need for redundant rails cars and containers and the difficulty in assuring timely return of empties for reloading.

Wastes in Massachusetts are transported by truck and by rail. This section provides a brief overview of both modes of transportation and their respective costs.

The most efficient form of road transportation employs semi cabs with a transfer trailer. A standard 53-foot trailer typically can be loaded with the maximum allowable gross vehicle weight (GVW), which in the waste industry is roughly 22.5 tons of materials. Trailers are usually loaded and compacted to meet this weight threshold for wastes destined for disposal. Conversely, it may not be desirable to compact recyclables and consequently payloads are lower.

Transportation costs for transfer trailers are relatively straightforward to estimate. The cost of driving is relatively linear to the distance driven. A major factor in the transportation cost is whether a back-haul exists after tipping of the waste or recyclables – haulers will usually charge each customer for one direction of the trip. However, with no backhaul, which is often the case with waste hauling (where other payloads may not be suitable for containment in a trailer that hauled putrescible wastes), the full round-trip cost is charged to the waste supplier.

MSW Consultants estimated the transportation costs of road haul of a generic load of MSW, single stream recyclables, and organics at radii from 30 to 150 miles. These costs, expressed in dollars per ton, are shown in Table 3-10. As shown, each of these materials has a slightly different transportation cost profile, with wastes being the least costly and single stream recyclables being costlier. Road transportation costs increase linearly with the time and distance driven.

Table 3-10 Estimated Truck Transportation Costs

Distance (miles)	Drive Time (hours)	Transport Costs (\$/ton)		
		MSW	Single Stream	Organics
30	1.25	\$6.10	\$13.72	\$9.15
60	2.08	\$12.20	\$27.45	\$18.30
90	2.75	\$18.20	\$41.17	\$27.45
120	4.08	\$24.40	\$54.90	\$36.60
150	5.42	\$30.50	\$68.62	\$45.75

Source: MSW Consultants

Rail transportation of waste is also occurring from Massachusetts. Waste-by-rail offers an opportunity to move wastes even longer distances at a competitive cost. However, the remote disposal of refuse that involves rail transport requires particular infrastructure to be developed at both origin and destination. This section highlights important concepts of waste-by-rail infrastructure.

3. OUT-OF-STATE CAPACITY

There are several models of rail transportation, two of which are utilized in waste-by-rail:

- ◆ **Intermodal:** Intermodal transportation involves loading wastes into a closed container that can be transported by truck, but can also be removed from the truck and loaded onto a flatbed car (single or double stacked) using specialized facilities and equipment (the container can be transported by both truck and rail car, hence “intermodal”). Specialized intermodal yards are required to both load and unload intermodal containers.
- ◆ **Direct Loading:** Alternatively, open top gondola cars accept waste loaded directly (either loose or baled) into the car as it sits on the track. Waste movement by gondola can be handled by railroads at a significantly cheaper cost compared to intermodal transport.

Further, waste-by-rail requires the following primary components to function efficiently:

- ◆ **Transload Facilities:** Located directly on a rail spur, transload facilities enable loading of wastes into rail cars using one of the two models above.
- ◆ **Railroad Transportation:** Railroad carriers provide locomotive power to move loaded rail cars between the origin terminal and the disposal site.
- ◆ **Offload Site:** The offload site facilitates the unloading of rail cars from the train to truck for transport to the landfill working face. Ideally, the rail offload facility is located at or near the landfill and is connected by a rail spur to the railroad mainline to avoid long truck drays (shuttles) of waste material. To allow for increased volumes over the course of time, the rail spur to the offload site should be capable of handling up to as many as 100 rail cars (or one-unit train) per day, which is approximately equivalent to 4,800 tons per day of municipal solid waste.
- ◆ **Disposal Site (Landfill or Incinerator):** A disposal site is an approved and permitted landfill (or incinerator) for receiving municipal solid waste and should be adjacent to or very near the offload facility (or vice versa). Developing a dedicated receiving offload site co-located or in close proximity to the destination disposal site (landfill) is critical as it avoids the need for ongoing truck drayage of the bulk waste containers between the offload point and the disposal site.

There is a significant fixed cost in a waste-by-rail system, and consequently typical distances are more than 250 miles (one-way) before the economics make sense. Further, rail-based transportation agreements depend on numerous factors, including the network of owned track that must be traversed from origination to destination; the committed quantity of waste; the duration of the commitment, and the type of waste materials.

