

# Regional Waste Movement Study

2024

## *Task 5: Key Study Parameters and Existing Conditions*

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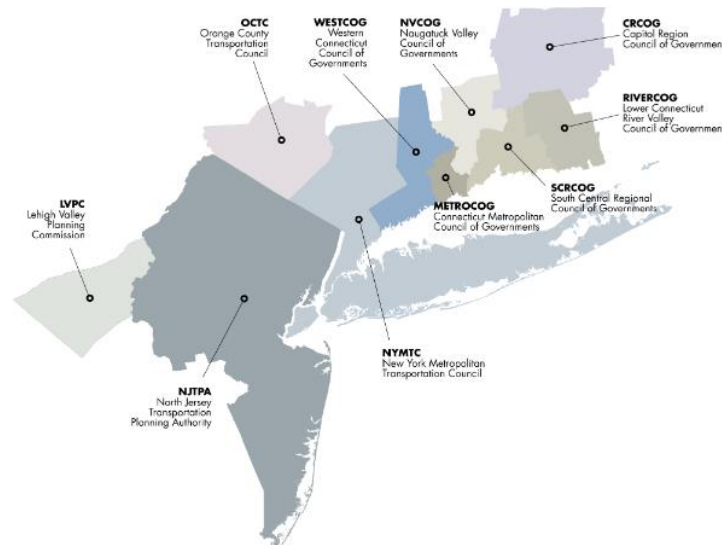
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# 1. Introduction

The Regional Waste Movement Study is focused on identifying the needs and opportunities associated with the movement of municipal solid waste (MSW) and construction and demolition (C&D) debris or waste in the Metropolitan Area Planning (MAP) Forum Study Area, which encompasses six councils of government (COGs) in Connecticut and four metropolitan planning organizations (MPOs) in New Jersey, New York, and Pennsylvania [1].

**Figure 1: Metropolitan Area Planning (MAP) Forum Study Area [2].**



The MAP Forum Area, which is the study area, produces an estimated 47.2 million tons of waste annually, or 2.0 tons annually per person. Over the next several decades, moving, processing, and storing this quantity of waste each year will present planners, policy makers, and the public with a series of complex physical, policy, public health and political challenges. This memo, which provides an overview of the existing conditions of waste movement systems, infrastructure, and waste streams in the study area, underscores the urgency of these challenges, driven by the capacity constraints of landfills, the impacts and regulatory limitations of Waste-to-Energy facilities, and the increasing need to move waste out of the study area for disposal. Even as the total volume of waste may moderate in the study area over the coming years as recycling, composting or other waste management techniques intensify, the logistical and infrastructural demands of waste movement will continue to grow.

This memorandum aims to quantify these challenges, providing essential data to inform and guide strategic planning for the sustainable and efficient movement of waste across the study area. It presents region-wide estimates for the generation, diversion, and disposal of MSW to inform understandings of waste movement between origin and destination. The memorandum also includes a description of waste generation variations by subregion within the study area, highlighting the differences in waste origin reporting across states and the implications for managing regional waste movement in the future. Additionally, it discusses the importance of

waste diversion and destination, including the role of various waste facilities such as landfills, incinerators, transfer stations, and processing facilities.

The data collected for this memo is derived from state-level data and the Transearch commodity flow database. These data were used for additional components of this study, including a lifecycle assessment of waste infrastructure in the region, as well as long-term forecasting of waste generation and movement. Waste volume and facility data are referenced throughout the report using a state abbreviation-reference ID format. For example, New Jersey landfill data is referenced as NJ-B. The following chart shows waste-related data with their corresponding reference ID. For more details, see Section 7. Data References.

| Data Subject                 | Reference ID |
|------------------------------|--------------|
| <b>Waste Generation</b>      | A            |
| <b>Landfills</b>             | B            |
| <b>Incinerators</b>          | C            |
| <b>Transfer Stations</b>     | D            |
| <b>Processing Facilities</b> | E            |

## 2. Key Findings

The study area produces an estimated 47.2 million tons of waste annually, or 2.0 tons of waste per person. This waste is collected at its point of generation and moved to transfer stations and processing facilities by truck. The key points and Figure 2 below illustrate the flow of waste in the MAP Forum Area, from generation to disposal in and out of region.

### *Waste Diversion*

- Approximately 22.3 million tons (about 47 percent of all waste) are diverted from the waste stream through recycling or composting.
- Within the study area, there are 311 transfer stations and 588 processing facilities, which aid in the sorting and preparing of material for diversion.
- The remaining 24.9 million tons of all waste types are moved by truck or rail and either disposed of in either landfills or waste-to-energy (WTE) facilities within the study area or outside of the study area.

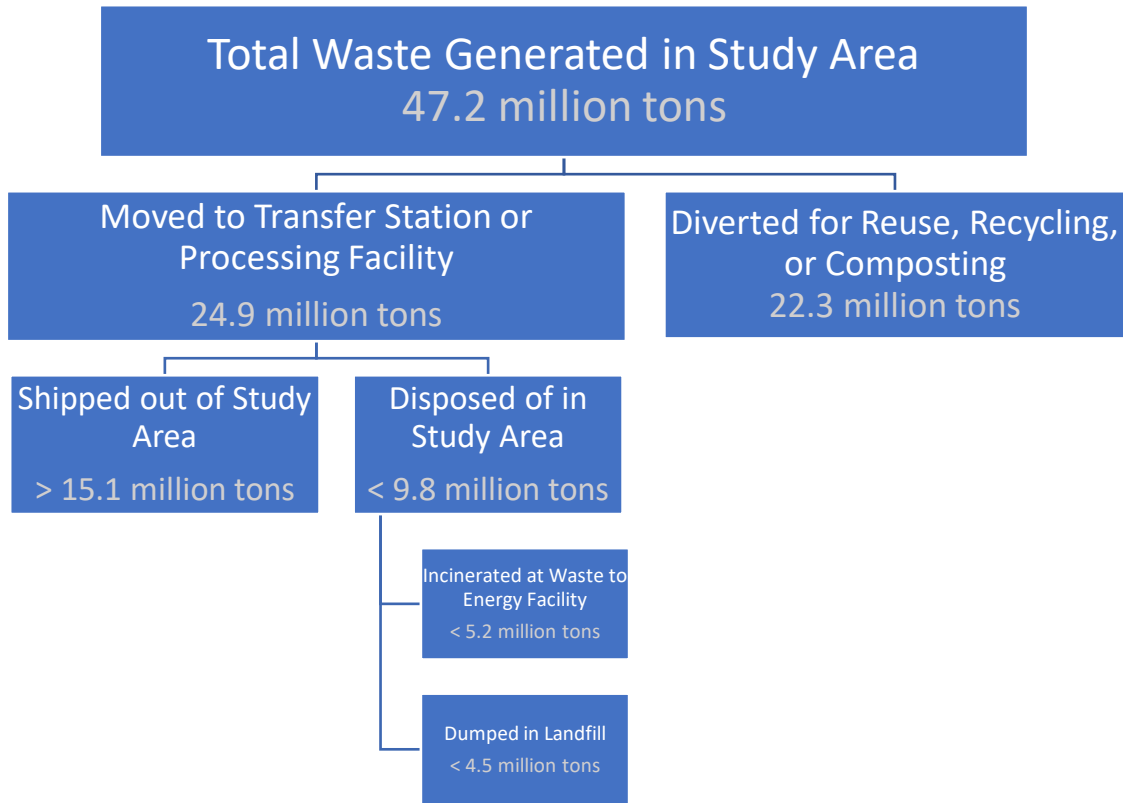
### *Waste Disposal*

- About 9.2 million tons of waste are either incinerated or landfilled each year within the study area.
- Twenty landfills are located in the study area. Of these 15 have significant capacity or acceptance rates, and 13 accept over 10,000 tons annually.
- On average, 4.5 million tons of waste are landfilled annually, with 3.0 million tons going to landfills that accept MSW.
- Each year, the nine WTE facilities within the study area are permitted to incinerate 5.2 million tons of waste but operate below full capacity, incinerating an estimated 4.7 million tons annually.

### *Waste Import and Export*

- WTE facilities and landfills in the study area accept waste from both inside and outside the area.
- Even if WTE facilities and landfills accepted in-area waste only, at minimum, 15.1 million tons of waste needs to be moved outside of the study annually for disposal due to the overall volume of waste generated.

**Figure 2: Study Area MSW Generation and Disposal**



*Note: Numbers do not sum due to rounding.*

*Source: Connecticut<sup>CTA</sup>, New Jersey<sup>NJA</sup>, New York<sup>NYA</sup>, Pennsylvania<sup>PA A</sup>, ESI*

### 3. Waste Generation

Understanding how waste is generated within the study area is important to understanding and forecasting its movement now and in the long-term. Knowing the amount and type of waste generated across the study area enables a regional assessment of waste collection, transport, and disposal. Additionally, understanding where waste is generated and how it moves through the area helps to illustrate the current and future social and environmental impacts of heavy truck and rail movement in the study area.

In a single year, an estimated 47.2 million tons of waste is generated in the study area, 47 percent of which, or 22.3 million tons, is diverted for recycling or composting. The generated waste includes 21.3 million tons of MSW, with about 25 percent, or 5.4 million tons, diverted. MSW accounts for about 45 percent of all waste generated and 64 percent of all waste disposed of in the study area.

These estimates are based on a compilation of subarea waste generation that are reported by each state (see Attachment A for details). The reported figures for all waste, MSW, and C&D are presented in **Table 2**.

**Table 2. Annual Tons of Waste Generation (millions)**

|                     | Municipal Solid Waste |                 |              | Construction and Demolition |                 |              | All Waste       |                 |              |
|---------------------|-----------------------|-----------------|--------------|-----------------------------|-----------------|--------------|-----------------|-----------------|--------------|
|                     | <i>Diverted</i>       | <i>Disposed</i> | <i>Total</i> | <i>Diverted</i>             | <i>Disposed</i> | <i>Total</i> | <i>Diverted</i> | <i>Disposed</i> | <i>Total</i> |
| <i>Connecticut</i>  | 0.6                   | 1.9             | 2.5          | NA                          | NA              | NA           | NA              | NA              | 2.7          |
| <i>New Jersey</i>   | 2.5                   | 4.4             | 6.9          | NA                          | NA              | 1.6          | 8.7             | 7               | 15.8         |
| <i>New York</i>     | 2                     | 9               | 11.1         | 8.2                         | 4.7             | 12.9         | 10.3            | 14.1            | 24.4         |
| <i>Pennsylvania</i> | NA                    | 0.5             | NA           | NA                          | 0.1             | NA           | NA              | 0.7             | NA           |

*Source: Connecticut<sup>CTA</sup>, New Jersey<sup>NJA</sup>, New York<sup>NYA</sup>, Pennsylvania<sup>PAA</sup>, ESI Analysis*

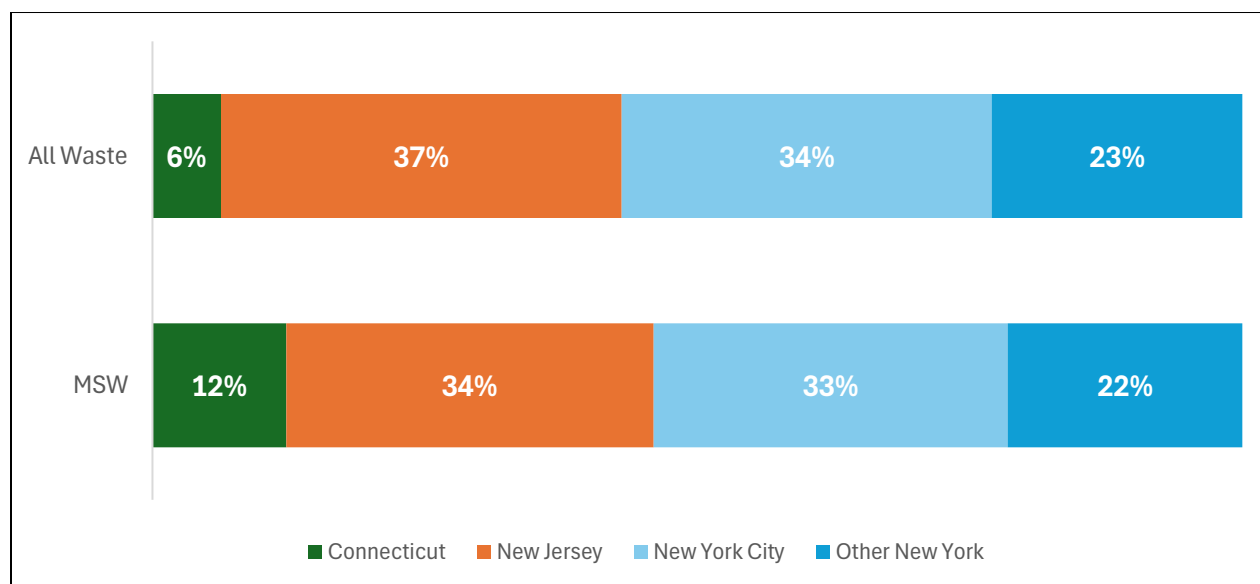
Waste generated in the study area is primarily moved by truck, according to interviews and transfer station reports. Movement by rail and barge comprises the balance in the study area. Of all waste types, 34 percent is generated in New York City.

Each year, 0.9 tons of MSW is generated per capita. The most populous areas of the study area produce the most MSW, as demonstrated in Figure 3. Of the MSW generated in the study area excluding Pennsylvania<sup>1</sup>, 33 percent is produced in New York City.

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<sup>1</sup> Pennsylvania waste is excluded in this equation, as Pennsylvania reports by county the quantity of waste disposed, but not the quantity of waste diverted.

