Overview of "Statewide Bulky Waste Characterization Study"

Study conducted by:

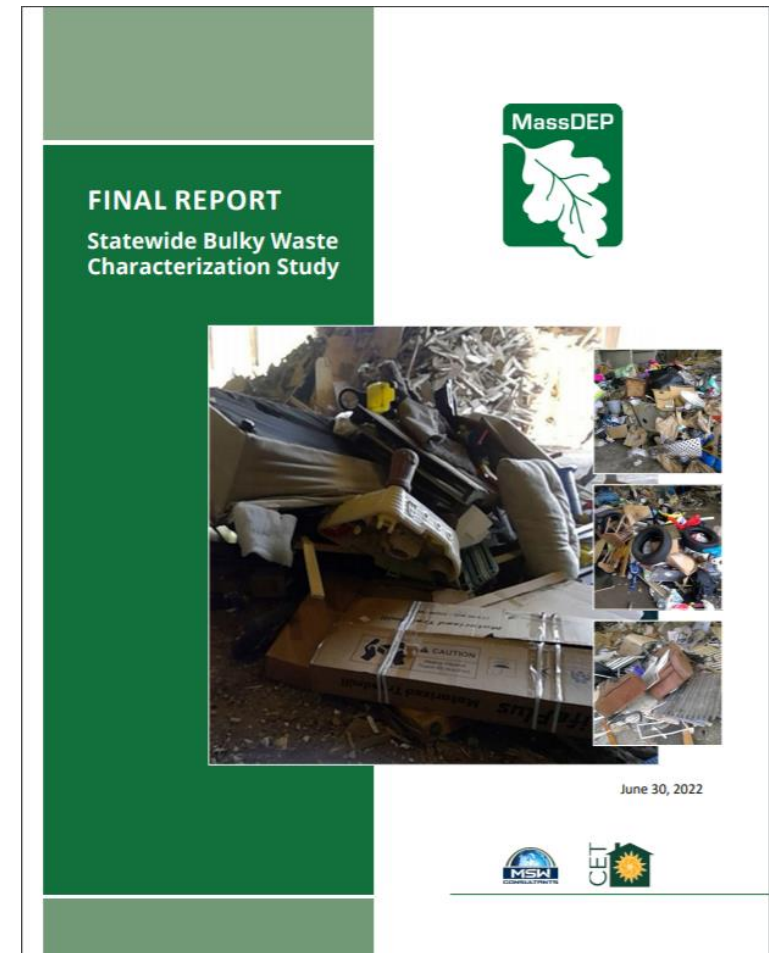- **Center for Ecotechnology**
- **MSW Consultants**

Dated: June 30, 2022

Prepared under Massachusetts State Contract PRF61, Environmental Services Category

Agenda

- Study Scope
- Sampling Strategy
- Visual Survey and Data Analysis Methodology
- Results
- Representative Photos
- Conclusion

Study Scope

- **Define the composition of bulky waste loads by material category and to determine what percentage of these loads consists of either waste ban materials or other recoverable materials.** (pg. 1, Section 1 "Introduction")


Household items such as furniture, file boxes, and bulky plastic items are visible in these bulky waste loads.

Sampling Strategy

- Selected five host facilities with some of the highest tonnages of inbound BW accepted in CY2021
  - Casella of Holyoke
  - Raynham Regional C&D Processing
  - Stoughton Recycling
  - Trojan Recycling, Brockton
  - Western Recycling, Wilbraham
- Established sampling plan target:
  - visually survey 20-25 loads each day at each host facility over 10-day period

Figure 2-1 Bulky Waste Tonnage as a Portion of Total Inbound Waste by Host Facility (2021)