It was beyond the scope and ability of this study to acquire actual waste-by-rail contract prices for Massachusetts waste, as this data is not widely available. However, average rail transportation costs have been used to provide an order-of-magnitude estimate of the cost of rail transportation. The estimated cost per ton to haul commodities by rail for longer distances is shown in Table 3-11. The cost for transportation of wastes may be higher or lower than the amounts shown in this table.

3. OUT-OF-STATE CAPACITY

Table 3-11 Estimated Rail Transportation Costs (2016)

Distance (miles)	Average Class I Railroad Freight Cost (\$/ton-mile)	Transport Costs (\$/ton)
300	\$0.0395	\$11.85
350	\$0.0395	\$13.83
400	\$0.0395	\$15.80
450	\$0.0395	\$17.78
500	\$0.0395	\$19.75

Source: US Department of Transportation

It should be noted again that these costs include only the rail transportation component. There are additional costs associated with: (a) loading the wastes into suitable rail cars (top load of gondola cars for C&D debris is generally less costly than intermodal containers); (b) mounting the intermodal containers, (c) offloading the containers or bulk wastes at the destination, and (d) final transport of offloaded wastes.

The transportation cost overview above illustrates why waste disposal and processing costs will increase as local disposal, combustion and processing capacity becomes scarce. It was beyond the scope of this study to estimate the likely market pricing for long haul and rail haul-based disposal and processing for Massachusetts.