**Figure 3: Waste Generation by Portions of States within the Study Area**



*Note: Pennsylvania is omitted from this chart as the waste data from PA does not include generated waste that is recycled or sent out of state. Numbers do not sum due to rounding.*

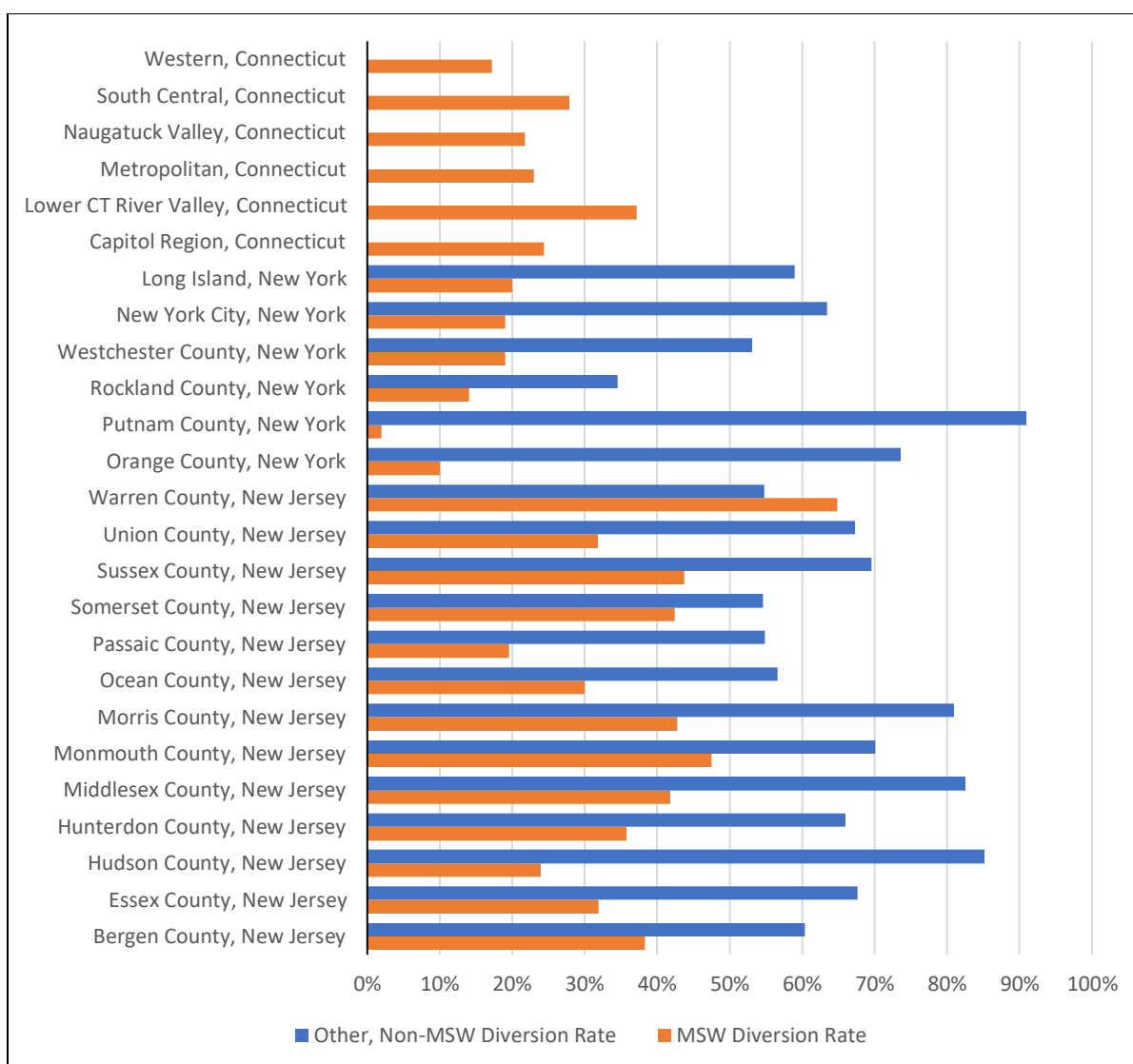
*Source: Connecticut<sup>CTA</sup>, New Jersey<sup>NJA</sup>, New York<sup>NYA</sup>, ESI Analysis*

Waste diversion rates vary by location and waste type due to differences in processing facilities. The reported diversion rates for MSW vary by location from 2 to 65 percent in the study area, with a median rate of 28 percent. For all waste types, diversion rates by location are higher with a median of about 51 percent. Comparing diversion rates between locations is problematic, as calculation methods may differ<sup>2</sup> and realized diversion depends on many factors including available programs and the composition of the waste stream. Despite these limitations, waste diversion significantly reduces the quantity of waste disposal from the study area.

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<sup>2</sup> Diversion is defined multiple ways, most typically including recycling and composting, and sometimes including incineration at waste-to-energy facilities. Diversion rates reported by New York and New Jersey did not describe diversion calculations and are assumed to exclude incineration. New Jersey reports recycling rates (2020) and New York reports diversion rates (2018). Connecticut figures are calculated from MSW data provided to the study team by the state and only include recycling and composting. Pennsylvania does not report diversion rates.

**Figure 4: Waste Diversion Rate by County or Planning Unit**

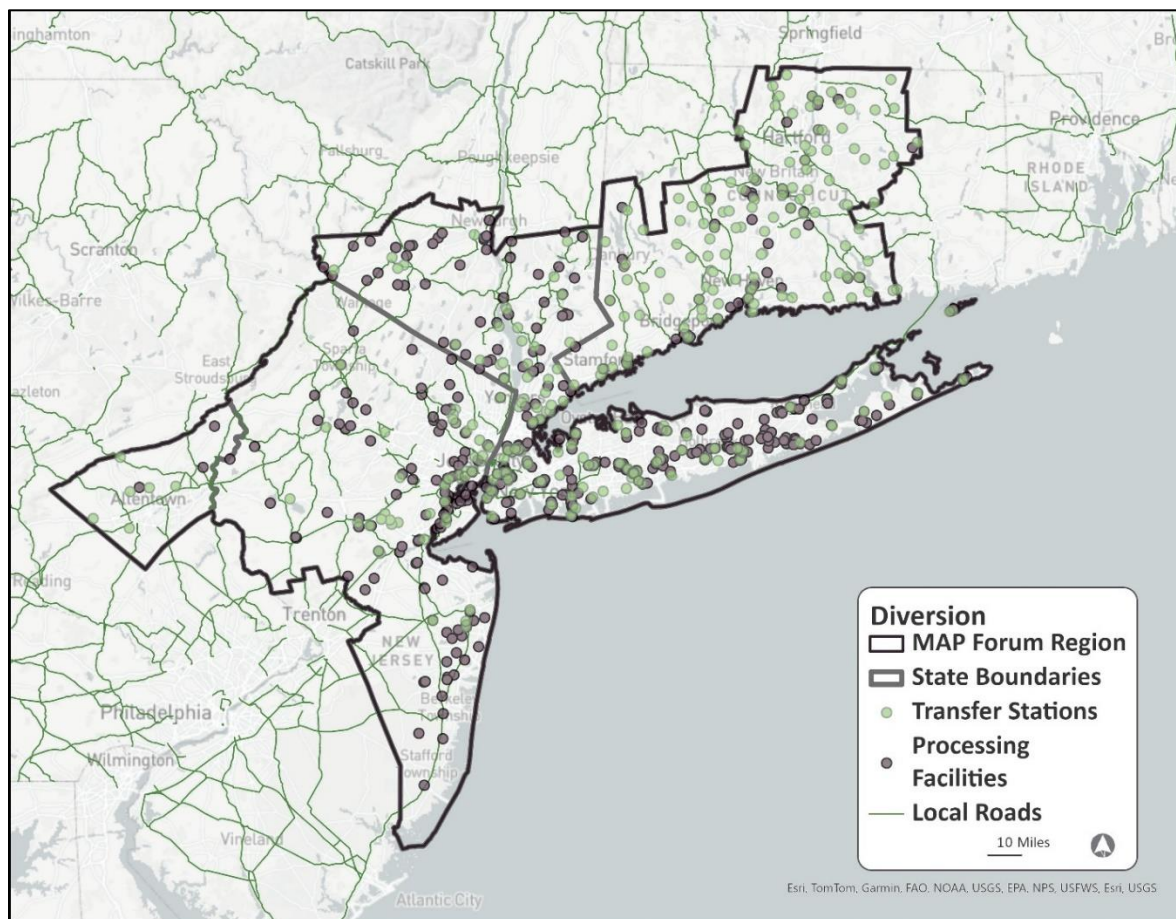


Source: Connecticut<sup>CTA</sup>, New Jersey<sup>NJA</sup>, New York<sup>NYA</sup>, Pennsylvania<sup>PAA</sup>, ESI

#### 4. Waste Diversion Transfer Stations and Processing Facilities

All waste generated in the study area is collected at its point of generation and moved by truck to processing facilities and/or transfer stations throughout the area. Processing facilities and transfer stations are local facilities used for sorting, processing, and preparing waste to be shipped for recycling, composting or disposal. To access these facilities, waste is moved by truck primarily on local roads.

### Figure 5: Diversion Network: Local Roads, Transfer Stations, and Processing Facilities



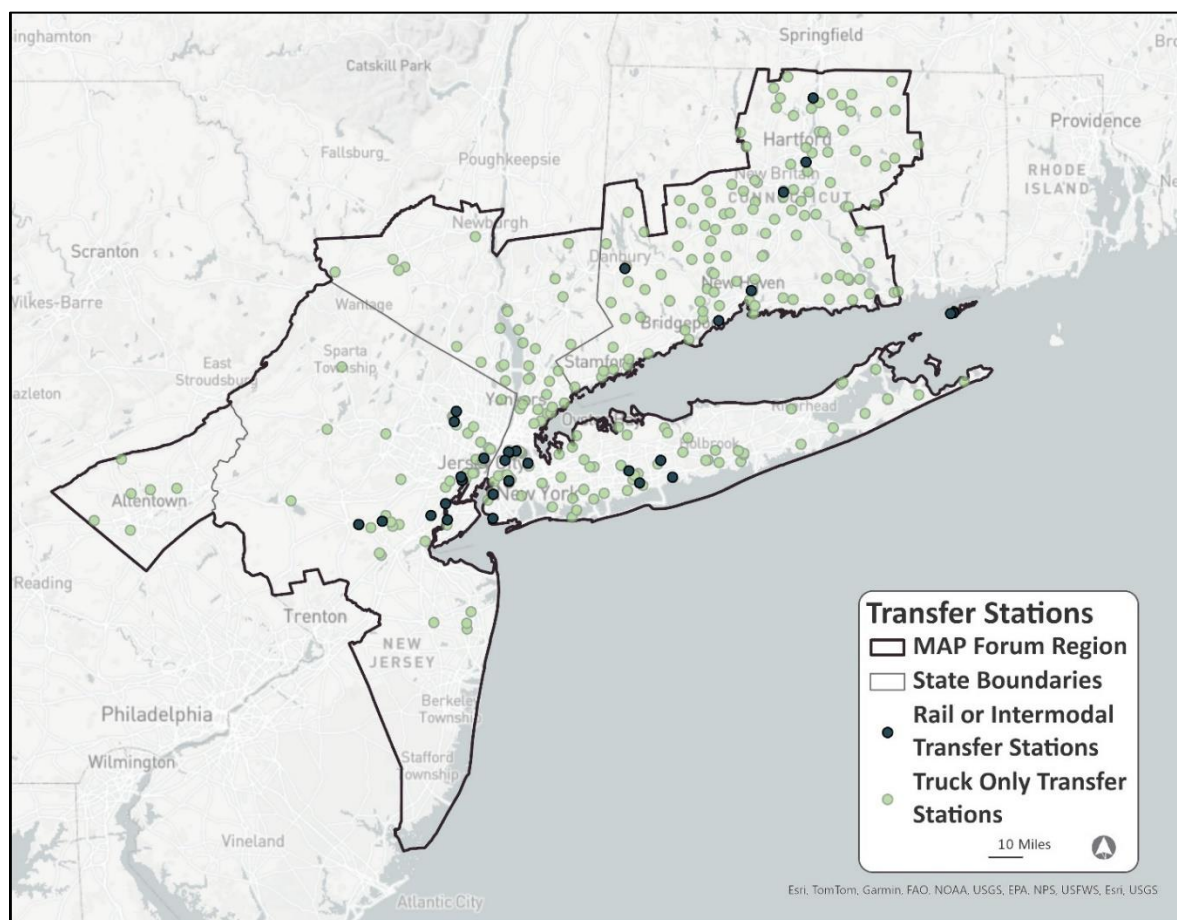
Source: Connecticut<sup>CT</sup><sup>Error! Reference source not found.</sup>, New Jersey<sup>NJD</sup>, New York<sup>NYD</sup>, Pennsylvania<sup>PAD</sup>, Transearch<sup>RD A</sup>, ESI Analysis

Each year, 22.3 million tons of waste generated in the study area is either recycled or composted. The processing of this waste is highly dependent on the material it contains and may require separate transportation for different waste types. Recyclable and composting materials may be picked up separately from garbage for disposal or other recyclables to minimize contamination with other waste types [13]. Further processing at facilities like Material Recovery Facilities or specialized recycling facilities may further divide these waste streams for preparation for use as materials in manufacturing. While recyclables are usually “dry”, organic waste sent to composters and anaerobic digesters is usually “wet” and represents another waste stream [3].

## 4.1 Transfer Stations

The study area has 311 transfer stations (Figure 6), which play an important role in the movement of waste. Transfer stations may be used to transfer waste from one truck to another, or from truck to another mode including rail and barge. Transfer stations are intermediary stops, not final destinations and are often small and privately run. Unlike landfills and incinerators, which are fixed features of the waste management system, these facilities may open or close due to market conditions of the area.

**Figure 6: Transfer Stations**



Source: Connecticut<sup>CTD</sup>, New Jersey<sup>NJD</sup>, New York<sup>NYD</sup>, Pennsylvania<sup>PAD</sup>, ESI Analysis

While most transfer stations serve truck to truck transfers, a limited amount of waste in the area is moved by barge or rail, especially near New York City. Transfer stations identified in the data as including rail or barge transfers are shown in the map above. MAP Forum counties in Pennsylvania do not have any rail transfer stations, according to interviews with local officials.