Legend:
- Inbound Bulky Waste
- Inbound C&D, Source-Separated, & Residuals
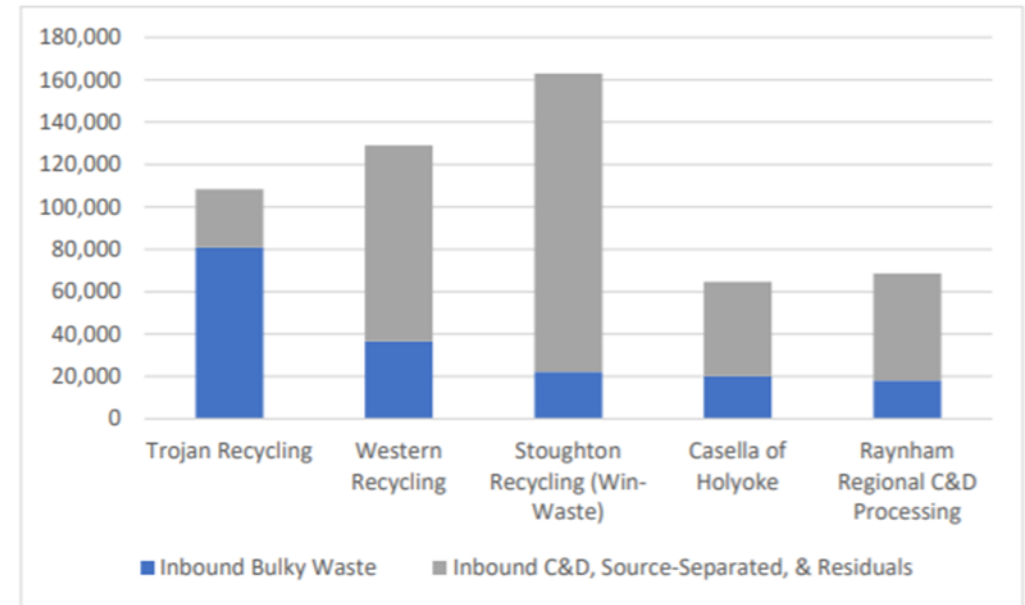
Bulky Waste Load Selection Process

- Complicated by: Not all loads contain exclusively one waste type
- Often definitive ID only possible after load tipped/spread on floor
- Started with random sampling, but then narrowed focus to just BW/Mixed loads for most of study
- Evaluated multiple lines of evidence to select BW loads:
  - Facility designation
  - Truck type (e.g., box, dump, trailer)
  - Hauler (e.g., junk/clean-out company)
  - Source of the load per driver interview
  - Materials contained in load

Table 2-4 Load Survey Distribution by Facility

Facility Name	Bulky Loads	Mixed Loads	C&D Loads	Total Loads Surveyed
Stoughton Recycling (Win-Waste)	15	8	18	41
Trojan Recycling*	29	17	27	73
Casella of Holyoke	30	13	0	43
Western Recycling	29	13	0	42
Raynham Regional C&D Processing	13	7	0	20
Total Samples	**116**	**58**	**45**	**219**

Visual Survey Methodology

- Involved a series of passes, each pass drilling down to further detail of the material composition of the load.

- Used a tablet-based app for visual estimation of C&D loads

- Provided professional data collection staff with:
  - density data,
  - mathematical conversion formulae, and
  - QA/QC support needed to convert volumetric composition estimates to weight-based composition estimates.

- The visual surveying app is a critical tool that provided the calculations in real time to achieve the most accurate estimates

Data Analysis Methodology

- Collected data statistically analyzed to determine the estimated weight and estimated mean percent associated with each of the primary and secondary material categories in the samples

- 90 percent confidence intervals were provided for each material category (i.e., margin-of-error)