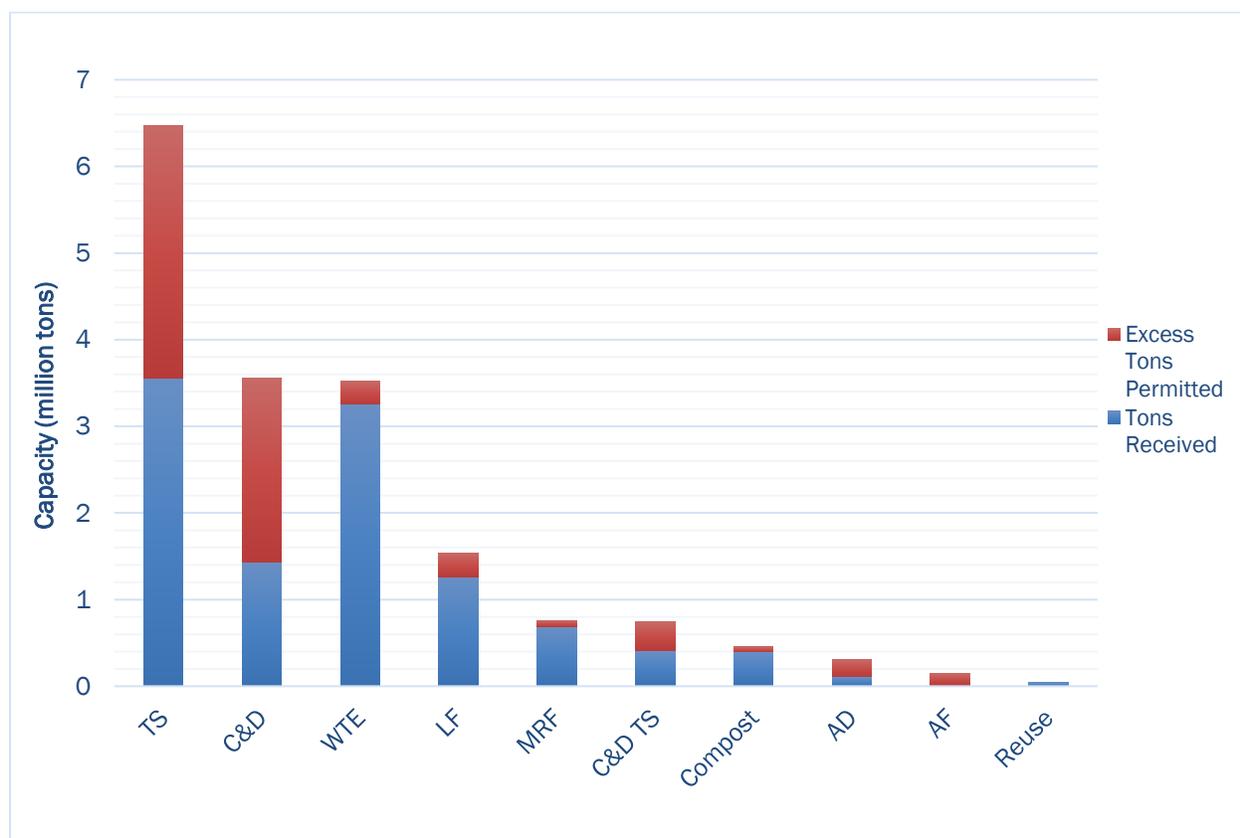
4. CONCLUSIONS

4.1 MATERIALS MANAGEMENT CAPACITY IN MASSACHUSETTS

This study provides an expanded view of the capacity of various facility types to accommodate the volume of solid wastes generated in Massachusetts. In addition to disposal capacity, the study also sought to compile the available capacity among recycling processors, organics processors, and reuse organizations to absorb fractions of solid waste generated in the state. A total of 7.6 million tons of Massachusetts solid waste were captured in the study (some of which may have been imported), including 226,000 tons directly hauled to out-of-state facilities.

Figure 4-1 shows the extent to which each type of disposal facility and solid waste permitted processing facility included in this study is operating compared to permitted capacity. For facilities that do not have a solid waste permit (but may have a general permit) and for which no permitted capacity is available, the figure shows total tons each facility type received.

Figure 4-1 Massachusetts Solid Waste Capacity Utilization by Facility Type



The following observations can be made from these data:

- ◆ Landfills and WTEs are generally operating at capacity. However, transfer stations have excess capacity of roughly 2.5 million tons. This suggests that wastes destined for disposal have an outlet in the export market via transfer stations. However, these wastes may be subjected to the higher expense of long-distance transportation.

4. CONCLUSIONS

- ◆ There appears to be significant available capacity for processing C&D materials. The C&D processing infrastructure can accommodate another 1.8 million tons of material. However, residue rates are quite high and although some fraction of these residuals may end up being used as alternate daily cover (ADC) at landfills, a majority of the C&D processed will ultimately end up being disposed.
- ◆ Organics processing facilities (including animal feed) also can accommodate additional feedstock, roughly another 400,000 tons. However, these facilities require organics to be source separated.
- ◆ Reuse facilities are able to absorb some materials, but the quantities are an order of magnitude lower than the solid waste facility infrastructure and provide an outlet for a relatively small fraction of materials. Reuse organizations receive donations from within a relatively small radius and receive less than 1% of the total solid waste managed by Massachusetts facilities.

Another key finding of this study is that the in-state infrastructure for handling wastes is growing only among processors of source separated materials. Anaerobic digestion facility capacity is increasing, as is other organics processing capacity. Based on feedback from reuse organizations, there is expected to be slight growth in the ability of these organizations to absorb incrementally more reusable items. However, by 2027, 95% of the state's current MSW landfill capacity will no longer be available, representing a 6% loss of total Massachusetts capacity.

There are several implications to this analysis regarding the direction for Massachusetts waste management:

- ◆ **Maximized Transfer Capacity:** Nearly 33% of the solid waste received at in-state facilities is first received at a transfer or processing facility. Going forward, the state will need to aggressively leverage its transfer station and processing facility network and the export market to reach more distant disposal facilities. Over 1.4 million tons are exported from Massachusetts via transfer or processing facilities at the current time, and there is an additional 2.5 million tons of capacity at transfer stations for incremental export. It was beyond the scope of this study to ascertain the incremental investment and costs associated with expanded export of solid wastes.
- ◆ **Source Separation:** In order to exploit the growing capacity of various recyclables and organics processing capacity, it will be increasingly necessary to establish source separation of the feedstocks for these facilities. Such programs will face the challenges of minimizing contamination.
- ◆ **Materials Management Costs:** Both of the bullets above point to a higher-cost materials management system. Source separation programs require a new fleet of containers for on-site storage of the source separated materials, as well additional collection resources (although the increased collection cost may be offset to some degree by lower processing fees for the source separated materials). Further, longer transportation distances both by truck and by rail will add to the cost of material handling, processing and disposal at all solid waste facility types.