Some states are more reliant on transfer stations than others. New Jersey has fewer transfer stations than other states, which is reflective of the regulations and system of waste movement in the area, according to interviews conducted for this study. In contrast, Connecticut has many

transfer stations, with many municipalities having their own station, as well as a few regional facilities used to move waste to the state's waste-to-energy incinerators or out of state [4].

## 4.2 Processing Facilities

The study area has 588 processing facilities. Processing facilities include facilities that aid in the volume reduction and recycling of materials. These are located throughout the area and represent a wide range of processes and types of materials handled (Figure 7).

In Connecticut, 28 of the processing facilities are Volume Reduction Facilities. Most of these facilities process C&D materials, such as asphalt roofing shingles, sheetrock, treated wood products, and scrap metal as well as oversized municipal solid waste (i.e. mattresses, rugs, and furniture), clean wood and other recyclable items [5]. Some of these facilities also handle MSW. In addition to VRFs, the study area of Connecticut has 13 composting facilities that handle food and yard waste among other organic materials.

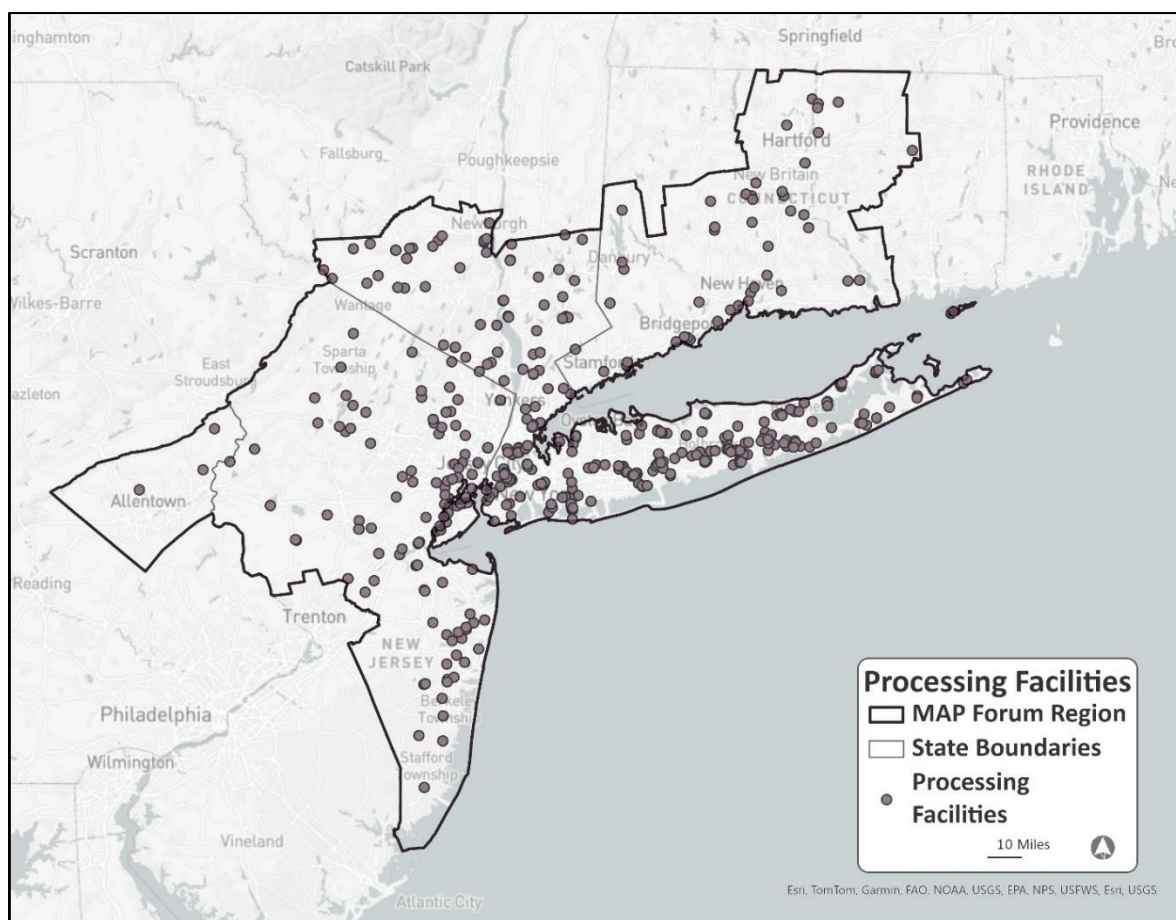
The portion of the study area in New Jersey has 16 Intermediate Processing Facilities that receive and process source separated, comingled recyclable containers. Other recycling centers specialize in materials generally classified as C&D or compostable waste<sup>3</sup>[6].

Similar to other states, New York has facilities for C&D, organics, and recyclables processing. C&D processing facilities are the most common type with 244 facilities in the area handling C&D. An additional 90 facilities are used for composting or mulch processing. The area has a limited number of MSW processing facilities and 66 Recyclables Handling and Recovery Facilities, which handle source separated recyclable materials [7]. There are 29 scrap metal processors.

The small portion of the study area in eastern Pennsylvania has few processing facilities. The three identified in the area specialize in handling various materials including soil, electronics, and C&D. No composting facilities are within the study area of Pennsylvania.

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<sup>3</sup> The area has 63 Class B Recycling centers, which takes certain construction wastes, among other materials. The 10 Class C Recycling facilities take compostable material such as food waste and yard trimmings. An additional 13 facilities are multi-class, meaning they can accept Class B or C materials [6].

**Figure 7: Processing Facilities**

Source: Connecticut<sup>CT</sup>, New Jersey<sup>NJ</sup>, New York<sup>NY</sup>, Pennsylvania<sup>PA</sup>, ESI Analysis

### 4.3 Potential End Markets

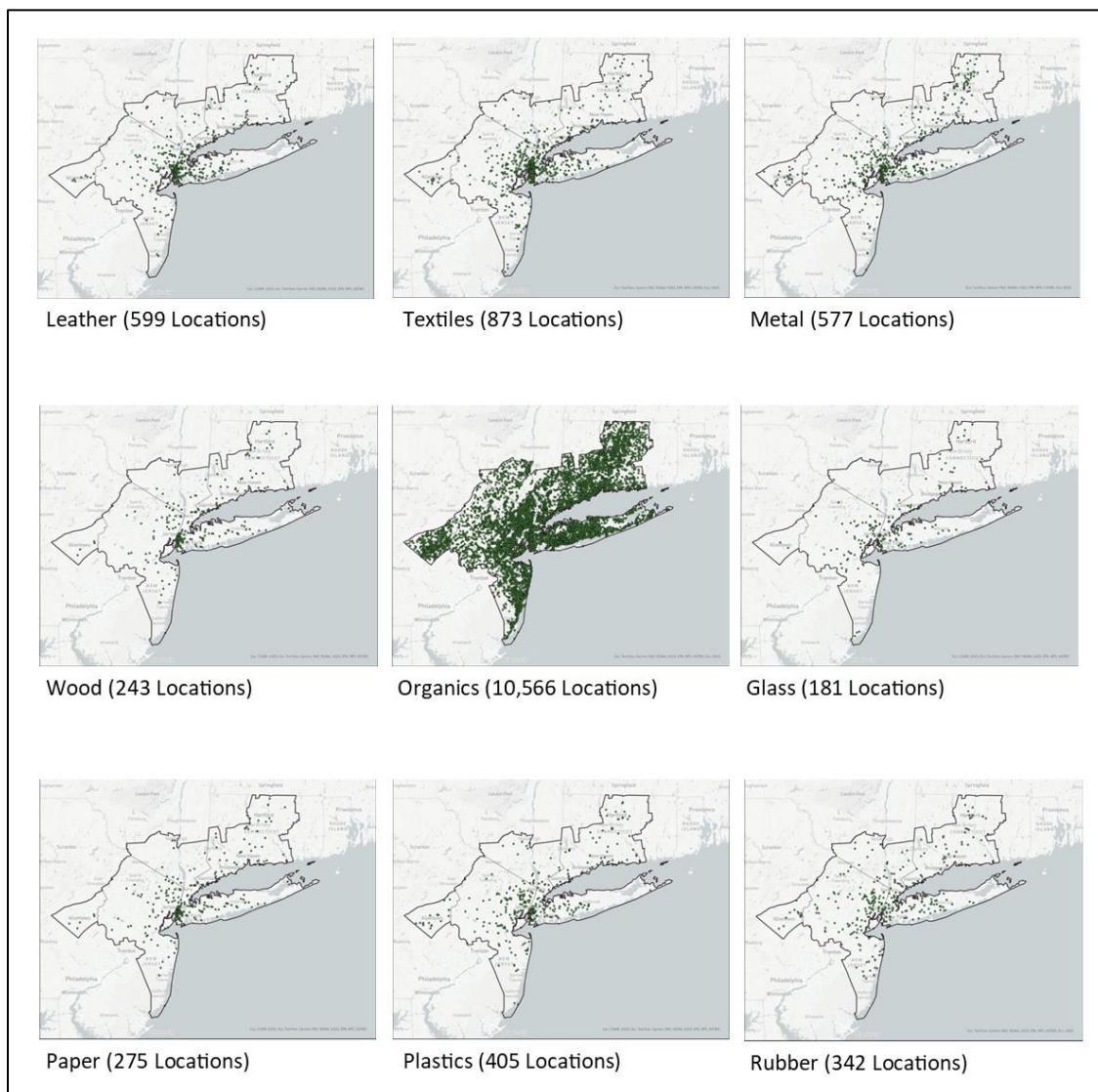
Following sorting and processing, recycled materials can be sent to manufacturing and other facilities for reuse. Markets affect profitability and therefore the likelihood that materials are recycled. According to interviews, finding recycling markets for plastics has been challenging. Metals, paper, and cardboard have robust markets.

In 2021 and 2022, the U.S. Environmental Protection Agency developed a database identifying potential primary recycling end markets as part of a larger effort to increase recycling rates across the nation. This database identifies the locations of industries that can directly use recycled material in their production, though they may or may not already do so [8]. Figure 8 shows the location of these potential end markets for each included waste type: wood, textiles, paper, plastics, rubber, organics, metal, leather, and glass.

While not all these facilities currently use recycled materials, the maps in Figure 8 demonstrate the multitude of potential end markets for recycled goods within the study area. Potential outlets exist throughout the area, though they are generally clustered around New York City. The market

for organic waste is particularly large, with over 10,500 potential end markets, and spread throughout the area. Conversely, glass, though a material physically easy to recycle, has relatively few (181) potential markets in the area.

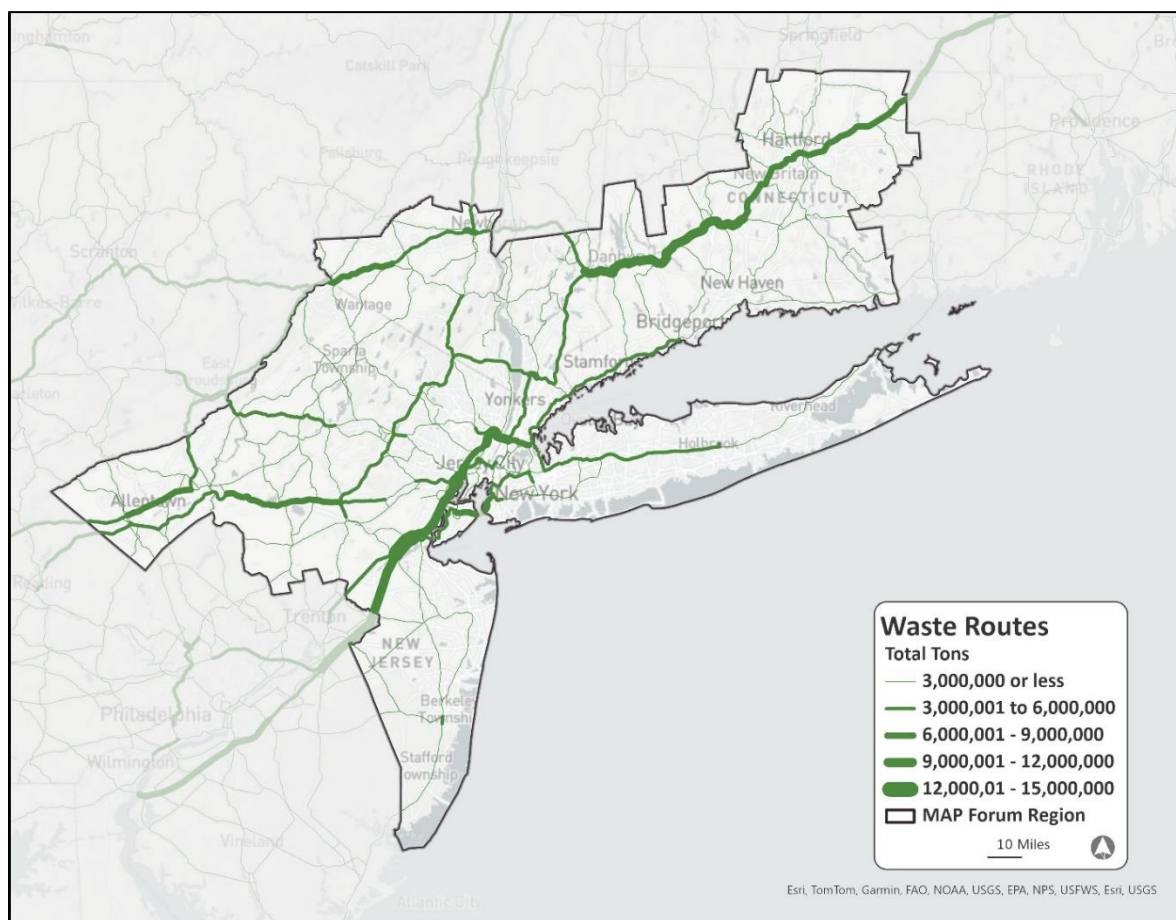
**Figure 8: Potential Primary End Markets by Material Type [8]**



## 5. Waste Disposal

Waste generated by the study area is moved to disposal sites: landfills and incinerators. These facilities, located both within and outside of the study area, are final destinations for waste. Road networks, and to a lesser extent rail and barges, are used to move waste from origin sites and transfer stations to disposal facilities.