It was beyond the ability of this study to estimate specific pricing impacts as a result of these trends. It was also beyond the scope of this study to investigate emerging waste processing technologies that may be capable of handling the mixed solid waste stream to recover resources without combustion or burial of a significant fraction of wastes.

4.2 EXPORT CONSIDERATIONS

This study also provides an overview of the capacity for wastes to be exported from Massachusetts to surrounding states. At 1.65 million tons (or 22.4% of all waste managed), there is already a significant fraction of Massachusetts wastes being exported. Most of this waste is destined for a disposal facility, with destinations as far away as Ohio.

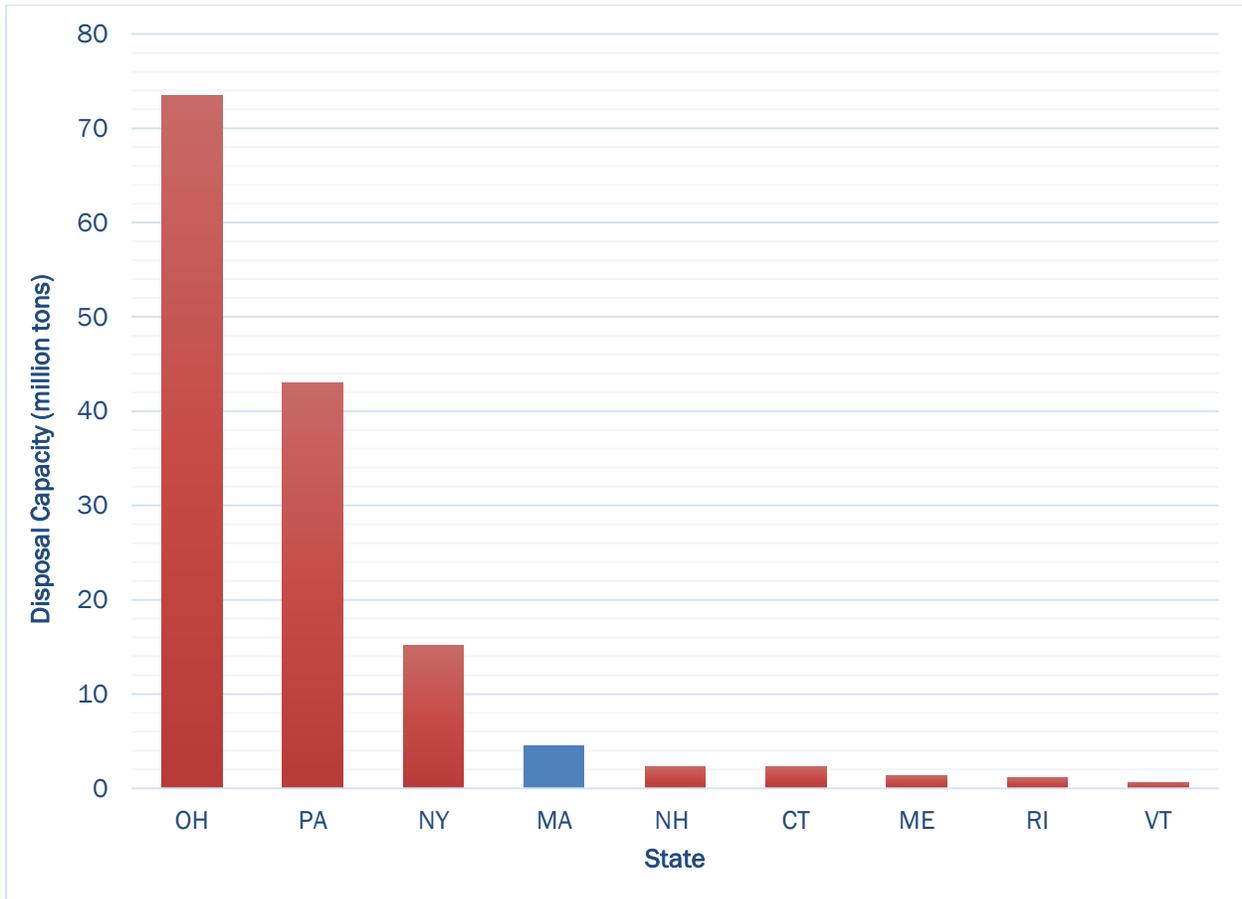
The research into available capacity in surrounding states reveals several important observations:

- ◆ **Excess Disposal Capacity to the West:** Disposal capacity, while increasingly scarce in New England, is widely available in New York, Pennsylvania and Ohio. This is shown in Figure 4-2. These

4. CONCLUSIONS

states have multiple large, regional mega-landfills, some with rail sidings, which offer an outlet for Massachusetts wastes. Not surprisingly, several of the closest of these disposal facilities are slated to close in the next decade unless they are successful obtaining permit expansions, which will shift 9% of exported Massachusetts waste to other destinations. It was beyond the scope of this study to assess the likelihood of success for these or other expansions.

Figure 4-2 Annual Disposal Capacity in Surrounding States



- ◆ **Organics Processing Infrastructure Growth:** Similar to Massachusetts, other New England states appear to have growth in the capacity of organics processing facilities, with anaerobic digestions plants coming online in several states. Anaerobic digestion capacity in the study area is expected to increase by 46% in the near future. However, out-of-state organics processing facilities receive almost no Massachusetts waste.
- ◆ **Recyclables Processing Uncertainty:** Out-of-state MRFs receive almost no Massachusetts recyclables. Although slightly harder to discern, processing of fiber and container recyclables did not appear to be growing at the current time in Massachusetts or surrounding states. This is likely influenced by the current disruption in recycling markets due to changes in the international marketplace associated with virtually eliminating contamination.

4.3 CONCLUSION

This study represents the first time MassDEP has attempted to compile an expanded view of materials management capacity in and around Massachusetts. The study incorporated a detailed set of definitions

4. CONCLUSIONS

and boundaries incorporated into the approach so that the findings are transparent to the state's stakeholders. The study compiled detailed reports from within the State's regulatory reporting framework, and supplemented these data with additional information obtained through direct surveying of a subset of industry participants. It is believed that the resulting study findings can reliably inform the State's upcoming Solid Waste Master Plan update.

Given the growing scarcity of capacity at certain facility types, this study suggests that MassDEP should continue monitoring such capacity on an ongoing basis. The study boundaries and definitions may be modified or updated in future studies based on input from stakeholders about this initial study, and based on perceived changes in the market for disposal, transfer, processing, recycling and reuse of materials.

APPENDIX A

DATA SOURCES

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APPENDIX A DATA SOURCES

Please see the tables below for a list of the state agencies contacted and the data sources referenced in the study.

Table A-1 State Agencies

State	Agency	Abbreviation
CT	Department of Energy and Environmental Protection	CT DEEP
MA	Department of Environmental Protection	MassDEP
ME	Department of Environmental Protection Division of Materials Management	ME DEP
NH	Department of Environmental Services Solid Waste Management Division	NHDES
NY	Department of Environmental Conservation Division of Materials Management	NYSDEC
OH	Environmental Protection Agency Division of Materials and Waste Management	Ohio EPA
PA	Department of Environmental Protection Bureau of Waste Management	PA DEP
RI	Department of Environmental Management	RIDEM
VT	Department of Environmental Conservation Waste Management Division	VT DEC