**Figure 9: Routes of Waste Movement (Transearch)**



Source: Transearch<sup>RD A</sup>, ESI Analysis

### 5.1 Disposal Sites Outside of the Study Area

More than 47 million tons of C&D and MSW are moved out of the study area by truck or by rail. Most waste in the area is moved by truck (see **Table 3**). According to the Transearch commodities database, major trucking routes for waste in the area are:

- I-78, I-84, and US-22 moving waste to central and western Pennsylvania,
- I-95 and US-1 moving waste to southern New Jersey and Pennsylvania, and
- I-87 moving north to other landfills primarily in New York state.

Of the jurisdictions in the study area, New York City exports the most waste for disposal outside the study area. Across all waste types, the city generates 14.5 million tons of waste. This includes 6.7 million tons of MSW. According to information obtained during interviews, much of this waste is sent by rail to Virginia and Pennsylvania, as well as to upstate New York. Intermodal facilities that move waste to and from rail are in three of the four states in the study area—Connecticut, New York, New Jersey.

**Table 3. Interstates/Routes with Highest Annual Transport of Waste Tonnage**

| Rank | Name   | Tons<br>(Millions) | Trucks<br>(Millions) | Route Length<br>(Miles) | States     |
|------|--------|--------------------|----------------------|-------------------------|------------|
| 1    | I-95   | 29.6               | 1.2                  | 369                     | NJ, NY, CT |
| 2    | I-287  | 15.2               | 0.6                  | 208                     | NJ, NY     |
| 3    | I-78   | 14.5               | 0.6                  | 276                     | PA, NJ     |
| 4    | I-84   | 14.1               | 0.6                  | 329                     | NJ, NY, CT |
| 5    | I-87   | 13.1               | 0.5                  | 208                     | NY         |
| 6    | US-22  | 11.5               | 0.4                  | 103                     | PA, NJ     |
| 7    | US-1   | 11.0               | 0.5                  | 70                      | NJ, CT     |
| 8    | I-278  | 9.5                | 0.4                  | 82                      | NJ, NY     |
| 9    | I-95W  | 9.3                | 0.4                  | 32                      | NJ         |
| 10   | I-495  | 8.0                | 0.3                  | 147                     | NY         |
| 11   | I-80   | 7.5                | 0.3                  | 173                     | NJ         |
| 12   | I-684  | 5.2                | 0.2                  | 73                      | NY, CT     |
| 13   | US-202 | 5.1                | 0.2                  | 194                     | NJ, NY, CT |
| 14   | I-687  | 4.6                | 0.2                  | 30                      | NY         |
| 15   | US-222 | 3.3                | 0.1                  | 24                      | PA         |
| 16   | I-295  | 3.2                | 0.1                  | 21                      | NY         |
| 17   | I-476  | 3.0                | 0.1                  | 65                      | PA         |
| 18   | US-46  | 3.0                | 0.1                  | 92                      | NJ         |
| 19   | US-9   | 2.5                | 0.1                  | 149                     | NJ, NY     |
| 20   | US-7   | 2.2                | 0.1                  | 63                      | CT         |

Sources: Transearch<sup>RD A</sup>, ESI Analysis

## 5.2 Within the Study Area

Waste moves within the study area on local, state, and county roads as well as interstates, such as I-95 and I-84 which cross through the area. Local roads with a high volume of waste movement include New York and New Jersey state routes, and several local roads in Manhattan, according to Transearch.

Barges also handle limited intra-area movement for New York City. New York City contracts with companies to haul MSW via barges to New Jersey, which is then transferred to other modes. Generally, barge is a lesser used mode, limited by port access and the need to transfer between modes to accommodate any non-waterfront origins or destinations.

**Table 4. Local Routes with Highest Annual Transport of Waste Tonnage**

| Rank | Name                   | Tons<br>(Millions) | Trucks<br>(Millions) | Length<br>(Miles) | Counties                | States |
|------|------------------------|--------------------|----------------------|-------------------|-------------------------|--------|
| 1    | NJ-18                  | 7.3                | 0.3                  | 77                | Middlesex, Monmouth     | NJ     |
| 2    | NJ-495                 | 6.3                | 0.2                  | 10                | Hudson, New York        | NJ, NY |
| 3    | NJ-440                 | 6.3                | 0.3                  | 13                | Hudson, Middlesex       | NJ     |
| 3    | NY-440                 | 6.3                | 0.3                  | 22                | Richmond                | NY     |
| 5    | NY-27                  | 5.0                | 0.2                  | 32                | Kings, Nassau, Queens   | NY     |
| 6    | NY-27W                 | 4.8                | 0.2                  | 12                | Kings, Queens           | NY     |
| 7    | 66th Street            | 4.3                | 0.2                  | 2                 | New York                | NY     |
| 8    | NY-495                 | 3.9                | 0.1                  | 2                 | New York                | NY     |
| 8    | 9th Avenue             | 3.9                | 0.1                  | 2                 | New York                | NY     |
| 10   | Route 83               | 3.8                | 0.2                  | 1                 | Suffolk                 | NY     |
| 11   | PA-33                  | 3.7                | 0.1                  | 38                | Northampton             | PA     |
| 12   | Garden State Parkway   | 3.7                | 0.1                  | 114               | Monmouth, Ocean         | NJ     |
| 13   | NJ-28                  | 3.0                | 0.1                  | 10                | Somerset, Union         | NJ     |
| 14   | Various I-95 Junctions | 2.9                | 0.1                  | 3                 | Bergen, Essex, Union    | NJ     |
| 15   | PA-309                 | 2.8                | 0.1                  | 74                | Lehigh                  | PA     |
| 16   | NJ-3                   | 2.8                | 0.1                  | 23                | Bergen, Hudson, Passaic | NJ     |
| 17   | NY-100A                | 2.7                | 0.1                  | 4                 | Westchester             | NY     |
| 18   | NJ-439                 | 2.4                | 0.1                  | 8                 | Union                   | NJ     |
| 19   | NY-24                  | 2.3                | 0.1                  | 8                 | Nassau                  | NY     |
| 20   | 65th Street            | 2.3                | 0.1                  | 3                 | New York                | NY     |

Source: Transearch<sup>RD A</sup>, ESI Analysis

### 5.3 Waste Disposal Within the Study Area

Landfills and waste-to-energy incinerators are the final destinations for waste tonnage not recycled or composted. The study area contains both, and these facilities receive waste from both within and outside the region.

#### 5.3.1 Landfills

The study area contains 20 landfills, 13 of which accept more than 10,000 tons of waste per year. These 13 landfills and 2 other active but low acceptance rate landfills<sup>4</sup>, accept an average of 4.5 million tons of waste annually and had 38.1 million tons of constructed remaining capacity as of 2022.<sup>5</sup> Waste accepted by these landfills is contained there indefinitely, with the exception of

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<sup>4</sup> There are seven “active” landfills in the Connecticut portion of the MAP Forum Area, but just two accept waste in any significant volume or with any regularity. See Table 4 below for more details.

<sup>5</sup> See Task 6 memo for the methodology used to develop the annual acceptance rate and tons of remaining capacity

Ocean County Landfill Corporation in New Jersey, which has a landfill mining operation that extracts recyclable goods from previously placed waste [9].

The landfills that have historically accepted the most waste in the study area are Brookhaven Waste Management Facility (New York) with an average of 822,631 tons per year and Grand Central Sanitary Landfill (Pennsylvania) with an average of 682,802 tons per year. Two additional landfills receive over a half million tons of waste each year: Ocean County Landfill (New Jersey) and Middlesex County Landfill (New Jersey).

Landfill capacity is clustered in the southern part of the study area and on Long Island. Landfills in the New Jersey portion of the study area take the most waste, receiving 39 percent of total received waste in the area. New York takes 29 percent and Pennsylvania takes 28 percent. While Connecticut has many landfills, they receive little waste each year, and no MSW. Together they account for just 4 percent of the waste landfilled in the study area. Most waste that remains in the state goes to incinerators, according to collected data and conversations with state officials.

Figure 11 presents the annual acceptance rate of landfills compared to their remaining capacity, estimated in tons and excluding the volume needed for the final cap. Landfills in Middlesex and Ocean counties in New Jersey have the most remaining capacity. At Brookhaven Landfill on Long Island, the acceptance rate compared to remaining capacity is near even. This indicates Brookhaven, the study area's highest accepting landfill in recent years, is near the end of its lifespan unless the landfill is expanded, or its acceptance rate drops dramatically. The landfill is expected to stop accepting C&D by the end of 2025. As of 2024, the town was seeking to accept ash at the landfill until 2027 or 2028 then permanently close the site<sup>6</sup> [10].

Landfills accept different types of waste, mainly MSW, C&D, and ash left over from incineration at waste-to-energy facilities. Regionally, the type of waste accepted by landfills differs. In Connecticut, historically most MSW has been handled by waste-to-energy facilities within the state, though the closure of the Hartford Resources Recovery Facility in mid-2022 was expected to increase export tonnage out of state [11]. The limited landfill space within Connecticut is used to dispose of C&D or ash.<sup>7</sup> Like Connecticut, landfills on Long Island in New York do not accept MSW due to the 1983 Long Island Landfill Law [12]. Of the five landfills on Long Island, four accept C&D and two accept ash from WTE facilities. Though landfills that accept MSW exist in upstate New York, none fall within the study area. New Jersey and Pennsylvania have landfills that accept multiple types of waste, including MSW and C&D. All landfills in the New Jersey portion of the study area take incinerator ash, providing an end point for a by-product of another waste disposal method used throughout the study area.

Landfills in different states also serve different roles in the movement of waste. Pennsylvania landfills accept a significant portion of waste from out of state. Between 2019 and 2022, 42

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<sup>6</sup> A complete discussion of the lifecycle of these landfills is detailed in Task 6.

<sup>7</sup> Connecticut's only ash landfill is located outside of the MAP Forum Area in Putnam, CT.

percent of all waste and 40 percent MSW entering these three PA landfills was from out of state [13]. In New Jersey many of the state's landfills operate in a regulatory environment encouraging disposal of locally generated waste. New Jersey has partial or full flow control in some counties—including Monmouth, Ocean and Sussex—meaning some or all waste types generated in these counties either must be disposed in county or out of state. Waste from these counties may not be disposed of in other counties within the state. Middlesex and Warren counties are open markets, allowing the facilities to accept waste from anywhere, although Middlesex County charges an additional fee for out-of-county disposal [14].

Waste that originates in the area does not necessarily stay in the area. During interviews, individuals in the waste industry identified landfills in Pennsylvania, Ohio and Virginia that receive waste from the Northeast and are appealing to haulers due to their relatively lower tipping fees. Additionally, many landfills in the area receive waste generated outside the study area.

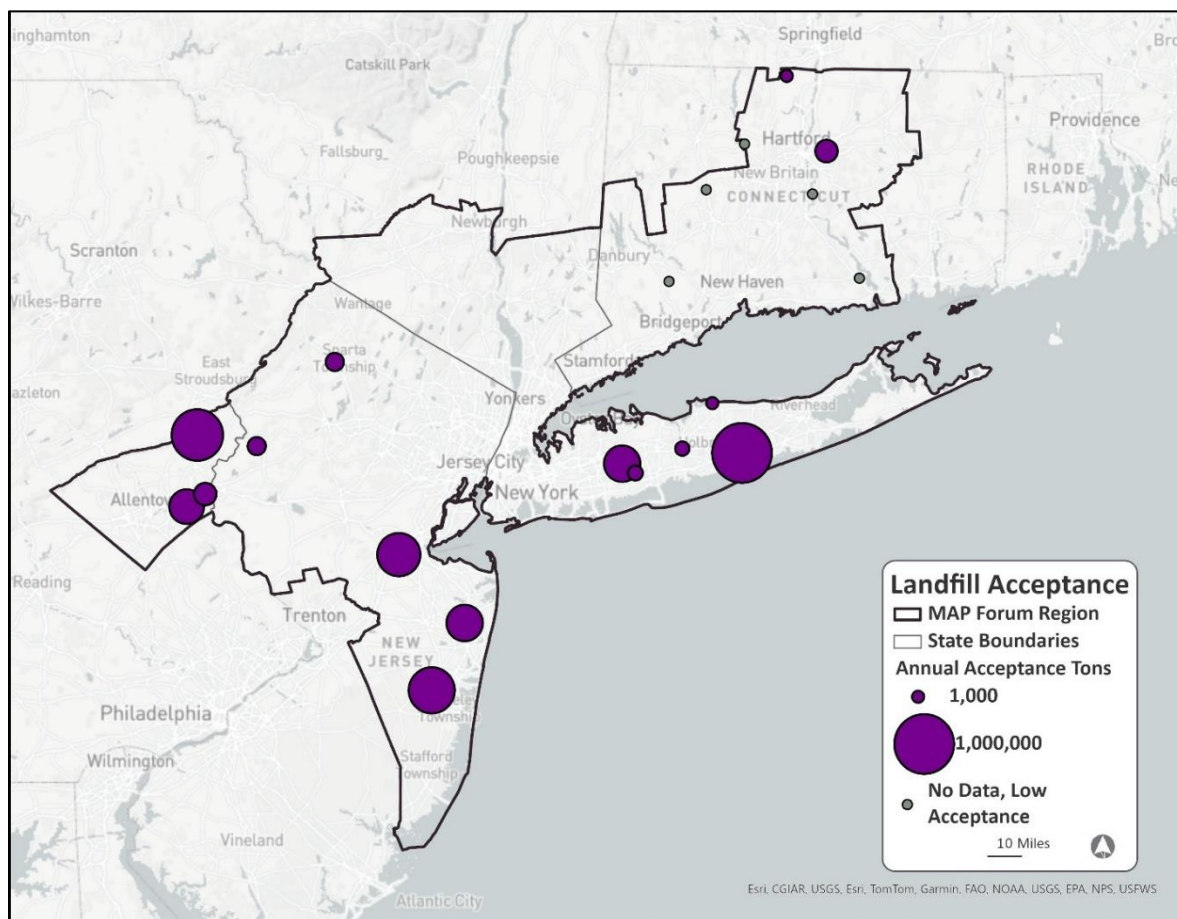
**Table 5. Landfill Location, Waste Type, and Access**