APPENDIX A

Table A-2 Data Sources

State	File Name	File Source	Data Year	Description
CT	Active Leaf Composting Facilities.url	CT DEEP	2015	Volume of leaves received at active leaf composting facilities
CT	Average_state_msw_statistics_FY2014.pdf	CT DEEP	2017	Estimates of MSW generated, disposed, and recycled
CT	EBC Connecticut Program Solid Waste Management Update.pdf	Web	2017	Approximated tons received, permitted capacity, and lifespan of Putnam ash landfill
CT	EPA Landfill Data.xlsx	EPA	2018	LMOP Landfill/Project database information for CT landfills
CT	Food Waste Composting Facilities.url	CT DEEP	2017	Permitted capacities of active composting and anaerobic digestion facilities
CT	Fort Hill AG Grid Permit.pdf	CT DEEP	2018	Draft permit for upcoming anaerobic digestion facility
CT	MSW Disposal Capacities 2018.xlsx	CT DEEP	2018	Permitted disposal capacities
CT	Recyclables Received FY 2017.pdf	CT DEEP	2016-2017	Tons of recyclables received at recycling facilities
CT	Registered_Municipal_Transfer_Stations.pdf	CT DEEP	2015	List of active transfer & handling facilities
CT	Solid Waste Received FY2017.pdf	CT DEEP	2016-2017	Tons of MSW received at landfills and combustion facilities
CT	Solid Waste Received TS FY 2016.pdf	CT DEEP	2015-2016	Tons of MSW received at combustion, landfill, and transfer & handling facilities
CT	Solid Waste Received TS FY 2017.pdf	CT DEEP	2016-2017	Tons of MSW received at regional transfer & handling facilities
CT	Wood and Compost Processing.url	CT DEEP	2018	List of facilities authorized to accept and process clean wood
MA	16.04 MRF 2017.xlsx	MassDEP	2016	Descriptive info and tonnage data for six MRFs
MA	180330_Organics_Proc.xlsx	MassDEP	2018	List of facilities with various organics management permits
MA	180330_Rec_Proc.xlsx	MassDEP	2018	List of facilities with various recycling permits
MA	2016_Organics Tonnages.doc	MassDEP	2016	Tonnage data for organics management and food rescue operations
MA	2017AD	MassDEP	2017	Tonnage data for anaerobic digestion facilities for years 2016 and 2017
MA	Active Combustion Facilities.pdf	MassDEP	2016	Tons received and permitted capacities of active combustion facilities
MA	Active Compost Operations.pdf	MassDEP	2017	List of sites accepting diverted food material

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State	File Name	File Source	Data Year	Description
MA	Active Compost Sites Report.pdf	MassDEP	2010	List of active compost sites and their tons reported
MA	Active Compost Sites.xls	MassDEP	2010	List of active compost sites and their tons reported
MA	Active Handling Facilities.pdf	MassDEP	2016	Tons received and permitted capacities of active transfer & handling, large compost, and C&D processing facilities
MA	Active Landfills.xls	MassDEP	2016	Tons received and permitted capacities of active landfills
MA	ActiveCombust.xls	MassDEP	2016	Tons received and permitted capacities of active combustion facilities
MA	ActiveHandling.xls	MassDEP	2016	Tons received and permitted capacities of active transfer & handling, large compost, and C&D processing facilities
MA	ActiveLandfill.xls	MassDEP	2016	Tons received and permitted capacities of active landfills
MA	AD Project List updates JAD.xlsx	MassDEP	2018	Statuses and capacities of active and planned anaerobic digestion facilities
MA	Auburn TS and MRF – MA TS Annual Report 2017.pdf	MassDEP	2017	Annual facility report for Auburn facility
MA	CD Handling Facilities 2016 Annual Report Summary draft_v1.xlsx	MassDEP	2016	Tons received, recycled, and disposed from C&D processing facilities
MA	CF2016data.pdf	MassDEP	2016	Tons received, metal recovered, and ash disposed from active combustion facilities
MA	CF2016data.xls	MassDEP	2016	Tons received, metal recovered, and ash disposed from active combustion facilities
MA	Disposal Capacity Projections 2017-2022.xls	MassDEP	2017-2022	Permitted and projected capacities for MSW landfills and combustion facilities
MA	El Harvey Transfer Westborough.pdf	MassDEP	2017	Annual facility report for Westborough facility
MA	fdcomlst.pdf	MassDEP	2017	List of active organics processing facilities
MA	HF2009data.pdf	MassDEP	2009	Tons received and exported at transfer & handling facilities, large compost, and C&D processing facilities
MA	HF2009data.xls	MassDEP	2009	Tons received at transfer & handling facilities, large compost, and C&D processing facilities
MA	HF2016data.pdf	MassDEP	2016	Tons received and exported at active large transfer & handling, large compost, and C&D processing facilities

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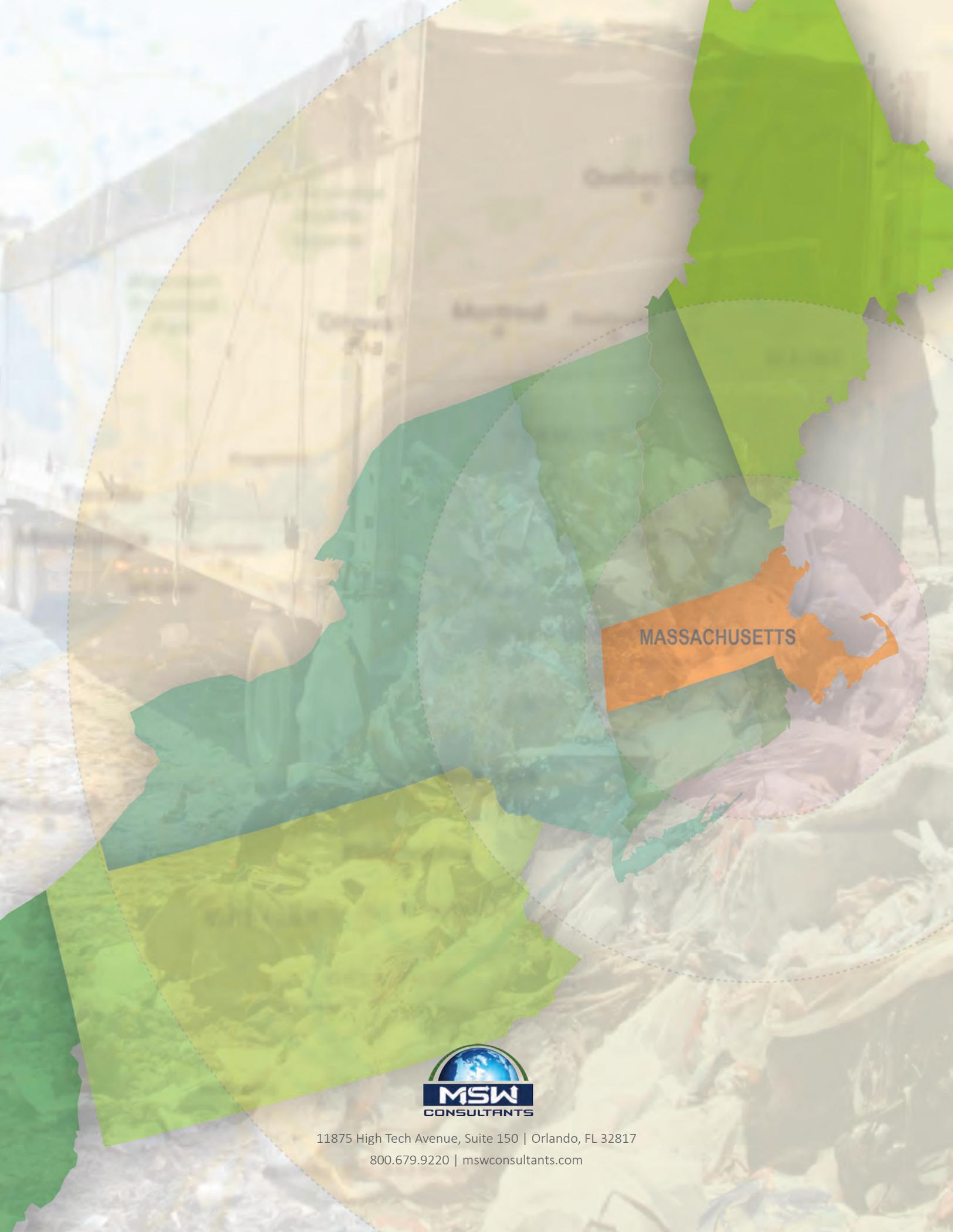
State	File Name	File Source	Data Year	Description
MA	HF2016data.xls	MassDEP	2016	Tons received at active large transfer & handling, large compost, and C&D processing facilities
MA	LF2016data.pdf	MassDEP	2016	Tons received at active landfills
MA	LF2016data.xls	MassDEP	2016	Tons received at active landfills
MA	Mass AD Capacity Sept 2018.xlsx	MassDEP	2018	Statuses and capacities of active and planned anaerobic digestion facilities
MA	mrfmap.pdf	MassDEP	2017	List of active MRFs
MA	RCC Permits	MassDEP	2015-2018	Collection of 11 RCC permits issued to MRFs, anaerobic digestion, and C&D processing facilities
MA	Reuse Contacts List for Capacity Study.xlsx	MassDEP	2018	Contact information for various reuse organizations
MA	SWFacilSummInfoRegions.xlsx	MassDEP	2018	Permitted capacities for active landfills, combustion, and large transfer & handling facilities
MA	Waste Management Capacity Projections 2017-2022.xls	MassDEP	2017-2022	Aggregated disposal capacity projections
MA	Web Links.docx	MassDEP	2018	Links to C&D Facility report data and recyclingworksma.com reuse operations
ME	2017 DRAFT MSW Disposal.docx	ME DEP	2017	Draft solid waste report data tables
ME	Active Processing Facilities.url	ME DEP	2018	List of active processing facilities
ME	Active Transfer Stations.url	ME DEP	2018	List of active transfer stations
ME	Exeter Agri-Energy Capacity.url	Web	2016	News article on the Exeter anerobic digestion facility
ME	Landfill Fill Rates 2017.xlsx	ME DEP	2017	Landfill capacities
ME	WGDC Report 2018.pdf	ME DEP	2016	Solid waste generation and disposal capacity report
N/A	EPA Furniture Conversions.url	EPA	2006	Standard volume-to-weight conversion factors for furniture
N/A	EPA Volume-to-Weight Conversion Factors, April 2016.url	EPA	2016	Standard volume-to-weight conversion factors
NH	BMP wmd-13-01 2014.pdf	NHDES	2014	Best management practices for solid waste facilities
NH	Facilities Accepting MA Waste.xlsx	NHDES	2015	List of facilities that accept waste from Massachusetts
NH	Onestop Search.url	NHDES	NA	Online portal to access annual facility reports