| State               | Landfill Name                              | Waste Types Accepted |     |     | Capacity*<br>(tons) | Annual<br>Acceptance<br>Rate (tons) | Nearest Freight<br>Connection |
|---------------------|--------------------------------------------|----------------------|-----|-----|---------------------|-------------------------------------|-------------------------------|
|                     |                                            | MSW                  | C&D | Ash | End of 2022         | 2018-2022                           |                               |
| <b>Connecticut*</b> | Town of Manchester Landfill                |                      | •   |     | 1,505,354           | 180,643                             | I-84 and I-384                |
|                     | Town of Suffield Landfill                  |                      | •   |     | 44,575              | 650                                 | County 168                    |
|                     | Landfill – Avon                            |                      | •   |     | Low                 | Low                                 | CT 79                         |
|                     | Landfill – Essex                           |                      | •   |     | Low                 | Low                                 | CT 9                          |
|                     | Landfill – Glastonbury                     |                      | •   |     | Low                 | Low                                 | CT 2, CT 66                   |
|                     | Landfill – Monroe                          |                      | •   |     | Low                 | Low                                 | I-84                          |
|                     | Landfill - Thomaston                       |                      | •   |     | Low                 | Low                                 | CT 8                          |
| <b>New York</b>     | 110 Sand Company Clean Fill Disposal Site  |                      | •   |     | 4,989,970           | 424,276                             | I-495                         |
|                     | Babylon Southern Ashfill                   |                      |     | •   | 774,656             | 49,866                              | I-495                         |
|                     | Blydenburgh Road Landfill Complex          |                      | •   |     | 74,738              | 39,417                              | I-495                         |
|                     | Brookhaven Waste Management Facility       |                      | •   | •   | 850,758             | 822,631                             | I-495                         |
|                     | Port Jefferson Village Clean Fill          |                      | •   |     | 8,547               | 808                                 | Local roads, I-495            |
| <b>New Jersey</b>   | Middlesex County Landfill                  | •                    | •   | •   | 4,874,427           | 537,711                             | I-95, NJ 18, and US 1         |
|                     | Monmouth County Regional Sanitary Landfill | •                    | •   | •   | 2,377,267           | 423,197                             | NJ 18; Garden State<br>Pkw    |
|                     | Ocean County LF Corp                       | •                    | •   | •   | 7,725,537           | 587,763                             | US 9                          |
|                     | Sussex County Solid Waste Complex          | •                    | •   | •   | 1,048,821           | 106,743                             | NJ 15 and NJ 94               |
|                     | Warren County - PCFAWC                     | •                    | •   | •   | 5,301,627           | 108,235                             | US 46 and NJ 31               |
| <b>Pennsylvania</b> | Bethlehem Landfill                         | •                    | •   |     | 2,179,971           | 392,327                             | I-78                          |
|                     | Chrin Brothers Sanitary Landfill           | •                    | •   |     | 4,091,617           | 182,251                             | I-78                          |
|                     | Grand Central Sanitary Landfill            | •                    | •   |     | 2,241,366           | 682,802                             | PA 33                         |

\*There are seven “active” landfills in the Connecticut portion of the study area. The CT Department of Energy and Environmental Protection defines “active” as “Landfills that have not completed closure in accordance with solid waste regulations.” Of these landfills, only the landfills in Manchester and Suffield accept a significant volume of waste.

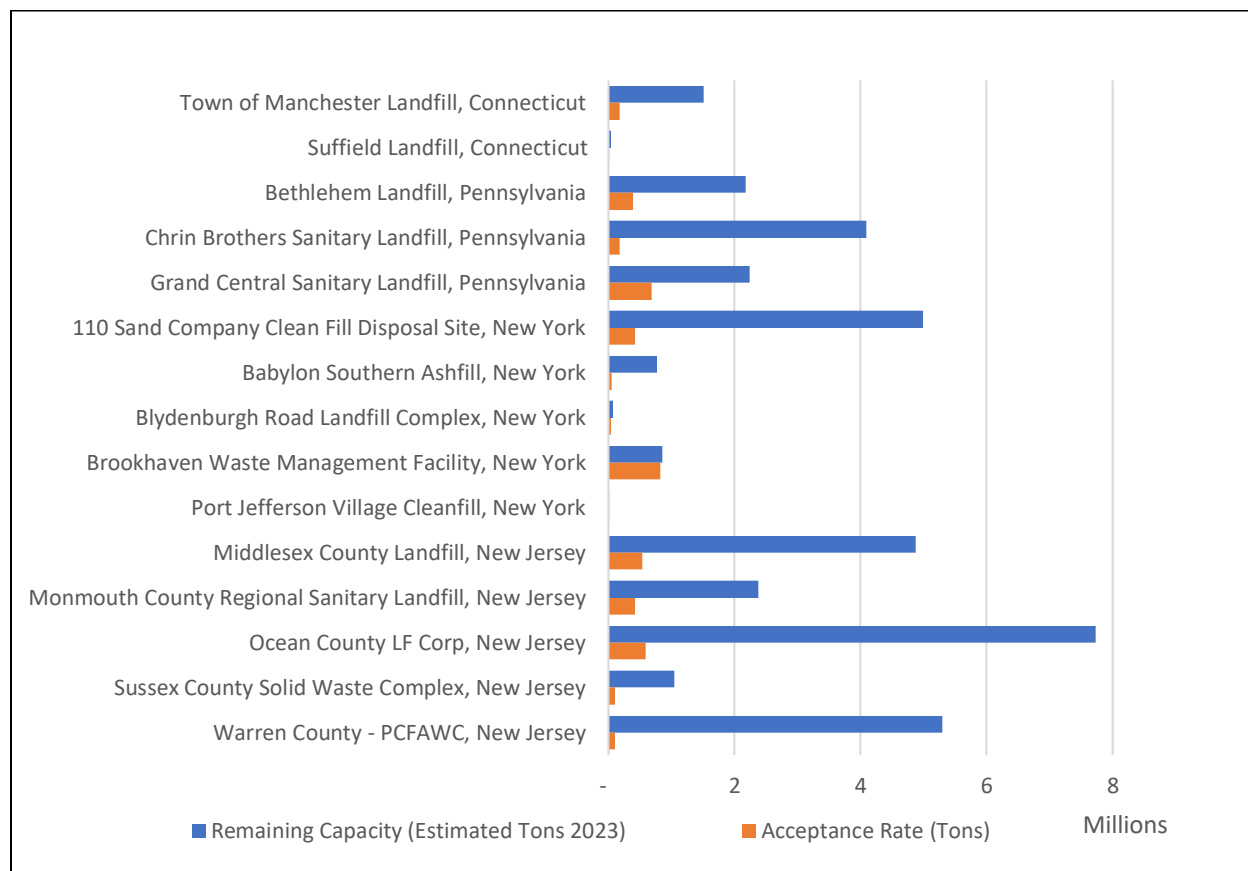
Source: Connecticut<sup>CT B</sup>, New Jersey<sup>Error! Reference source not found.</sup>, New York<sup>NY B</sup>, Pennsylvania<sup>PA B</sup>, ESI Analysis

**Figure 10: Landfill Annual Acceptance Rate (Tons)**



Source: Connecticut<sup>CTB</sup>, New Jersey<sup>NJB</sup>, New York<sup>NYB</sup>, Pennsylvania<sup>PAB</sup>, ESI Analysis

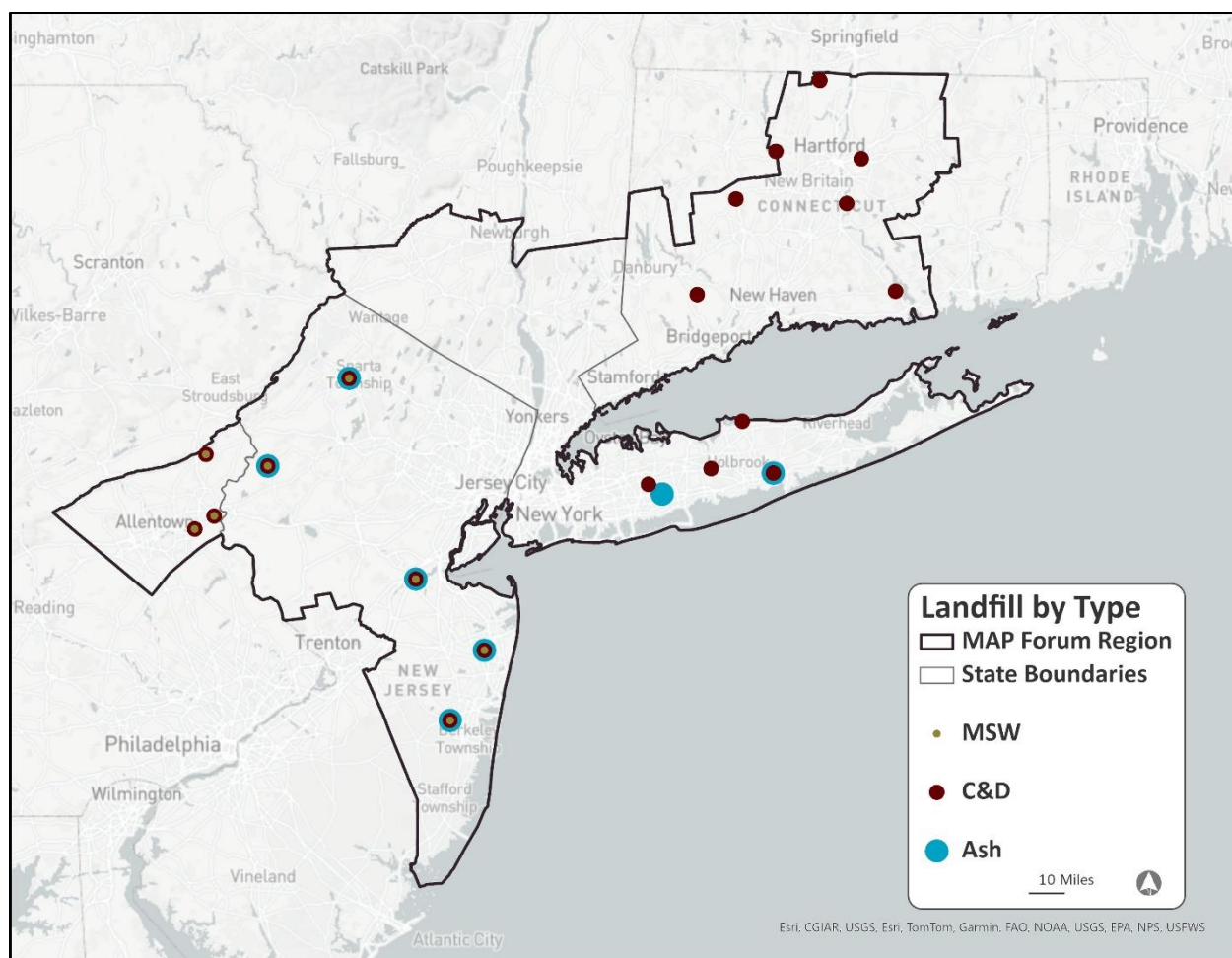
**Figure 11: Landfill Remaining Capacity and Average Annual Acceptance Rate (Beginning of 2023)\***



*\*Excludes landfills without reported data.*

*Source: Connecticut<sup>CT B</sup>, New Jersey<sup>NJ B</sup>, New York<sup>NY B</sup>, Pennsylvania<sup>PA B</sup>, ESI Analysis*

**Figure 12: Landfill by Acceptance Type**



Source: Connecticut<sup>CT B</sup>, New Jersey<sup>NJ B</sup>, New York<sup>NY B</sup>, Pennsylvania<sup>PA B</sup>, ESI Analysis

### 5.3.2 Waste-to-Energy Facilities

The study area has nine waste-to-energy (WTE) facilities, which receive waste from off-site and burn this material in a process that generates energy and ash residue. Each year these facilities are permitted to receive 5.2 million tons of waste and operate at an average of 89 percent<sup>8</sup> of permitted capacity. An estimated 4.7 million tons of waste are incinerated each year, reducing this waste to ash weighing about 15 to 25 percent of its initial weight [15].

There are WTE facilities in the New Jersey, New York, and Connecticut portions of the study area. Hempstead Resource Recovery Facility in New York (1.0 million tons permitted) and

<sup>8</sup> Based on New York (2021) and Connecticut (2022)

Essex County RRF Newark in New Jersey (1.0 million tons permitted) are the largest WTE facilities by permitted rate of acceptance.