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State	File Name	File Source	Data Year	Description
NH	SWF_20180612153002.xls	NHDES	2018	Database output of all active and inactive solid waste facilities
NY	2010 SWM Plan frptbeyondwaste.pdf	NYSDEC	2010	Materials management strategy report
NY	2015 Municipal Waste Combustion Facility Capacity Chart - NYS DEC.pdf	NYSDEC	2015	Municipal waste combustion facility capacity
NY	Colonie Landfill Lifetime.url	Web	2018	News article on the Colonie landfill
NY	Copy of 2014 Waste Imports from MA.xlsx	NYSDEC	2014	List of imports from Massachusetts
NY	Landfill Permitted Capacities.url	NYSDEC	2015	Tons received and permitted capacities of active landfills
NY	listmswlandfill.pdf	NYSDEC	2017	Permit issue/expiration dates for active MSW landfills
NY	Rapp Road Landfill Lifetime.url	Web	2018	News article on the Albany landfill
NY	SWMF Annual Report.url	NYSDEC	2016-2017	Online portal to access annual facility reports
OH	2009 State Plan.pdf	Ohio EPA	2009	State solid waste management plan
OH	2014 Facility Data Tables 9-21-2016.pdf	Ohio EPA	2014	Facility data report tables
OH	2016 Facility Data Report Tables.pdf	Ohio EPA	2016	Facility data report tables
OH	2017 Landfill Report rptT13 10-12-2018.pdf	OH EPA	2017	Landfill remaining capacities and daily waste receipt amounts
OH	34 years remaining capacity as of 2016 gd_1008.pdf	Ohio EPA	2016	Disposal facts sheet
OH	Facilities- 2016Mass.xlsx	Ohio EPA	2017	List of imports from Massachusetts
OH	Imports and Exports Total 2017.pdf	Ohio EPA	2017	Aggregated list of imports and exports by state
OH	Landfill Lifetimes.pdf	Web	2013	Construction and demolition waste characterization and market analysis
PA	Disposal Data Summary.xlsx	PA DEP	2017-2018	Disposal capacity summary table
PA	MSW Landfill Data 2017.xlsx	PA DEP	2017	Tons received and permitted capacities at active landfills
PA	Waste Imports PA 2016.xlsx	PA DEP	2016	List of imports by state
PA	WTE Data 2017.xlsx	PA DEP	2017	Tons received at combustion facilities
RI	2016 SW Facility Survey Aggregated Data.xlsx	RIDEM	2016	Tons received at active solid waste facilities

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State	File Name	File Source	Data Year	Description
RI	Active Sites 2018.pdf	RIDEM	2018	List of active solid waste facilities
VT	2012_All_Tables_FinalDraft.pdf	VT DEC	2012	Solid waste summary tables
VT	2016-Diversion-and-Disposal-Report.pdf	VT DEC	2017	Diversion and disposal report
VT	Copy of MA2017GenerationData.xlsx	VT DEC	2017	List of imports from Massachusetts
VT	State OKs 51-acre expansion at Coventry landfill - VTDigger.url	Web	2018	News article on the Coventry landfill



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