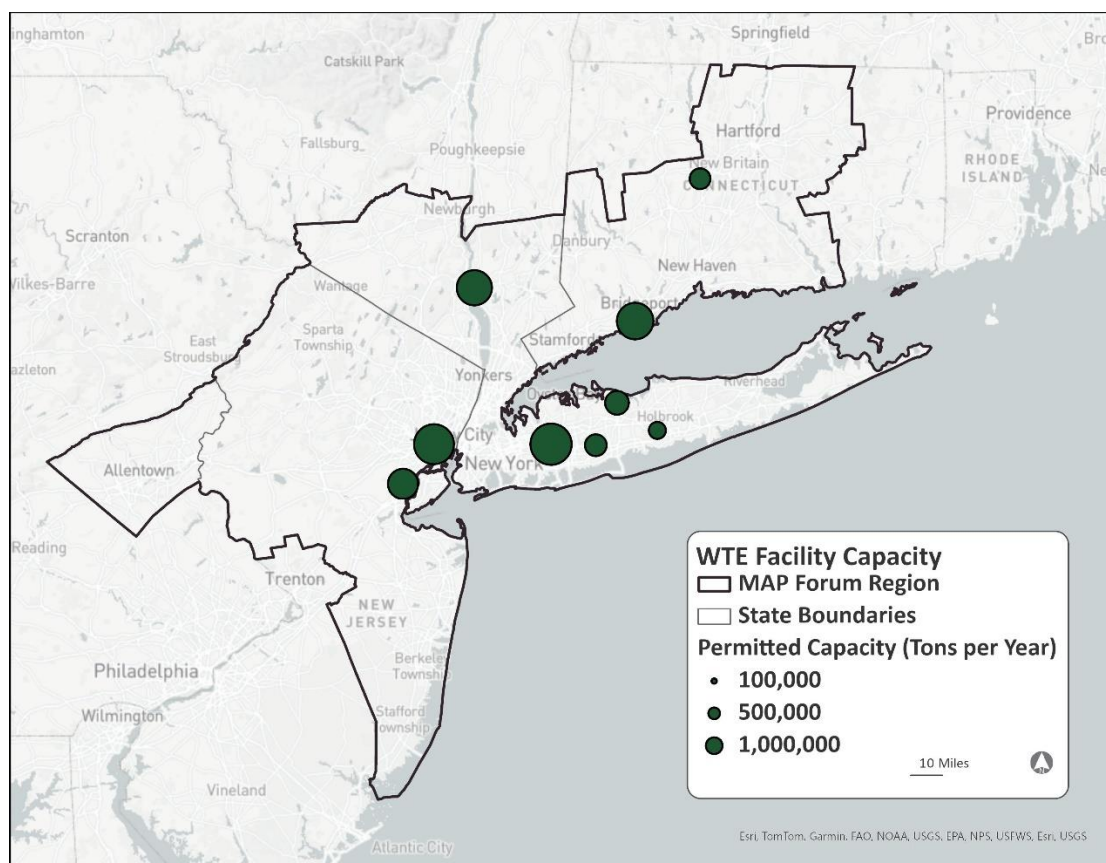
The amount of waste received by these facilities annually is less than the total permitted amount. The facilities within the study area in New York are operating at between 84 percent and 98 percent of the total permitted capacity. The Connecticut facilities, Reworld Bristol Resource Recovery Facility and Wheelabrator Bridgeport Resource Recovery Facility, respectively accepted 80 and 87 percent permitted capacity, near the 85 percent described as “practical” capacity by the Connecticut Department of Energy & Environmental Protection January 2023 CMMS Amendment [11].

**Table 6. Waste-to-Energy Incinerators**

| State                                                                                                                                                                                                  | Landfill Name                                      | Capacity*<br>(tons) | Annual<br>Acceptance<br>Rate (tons) | Nearest Freight<br>Connection    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------|-------------------------------------|----------------------------------|
| <b>Connecticut*</b>                                                                                                                                                                                    | Reworld Bristol Resource Recovery Facility         | 261,340             | 209,518                             | I-84                             |
|                                                                                                                                                                                                        | Wheelabrator Bridgeport Resource Recovery Facility | 821,250             | 715,177                             | I-95                             |
| <b>New York**</b>                                                                                                                                                                                      | Babylon Resource Recovery Facility                 | 287,442             | 244,651                             | I-495                            |
|                                                                                                                                                                                                        | Hempstead Resource Recovery Facility               | 1,040,250           | 1,019,132                           | I-495, NY-106, NY-24, Clinton St |
|                                                                                                                                                                                                        | Huntington Resource Recovery Facility              | 350,400             | 339,395                             | I-495                            |
|                                                                                                                                                                                                        | Reworld MacArthur Renewable Energy                 | 177,025             | 160,973                             | I-495                            |
|                                                                                                                                                                                                        | Wheelabrator Westchester L.P.                      | 755,000             | 630,486                             | US-9                             |
| <b>New Jersey</b>                                                                                                                                                                                      | Essex County RRF Newark                            | 985,500             | NA                                  | I-95                             |
|                                                                                                                                                                                                        | Union County RRF Rahway                            | 562,100             | NA                                  | I-95                             |
| <p>*Received annual tons for Connecticut from 2022<br/> ** Received annual tons for New York from 2021<br/> Note: Waste-to-energy incinerators only accept MSW. They do not accept C&amp;D or Ash.</p> |                                                    |                     |                                     |                                  |

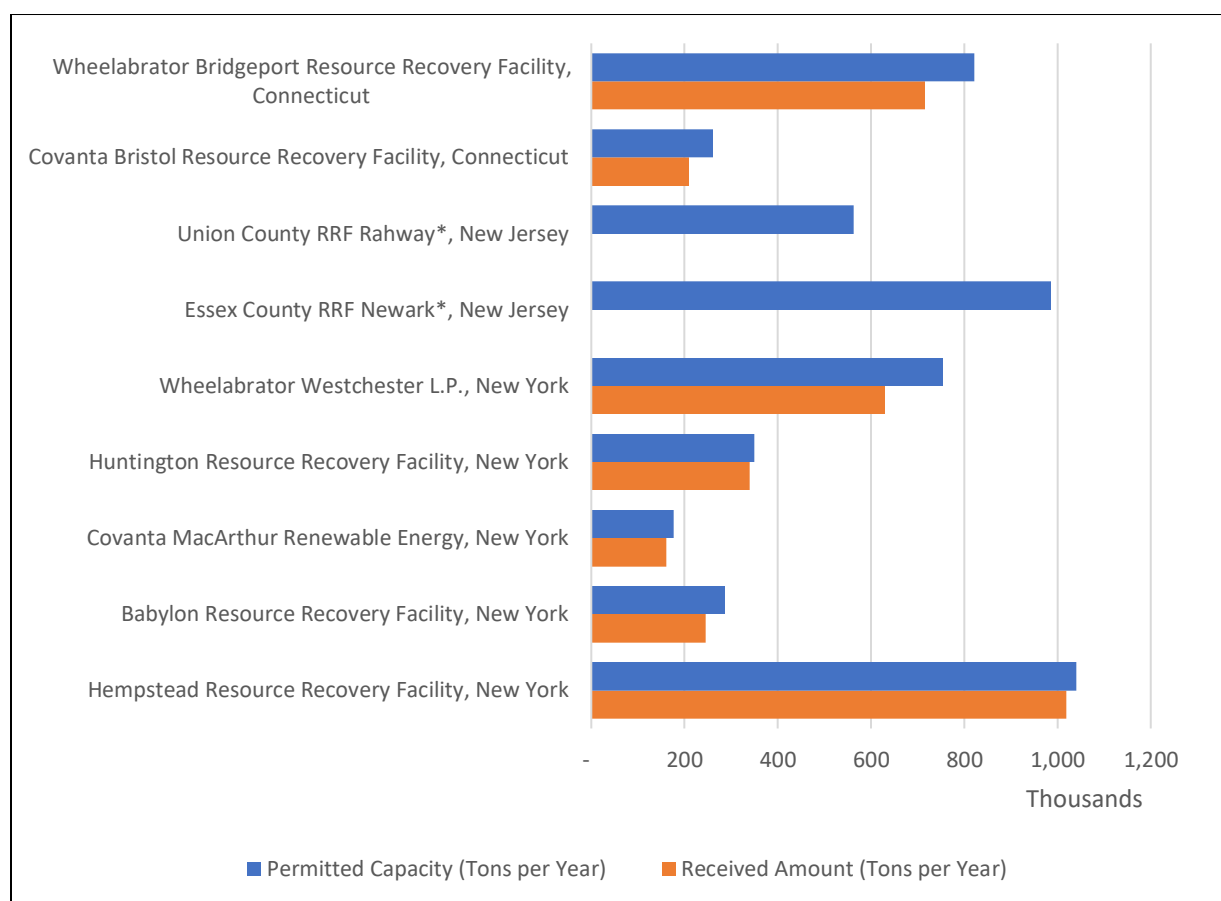
Source: Connecticut<sup>CT</sup>, New Jersey<sup>NJ</sup>, New York<sup>NY</sup>, Pennsylvania<sup>PA</sup>, ESI Analysis

**Figure 13: Annual WTE Facility Capacity**



Source: Connecticut<sup>CTC</sup>, New Jersey<sup>NJC</sup>, New York<sup>NYC</sup>, Pennsylvania<sup>PAC</sup>, ESI Analysis

**Figure 14: Tons of Waste Permitted and Received at WTE Facilities per Year (tons)**



\*No received amount data for New Jersey incinerators

Source: Connecticut <sup>CT C</sup>, New Jersey <sup>NJ C</sup>, New York <sup>NY C</sup>, Pennsylvania <sup>PA C</sup>, ESI Analysis

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## 7. Data References

**Table 6: All States**

| In-Text Reference | Data Subject | Source     | Year | Agency | Link                                                                                                                                                                                                                                |
|-------------------|--------------|------------|------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>RD A</i>       | Roads        | Transearch | 2021 | S&P    | <a href="https://www.spglobal.com/marketintelligence/en/mi/products/transearch-freight-transportation-research.html">https://www.spglobal.com/marketintelligence/en/mi/products/transearch-freight-transportation-research.html</a> |

**Table 7: Connecticut**

| In-Text Reference | Data Subject     | Source                                                                           | Year | Agency                       | Link                                                                                                                                                                                                                                                                                        |
|-------------------|------------------|----------------------------------------------------------------------------------|------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CT A</i>       | Waste Generation | Disposal and diversion by town and facility                                      | 2022 | CT DEEP                      | Requested from CT DEEP                                                                                                                                                                                                                                                                      |
| <i>CT B</i>       | Landfills        | Active Landfill sites in Connecticut                                             | 2023 | CT DEEP                      | <a href="https://portal.ct.gov/deep/waste-management-and-disposal/solid-waste/active-landfill-sites">https://portal.ct.gov/deep/waste-management-and-disposal/solid-waste/active-landfill-sites</a>                                                                                         |
|                   |                  | Manchester Annual Topographic Map and Site Life Analysis                         | 2024 | Manchester Sanitary Landfill | From Manchester Sanitary Landfill, from report submitted to CT                                                                                                                                                                                                                              |
|                   |                  | Suffield Annual Topographic Survey Letter                                        | 2023 | Suffield Landfill            | From Suffield Landfill, from report submitted to CT                                                                                                                                                                                                                                         |
|                   |                  | Tonnage managed by facility in the study area                                    | 2022 | CT DEEP                      | Requested from CT DEEP                                                                                                                                                                                                                                                                      |
| <i>CT C</i>       | Incinerators     | Connecticut Resource Recovery Facilities                                         | 2020 | CT DEEP                      | <a href="https://portal.ct.gov/deep/waste-management-and-disposal/solid-waste/resources-recovery-facilities">https://portal.ct.gov/deep/waste-management-and-disposal/solid-waste/resources-recovery-facilities</a>                                                                         |
|                   |                  | Map of Permitted Municipal Solid Waste ("MSW") Facility Locations in Connecticut | 2022 | CT DEEP                      | Requested from agency, viewable online at <a href="https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621">https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621</a>                                     |
|                   |                  | Tonnage managed by facility in the study area                                    | 2022 | CT DEEP                      | Received from CT DEEP                                                                                                                                                                                                                                                                       |
|                   |                  | Comprehensive Materials Management Strategy Amendment                            | 2023 | CT DEEP                      | <a href="https://portal.ct.gov/-/media/deep/waste_management_and_disposal/solid_waste_management_plan/january2023/cmms-amendment-2023-draft.pdf">https://portal.ct.gov/-/media/deep/waste_management_and_disposal/solid_waste_management_plan/january2023/cmms-amendment-2023-draft.pdf</a> |

**Table 7 (continued): Connecticut**

| In-Text Reference | Subject               | Source                                                       | Year | Agency                           | Link                                                                                                                                                                                                                                                     |
|-------------------|-----------------------|--------------------------------------------------------------|------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CT D</i>       | Transfer Stations     | Connecticut Capacity                                         | 2022 | Agency                           | Link                                                                                                                                                                                                                                                     |
|                   |                       | Transfer Stations Rail Transfer                              | 2022 | CT DEEP                          | Requested from agency                                                                                                                                                                                                                                    |
|                   |                       | Transfer Stations Truck Transfer                             | 2022 | CT DEEP                          | Requested from CT DEEP, viewable online at <a href="https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621">https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621</a> |
|                   |                       | Ongoing Waste Transfer Operations                            | 2024 | CT DEEP                          | Requested from agency, viewable online at <a href="https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621">https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621</a>  |
|                   |                       | Tonnage managed by facility in the study area                | 2022 | MIRA<br>Dissolution<br>Authority | <a href="https://www.ctmira.org/miras-ongoing-waste-transfer-operations">https://www.ctmira.org/miras-ongoing-waste-transfer-operations</a>                                                                                                              |
|                   |                       | CSX Municipal and Consumer Waste Map                         | 2024 | CT DEEP                          | Requested from agency                                                                                                                                                                                                                                    |
|                   |                       | Registered Municipal Transfer Stations                       | 2020 | CSX                              | <a href="https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/">https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/</a>                      |
|                   |                       | Connecticut Capacity                                         | 2022 | CT DEEP                          | <a href="https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home">https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home</a>                                                                |
| <i>CT E</i>       | Processing Facilities | Transfer Stations Rail Transfer                              | 2022 | CT DEEP                          | Requested from agency                                                                                                                                                                                                                                    |
|                   |                       | Transfer Stations Truck Transfer                             | 2022 | CT DEEP                          | Requested from agency, viewable online at <a href="https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621">https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621</a>  |
|                   |                       | Ongoing Waste Transfer Operations                            | 2024 | CT DEEP                          | Requested from agency, viewable online at <a href="https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621">https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=d320b55589fe4a8cbafab7d19e434621</a>  |
|                   |                       | Permitted Transfer Stations                                  | 2016 | MIRA<br>Dissolution<br>Authority | <a href="https://www.ctmira.org/miras-ongoing-waste-transfer-operations">https://www.ctmira.org/miras-ongoing-waste-transfer-operations</a>                                                                                                              |
|                   |                       | C&D Volume Reduction Plants                                  | 2020 | CT DEEP                          | <a href="https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home">https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home</a>                                                                |
|                   |                       | Tonnage managed by facility in the study area                | 2022 | CT DEEP                          | <a href="https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home">https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Solid-Waste/Solid-Waste-Home</a>                                                                |
|                   |                       | Recycling Processing Facilities/Material Recovery Facilities | 2018 | CT DEEP                          | Requested from agency                                                                                                                                                                                                                                    |

**Table 8: New Jersey**

| In-Text Reference | Subject                | Source                                                           | Year      | Agency | Link                                                                                                                                                                                                                                          |
|-------------------|------------------------|------------------------------------------------------------------|-----------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>NJ A</i>       | Waste Generation       | Disposal Rates by County                                         | 2020      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/recycling/stats.htm">https://www.nj.gov/dep/dshw/recycling/stats.htm</a>                                                                                                                                 |
| <i>NJ B</i>       | Landfills              | Solid Waste Landfill Site Extent                                 | 2023      | NJ DEP | <a href="https://gisdata-njdep.opendata.arcgis.com/datasets/njdep::solid-waste-landfill-site-extents-in-new-jersey/about">https://gisdata-njdep.opendata.arcgis.com/datasets/njdep::solid-waste-landfill-site-extents-in-new-jersey/about</a> |
|                   |                        | NJDEP Approved Operating Commercial Landfills                    | 2018      | NJ DEP | <a href="https://nj.gov/dep/dshw/lrm/aocslf.htm">https://nj.gov/dep/dshw/lrm/aocslf.htm</a>                                                                                                                                                   |
|                   |                        | LMOP Landfill Capacity                                           | 2022      | US EPA | <a href="https://www.epa.gov/lmop/lmop-landfill-and-project-database">https://www.epa.gov/lmop/lmop-landfill-and-project-database</a>                                                                                                         |
|                   |                        | Annual Topographic Survey                                        | 2019-2023 | NJ DEP | Requested from agency                                                                                                                                                                                                                         |
|                   |                        | Solid Waste Facility Permits                                     | Various   | NJ DEP | Requested from agency                                                                                                                                                                                                                         |
| <i>NJ C</i>       | Incinerators           | Authorized New Jersey Incinerators                               | 2018      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/rtrp/njaincin.htm">https://www.nj.gov/dep/dshw/rtrp/njaincin.htm</a>                                                                                                                                     |
|                   |                        | Solid and Hazardous Waste Facilities                             | 2022      | NJ DEP | <a href="https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about">https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about</a>                                       |
| <i>NJ D</i>       | Transfer Stations      | Transfer Station/Intermodal Container/Material Recovery Facility | 2024      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/hwtf/tsicmrfd.htm">https://www.nj.gov/dep/dshw/hwtf/tsicmrfd.htm</a>                                                                                                                                     |
|                   |                        | Solid and Hazardous Waste Facilities                             | 2022      | NJ DEP | <a href="https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about">https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about</a>                                       |
|                   |                        | CSX Municipal and Consumer Waste Map                             | 2024      | CSX    | <a href="https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/">https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/</a>           |
| <i>NJ D</i>       | Processing Facilities: | Solid and Hazardous Waste Facilities                             | 2022      | NJ DEP | <a href="https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about">https://gisdata-njdep.opendata.arcgis.com/datasets/896615180fb04d8eafda0df9df9a1d73_28/about</a>                                       |
|                   |                        | Class B Recycling Facilities                                     | 2024      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm">https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm</a>                                                                                                       |
|                   |                        | Transfer Station/Intermodal Container/Material Recovery Facility | 2024      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/hwtf/tsicmrfd.htm">https://www.nj.gov/dep/dshw/hwtf/tsicmrfd.htm</a>                                                                                                                                     |
|                   |                        | Class C Recycling Facilities                                     | 2023      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm">https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm</a>                                                                                                       |
|                   |                        | Multi-Class (Class B & C) Recycling Facilities                   | 2024      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm">https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm</a>                                                                                                       |
|                   |                        | Intermediate Processing Facilities                               | 2023      | NJ DEP | <a href="https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm">https://www.nj.gov/dep/dshw/recycling/recymkts_directory.htm</a>                                                                                                       |

**Table 9: New York**

| In-Text Reference | Subject               | Source                                                                  | Year          | Agency | Link                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|-----------------------|-------------------------------------------------------------------------|---------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>NY A</i>       | Waste Generation      | New York State Solid Waste Management Plan 2023                         | 2023/<br>2018 | NY DEC | <a href="https://dec.ny.gov/environmental-protection/waste-management/solid-waste-management-planning/nys">https://dec.ny.gov/environmental-protection/waste-management/solid-waste-management-planning/nys</a>                                                                                                                                                                                                             |
| <i>NY B</i>       | Landfills             | Active Landfills                                                        | 2023          | NY DEC | <a href="https://data.gis.ny.gov/datasets/6f037983fc6846b6ae8d2f77b148084b/explore?location=41.920364%2C-74.534277%2C7.83">https://data.gis.ny.gov/datasets/6f037983fc6846b6ae8d2f77b148084b/explore?location=41.920364%2C-74.534277%2C7.83</a>                                                                                                                                                                             |
|                   |                       | Annual Reports                                                          | 2019-<br>2022 | NY DEC | <a href="https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Landfill/">https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Landfill/</a>                                                                                                         |
| <i>NY C</i>       | Incinerators          | Combustion Facilities                                                   | 2022          | NY DEC | <a href="https://data.gis.ny.gov/datasets/0316ae76bad048a5ad7e2fd892dc79ad_14/about">https://data.gis.ny.gov/datasets/0316ae76bad048a5ad7e2fd892dc79ad_14/about</a>                                                                                                                                                                                                                                                         |
|                   |                       | Municipal Waste Combustion Facility Combustion Chart and Summary Report | 2024          | NY DEC | <a href="https://data.gis.ny.gov/datasets/0316ae76bad048a5ad7e2fd892dc79ad_14/about">https://data.gis.ny.gov/datasets/0316ae76bad048a5ad7e2fd892dc79ad_14/about</a>                                                                                                                                                                                                                                                         |
| <i>NY D</i>       | Transfer Stations     | Annual Reports                                                          | 2022          | NY DEC | <a href="https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Transfer%20Facilities/Transfer%20Annual%20Reports%20-%202022/">https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Transfer%20Facilities/Transfer%20Annual%20Reports%20-%202022/</a> |
|                   |                       | CSX Municipal and Consumer Waste Map                                    | 2024          | CSX    | <a href="https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/">https://www.csx.com/index.cfm/customers/commodities/waste/maps-locations/municipal-and-consumer-waste-map/</a>                                                                                                                                                                                         |
| <i>NY E</i>       | Processing Facilities | Solid Waste Management Facilities                                       | 2023          | NY DEC | <a href="https://data.ny.gov/Energy-Environment/Solid-Waste-Management-Facilities/2fni-raj8/about_data">https://data.ny.gov/Energy-Environment/Solid-Waste-Management-Facilities/2fni-raj8/about_data</a>                                                                                                                                                                                                                   |

**Table 10: Pennsylvania**

| In-Text Reference | Subject               | Source                                            | Year                   | Agency             | Link                                                                                                                                                                                                                                                                                                                        |
|-------------------|-----------------------|---------------------------------------------------|------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>PA A</i>       | Waste Generation      | Waste Management Disposal Information             | 2022                   | PA DEP             | <a href="http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information">http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information</a>                                                                                                             |
| <i>PA B</i>       | Landfill              | Annual Report                                     | 2022                   | PA DEP             | Requested from agency                                                                                                                                                                                                                                                                                                       |
|                   |                       | Waste Management Disposal Information             | 2019-2023              | PA DEP             | <a href="http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information">http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/WM/PBI/Solid_Waste_Disposal_Information</a>                                                                                                             |
|                   |                       | Solid Waste Disposal and/or Processing Permits    | Various                | PA DEP             | Requested from agency                                                                                                                                                                                                                                                                                                       |
|                   |                       | LMOP Landfill Capacity                            | 2022                   | US EPA             | <a href="https://www.epa.gov/lmop/lmop-landfill-and-project-database">https://www.epa.gov/lmop/lmop-landfill-and-project-database</a>                                                                                                                                                                                       |
| <i>PA C</i>       | Incinerators          | Landfills and Resource Recovery Facilities        | Undated, Accessed 2024 | NJ DEP             | <a href="https://www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx">https://www.dep.pa.gov/Business/Land/Waste/SolidWaste/MunicipalWaste/MunicipalWastePermitting/Pages/MW-Landfills-and-Resource-Recovery-Facilities.aspx</a> |
| <i>PA D</i>       | Transfer Stations     | Municipal Waste Operations – Transfer Stations    | 2023                   | PA DEP             | <a href="https://newdata-padep-1.opendata.arcgis.com/datasets/PADEP-1::municipal-waste-operation-transfer-stations/about">https://newdata-padep-1.opendata.arcgis.com/datasets/PADEP-1::municipal-waste-operation-transfer-stations/about</a>                                                                               |
|                   |                       | Municipal Waste Operations                        | 2023-2024              | PA DEP             | <a href="https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=281">https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=281</a>                                                                                                                                                                                         |
|                   |                       | Northampton Landfill & Transfer Station Locations | 2020                   | Northampton County | <a href="https://www.norcopa.gov/PUBWRKS/ENV SVC/Documents/Locations/TransferStations.pdf">https://www.norcopa.gov/PUBWRKS/ENV SVC/Documents/Locations/TransferStations.pdf</a>                                                                                                                                             |
| <i>PA E</i>       | Processing Facilities | Municipal Waste Operations                        | 2024                   | PA DEP             | <a href="https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=281">https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=281</a>                                                                                                                                                                                         |

## Attachment A: Data Collection, Processing, and Analysis

This task required the study team to compile, process, organize, and present data illustrating current waste movements in the study area. The team's collection efforts focused on waste generation, the locations and capacities of waste facilities, and transportation infrastructure.

Infrastructure data collected for this study includes:

- The location of waste facilities, including landfills, waste-to-energy (or incineration) facilities, transfer stations, and other processing facilities.
- The type and quantity of waste accepted at disposal facilities
- Lifetime and annual capacity of disposal waste facilities
- Road, rail and waterway infrastructure used in freight movements
- Waste freight movement estimates

### Goals

Gathering this data serves multiple purposes. Compiling information from many different sources into a single location allows for a holistic view of waste movement that crosses state lines, waste facility types, and transportation modes. It creates a browsable database that can be referenced to inform or guide future inquiries.

Additionally, this data can be used as a communication tool. Much of the collected data is geospatial, meaning it can be visualized on a map alongside other datasets. Creating a publicly accessible map is part of this study. The resulting map will make this data both more accessible and digestible, increasing stakeholder access to information about the current regional waste system.

Compiling this data has the added benefit of documenting existing data limitations and strengths. Professionals studying or working with waste data often note inconsistencies across geographies of data creation and processing. Freight data, an essential component in understanding waste movement, has similar challenges. The data gathered in this study is not free from these constraints and some datasets are more complete than others. However, bringing this information into one place creates a record of data sources and types, which can be used to identify gaps and draft recommendations.

This data collection effort also supports Task 6 and 7 of this study: the facility lifecycle analysis and waste movement projections. Current waste capacity, lifespan, and expected expansions can be used to estimate how facilities used to process or dispose of waste may increase or decrease in capacity. Such changes would shift the nodes in the waste movement network. Waste generation data can be used in conjunction with policy research (Task 4), demographics, and GDP to develop a baseline to project future waste production (Task 6).

Collecting this data aligns with the NYMTC objectives to understand existing waste movement networks in the study area. Future studies can seek to deepen understandings of waste and movement in the area by studying congestion, waste freight emissions, waste transportation expenses, and opportunities for increased efficiencies.

## **Data Collection and Processing**

The project team collected and processed data, seeking to compile the most recent and comprehensive data about waste movement. As the scope of this study is limited to Municipal Solid Waste (MSW) and Construction and Demolition Debris (C&D), the data collected focused on facilities and metrics related to these waste types whenever possible.

### **Sources**

The compiled data is primarily from state government sources, occasionally supplemented by interviews, local and federal government datasets, and, in one case, a private proprietary dataset. See 7. Data References for more detail.

Online state and local datasets were used to develop the location, capacity, acceptance rates, and waste types of waste facilities including landfills, waste-to-energy (or incineration), transfer stations, and other processing facilities. State plans and datasets were used to compile data related to waste production, diversion rates and waste planning regions. In some cases, such as planned waste facility expansions or capacities, the desired data was partially or fully unavailable from online sources. In these instances, phone calls, emails, or public record requests were made to the relevant state or local entities to request data to address these gaps. Additionally, NYMTC, TAC representatives, and participants in the interviews provided information and datasets that were used to further supplement data collection efforts.

Federal datasets were occasionally used to supplement state sources. Population information used to derive per capita waste rates was downloaded from the US Census Bureau. Information from the Landfill Methane Outreach Program operated by the US Environmental Protection Agency, was used to supplement state sources regarding landfill location, capacity, and lifespan.

S&P Transearch, a private proprietary dataset provided to the study team by the New York Department of Transportation, was used to estimate and map waste movement networks.

### **Data Processing**

To compile a useful and reliable database, processing this information followed several guidelines. First, this study focused on recent data. Datasets compiled prior to 2018 were excluded, with most data from 2020 or later. Data was crosschecked against multiple sources whenever possible. In some cases, this included checking the data against another similar dataset. In other cases, people interviewed as part of Task 4 or other stakeholders, such as NYMTC, were asked for feedback or verification of the collected data.

To make the compiled data truly regional, the data and its documentation was analyzed to find common variables between datasets from different sources or states. To the extent possible, datasets from different states were combined to create regional datasets specific to a type of infrastructure or waste metric. This was approached cautiously and intermediary, state-specific datasets were also created, along with documentation of their sources. These layers of documentation seek to make it possible to trace the source of individual data points.

The study team processed most of this data using Excel. QGIS, an open-source mapping program, was used to visually check the data. An R script was used to convert Excel or comma-separated value to geospatial formats.

## Data Analysis

### Waste Generation

The study team estimated total waste generation for the study area using existing data and assumptions based on available data. States in the study area have inconsistent data availability, requiring estimation in the development of regional totals. Some examples include:

- Connecticut does not report diversion rates for non-MSW waste
- Pennsylvania reports diversion rates for specific materials in the waste stream, but not for larger waste types, such as MSW or C&D.
- New Jersey does not report C&D in its 2020 estimates. Total C&D generation for 2022 was obtained using a public records request, however this does not include a diversion rate or quantity.
- New York’s 2023 Solid Waste Management Plan contained 2018 data for MSW, C&D and all waste, which was processed to quantify total waste generation and diversion quantities.

The reported waste generation quantities are reported in Table and broken down by waste type. Each are from the available data year, as detailed in the source list included in section 7. Data References. Each waste type has the total amount of waste generated (disposal and diversion) and the amount of waste disposed, a portion of the total.

**Table 11. Reported Waste Disposal and Diversion**

|              | All Waste |          |          | MSW   |          |          | C&D   |          |          |
|--------------|-----------|----------|----------|-------|----------|----------|-------|----------|----------|
|              | Total     | Diverted | Disposed | Total | Diverted | Disposed | Total | Diverted | Disposed |
| Connecticut  | 2.7       | NA       | NA       | 2.5   | 0.6      | 1.9      | NA    | NA       | NA       |
| New Jersey   | 15.8      | 8.7      | 7.0      | 6.9   | 2.5      | 4.4      | 1.6   | NA       | NA       |
| New York     | 24.4      | 10.3     | 14.1     | 11.1  | 2.0      | 9.0      | 12.9  | 8.2      | 4.7      |
| Pennsylvania | NA        | NA       | 0.7      | NA    | NA       | 0.5      | NA    | NA       | 0.1      |

Source: Connecticut<sup>CTA</sup>, New Jersey<sup>NJA</sup>, New York<sup>NYA</sup>, Pennsylvania<sup>PAA</sup>, ESI Analysis

This analysis is based on recycling or diversion rates reported by the states, though some discrepancies may exist between these definitions. Diversion is defined by the US Environmental Protection Agency as:

“Activities surrounding the handling of recovered resources such that they are not disposed of in landfills, waste piles, surface impoundments, land application units on a permanent or long-term temporary basis; and are not incinerated or converted to fuel energy, or base chemicals through combustion, pyrolysis, gasification, or other conversion technologies. Diversion can be attributed to several processes where materials are systematically redirected from disposal: Recycling, Reuse, Beneficial Use, and

Composting. Each of these four processing forms of diversion are defined in a way that make them mutually exclusive to one another, yet a total diversion metric can be calculated by adding the amounts from all four processes together” [16].

While occasionally the definition of diversion is expanded to include incinerators, this analysis assumes reported diversion rates do not include incineration. The disposal quantities for New York are based on state reported “diversion” rates. The disposal quantities for New Jersey are based on state reported “recycling” rates. For Connecticut, diversion rates were calculated based on state reported recycling and composting quantities.

As previously mentioned, data availability varied between states. Estimates were used to generate area-wide totals. When data for a particular state was unavailable, the study team estimated the sum for all states by using observed relationships between the data from the available states. The calculations are as follows:

- **MSW Disposed:** The total amount of MSW Disposed was summed from reported figures.

$$\sum MSW\ Disposed_{CT,NJ,NY,PA} = MSW\ Disposed_{TOTAL}$$

- **MSW Disposed or Diverted:** The disposal rate for MSW was calculated for all states with available data -- Connecticut, New Jersey, and New York. This rate was applied to the total of MSW—Disposed using the following calculation:

$$\left[ 1 / \left( \frac{\sum MSW\ Disposed_{CT,NJ,NY,PA}}{\sum MSW\ Disposed\ and\ Diverted_{CT,NJ,NY}} \right) \right] * MSW\ Disposed_{TOTAL} \\ = MSW\ Disposed\ or\ Diverted_{TOTAL}$$

- **MSW Diverted:** The diverted amount of MSW is found by subtracting MSW Disposed from MSW Disposed and Diverted.

$$MSW\ Disposed\ and\ Diverted_{TOTAL} - MSW\ Disposed_{TOTAL} = MSW\ Diverted_{TOTAL}$$

- **MSW Diversion Rate:** This is the inverse of the disposal rate. It was developed using only the states with sufficient data available -- Connecticut, New Jersey, and New York -- to estimate the areawide rate.

$$\frac{MSW\ Diverted_{TOTAL}}{MSW\ Disposed\ and\ Diverted_{TOTAL}} = MSW\ Diversion\ Rate$$

- **All Waste Disposed:** The amount of all waste disposed was found by calculating the relationship between MSW Disposed and All Waste Disposed for the states where data was available—New Jersey, New York, and Pennsylvania. This is then multiplied by the known total of MSW Disposed to estimate the total of All Waste Disposed.

$$\left[ 1 / \left( \frac{MSW\ Disposed_{NJ,NY,PA}}{All\ Waste\ Disposed_{NJ,NY,PA}} \right) \right] * MSW\ Disposed_{TOTAL} \\ = All\ Waste\ Disposed_{TOTAL}$$

- **All Waste Disposed or Diverted:** The disposal rate for all waste was calculated using states where reported data was available for both -- New Jersey and New York. This proportion was applied to the calculated total of All Waste Disposed to find the total of All Waste Disposed and Diverted.

$$\left[ 1 / \left( \frac{All\ Waste\ Disposed_{NJ,NY}}{All\ Waste\ Disposed\ and\ Diverted_{NJ,NY}} \right) \right] * All\ Waste\ Disposed_{TOTAL} \\ = All\ Waste\ Disposed\ or\ Diverted_{TOTAL}$$

- **All Waste Diverted:** The amount of all waste diverted was calculated by subtracting the amount of waste disposed from the total of all waste disposed and diverted.

$$All\ Waste\ Disposed\ and\ Diverted_{TOTAL} - All\ Waste\ Disposed_{TOTAL} \\ = All\ Waste\ Diverted_{TOTAL}$$

- **All Waste Diversion Rate:** The diversion rate for all waste was found by dividing the amount of waste disposed and diverted by the amount of waste diverted.

$$= \frac{All\ Waste\ Diverted_{TOTAL}}{All\ Waste\ Disposed\ and\ Diverted_{TOTAL}} = All\ Waste\ Diversion\ Rate$$

## Transearch

The Transearch files provided by NY DOT required analysis, which was conducted using R, a data visualization and statistical computing language. Transearch includes a variable “40 – Waste or Scrap Materials” for waste that includes sub-variables for the following categories: ashes; metal or scrap tailings; textile scrap or sweepings; wood scrap or waste; paper waste or

scrap; chemical or petroleum waste; rubber or plastic scrap; stone, clay or glass scrap; leather waste or scrap; miscellaneous waste or scrap. This variable was selected and used to represent waste. Transearch documentation describes limitations regarding waste data, such as the absence of MSW, one of the major focuses of this study. The first node and last node of individual routes, associated with total tonnage, was used to join route segment data with the road network to create a geospatial representation of the waste freight tonnage moved across the area. This includes all waste movement recorded by Transearch within the area, even if the waste did not originate or terminate in the study area.

To create the rankings of most used roads, the data was grouped by road and trip identification, instead of route segment. This was applied to avoid double counting, as many trips included multiple segments along the same road. The total tonnage and trips reported in the interstate and local road ranking tables represents the amount of unique tonnage moved annually on the road, as modelled and reported by Transearch. Only roads longer than one mile were included in this table. Local roads are defined as all roads that are not interstates or United States Numbered Highways.

## Data Limitations

This data comes with a variety of limitations and caveats, which should be considered when digesting this report. The following provides further information about the data by report section.

### *Waste Origins*

This section relies on waste generation as categorized and recorded locally, according to each state's reporting requirements. Analysis of waste origin trends from these sources are limited by data availability and format. The following data years were used for each state

- Connecticut: 2022
- New Jersey: 2020
- New York: 2018
- Pennsylvania: 2022

New Jersey and Pennsylvania report waste origin by county. New York reports this by Planning District.

Connecticut waste data was received and processed by the state to estimate the amount of waste generated in each municipality, which was then grouped by council of government. Connecticut DEEP provided this data to the study team with thorough documentation of its caveats and limitations. The quality of this data is limited by the quality and reporting structure of information submitted to the state by towns and haulers. Total waste was calculated by adding MSW and non-MSW, defined as bulky waste, C&D, landclearing, and special wastes. Facilities and towns categorize non-MSW inconsistently, so C&D generation totals were not available. Recycling rates for non-MSW were also unavailable as it is not possible to track what gets recycled compared to what is disposed by town. Available recycling data excludes select waste types: waste oil recycled by businesses or garages; material backhauled by retail chains to out-of-state distribution centers for recycling or other recyclable material which does not pass through a permitted Connecticut solid waste facility or municipality; food scraps accepted at

farms/anaerobic digesters that accept less than 40 percent of their feedstock from off-site; home or community food scrap, leaf, and yard waste composting; textiles and home goods reused or recycled through charitable organizations

Pennsylvania report waste origin by county. Pennsylvania waste origin data does not include waste shipped out of state or waste collected for recycling.

New Jersey estimates waste by county. While New Jersey reports waste generation and diversion rates for MSW by county and non-MSW, it does not individually report this information for C&D.

New York reports waste by Planning District, which combines counties in Long Island into one reporting unit. Counties in NYC are also combined into one planning unit.

### *Waste Movement*

S&P Transearch is a proprietary database modelling freight movement, including a category for waste or scrap materials. This database is not comprehensive—it excludes many waste types including MSW according to the 2020 Transearch methodology—though offers insight into the major corridors of waste movement. While the database does include a small number of rail movements, these were not available in a format that can be mapped. See the methodology section of this attachment for further details.

### *Landfill*

Landfill capacity should be treated as a snapshot in time, as operators of landfills nearing capacity may, and often do, seek permits to expand the landfill capacity and, in effect, its lifespan. Landfill acceptance rates are based on an average of past years (2019-2023) as data was available. Task 6: Forecasting Site/Facility Life Cycles and Anticipated Replacements/Expansions further examines the long-term landfill capacity of the area.

### *Incinerator*

All Waste-to-Energy incinerators in the area handle MSW alongside various other waste types, such as industrial or animal waste, depending on the facility. In states where waste fraction data was available, New York and Connecticut, MSW is the primary type of waste received by these facilities. Following incineration, burned material becomes ash residue. Data for New York reports this summing to about one-fifth the waste tonnage received by the facility. Ash from these New York facilities is transported to landfills in Long Island and Connecticut. Additionally, a limited amount of metal (about 2 to 4 percent of total received waste) is recovered and transported to transfer or recycling facilities, according to 2021 New York facility annual reports. MIRA Hartford, one of the largest incinerators in Connecticut closed in July 2022 and is not included in the incinerator data in this report.

### *Transfer Stations*

Data availability for transfer stations varies by state. As detailed in the data sources, information about transfer station facilities comes from state data and CSX. The list of transfer stations in Connecticut includes private and public regional transfer stations receiving waste from multiple

places in the state, as well as locally serving municipal transfer stations. Transfer stations in New Jersey include Material Recovery Facilities, which are sometimes co-located with B and C recycling facilities. Transfer stations for New York are from a state list of regulated transfer facilities, supplemented with facility permit data, including information such as quantity of waste fractions handled. The list of transfer stations in Pennsylvania includes transfer stations identified through a state database (2023) and two additional transfer stations identified through a 2020 list of transfer stations published by Northampton County. Data for Connecticut, New Jersey, and New York contained full or partial information about the mode or modes used at the transfer stations. Through interviews, Pennsylvania was determined not to have any intermodal transfer stations.

### *Processing Facilities*

Data availability for processing facilities varies by state.

The list of Connecticut processing facilities pulls from multiple state sources. The compiled list of Connecticut processing facilities in this study includes volume reduction facilities (VRFs), C&D processing facilities, composting facilities, and material recovery facilities. VRFs sometimes also serve as transfer stations and are sometimes identified as more specific processing facility types in other sources. In Connecticut, eight facilities are identified in both the transfer station and processing facility list.

In New Jersey, the compiled processing facility list includes all Class B recycling, Class C recycling, and intermediate processing facilities. Class B recycling includes C&D waste, as well as large plant materials, source separated scrap tires and source separated petroleum contaminated soil. Class C recycling includes compostable materials. IPFs receive “source separated commingled recyclable containers and processes the recyclable materials through mechanical and manual means into their constituent components.” [9]. These facilities are a subset of Class A recycling facilities, and the type of Class A facilities required for inclusion on county solid waste management plans.

The compiled list of New York facilities is pulled from a state GIS source of waste handling facilities. Facilities in this report include C&D handling and processing, composting, recyclables handling and recovery, MSW processing, mulch processing, and scrap metal processing.

Processing facilities in Pennsylvania were identified using a list from the commonwealth of all waste handling facilities. Of this list, only three were identified in the study area as “processing facilities,” including a C&D processor and medical waste management facility. At the time of this report, no composting facilities were active in the Pennsylvania study area, according to a list from the PA DEP.