Table 4-2 Detailed Bulky Waste Composition

Material Category	Mean Percent	Margin of Error	Est. Annual Tons	Material Category	Mean Percent	Margin of Error	Est. Annual Tons
Paper	**3.1%**	**0.5%**	**9,608**	**C&D Debris**	**10.0%**	**3.0%**	**30,943**
Uncoated OCC	1.4%	0.2%	4,328	Asphalt Pavement		Not Found	0
Other Recyclable Paper	0.8%	0.2%	2,374	Brick/Block	0.1%	0.2%	336
Non-Recoverable Paper	0.9%	0.2%	2,905	Concrete		Not Found	0
Plastic	**3.3%**	**0.4%**	**10,182**	Gypsum wallboard - CLEAN	0.1%	0.1%	205
Recyclable Plastic Containers	0.2%	0.0%	571	Gypsum wallboard - USED	1.1%	0.7%	3,431
Clean Film Plastic	0.0%	0.0%	152	Asphalt Shingles	0.6%	0.6%	1,880
5-gal Buckets and Plastic Toters	0.3%	0.1%	815	Carpet & Carpet Padding	3.6%	1.0%	11,134
Durable Plastics (Not Furniture)	1.2%	0.2%	3,671	Rock/Gravel/Dirt/Sand	1.0%	1.6%	2,961
Non-Recoverable Plastics	1.6%	0.2%	4,973	Porcelain/Plumbing Fixtures	1.5%	1.0%	4,501
Metal	**8.2%**	**1.5%**	**25,144**	Other C&D Materials	2.1%	1.2%	6,495
Recyclable Metal Containers	0.0%	0.0%	140	**Furniture**	**34.1%**	**5.3%**	**105,131**
Large Appliances (white goods)	0.3%	0.2%	876	Predominantly Wood	17.2%	3.3%	53,050
Ferrous/Non Ferrous Scrap	7.8%	1.4%	24,127	Predominantly Plastic	0.7%	0.2%	2,133
Glass	**1.3%**	**0.5%**	**3,908**	Predominantly Metal	3.5%	1.6%	10,732
Recyclable Glass Containers	0.1%	0.1%	214	Predominantly Upholstered	1.3%	0.4%	4,029
Non-Recoverable Glass	1.2%	0.5%	3,694	Predominantly Mixed	9.4%	4.0%	28,877
Organics	**3.6%**	**2.7%**	**10,974**	Mattresses	1.2%	0.3%	3,555
Land Clearing	0.0%	0.0%	75	Box Springs	0.9%	0.3%	2,755
Yard Waste/Green Waste	1.6%	1.4%	4,951	**Other Bulky**	**5.4%**	**1.3%**	**16,731**
Other Organics	1.9%	1.9%	5,948	CRTs	0.3%	0.3%	920
Wood	**18.6%**	**2.4%**	**57,308**	Vehicle Batteries		Not Found	0
Untreated Dimensional Lumber	1.8%	0.3%	5,667	Tires	0.3%	0.2%	803
Engineered Wood	6.3%	1.3%	19,344	Textiles	3.7%	1.1%	11,366
Wood Pallets/Crates/Spools	1.7%	0.7%	5,346	E-Waste	0.4%	0.4%	1,334
Painted/Stained Wood	2.8%	0.7%	8,756	Other Bulky Materials	0.7%	0.3%	2,308
Treated Wood	3.1%	0.6%	9,610	**Mixed MSW**	**12.4%**	**1.9%**	**38,198**
Cabinetry/Countertops/Doors	2.8%	0.7%	8,585	Bagged and Loose MSW	12.4%	1.9%	38,152
				HHW/Universal Waste	0.0%	0.0%	46
				Grand Total	**100%**		**308,127**
				No. of Samples	*116*		

Results: Composition of Bulky Waste

Figure 4-1 Bulky Waste Composition by Recoverability Potential

- Non-Recoverable, 33.1%
- Waste Ban, 37.3%
- Additional Recoverability Potential, 29.6%
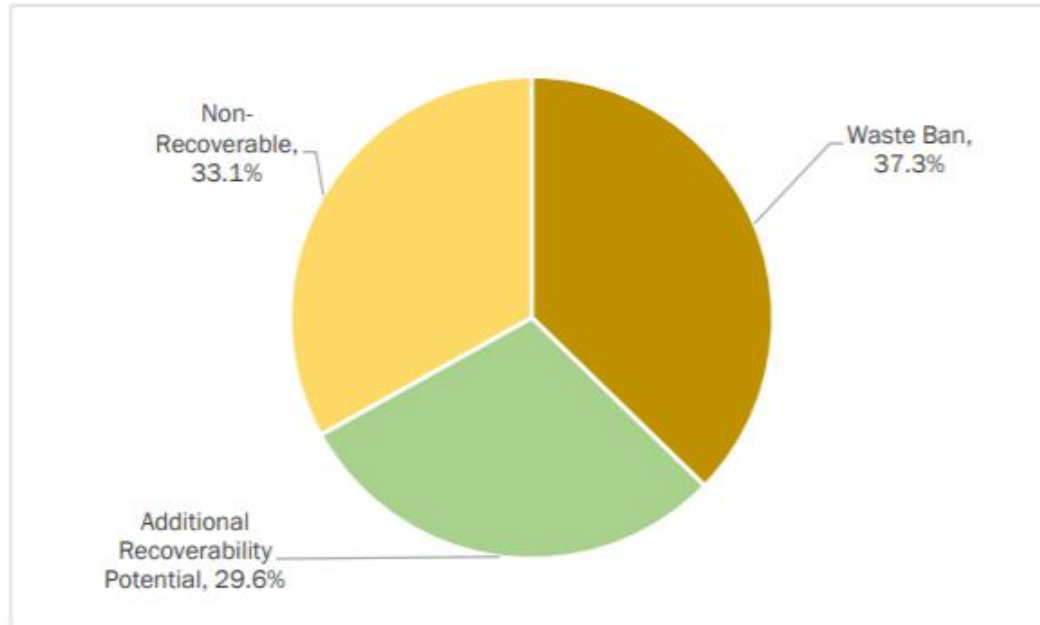
Figure 4-2 Bulky Waste Composition by Material Group

- Other Bulky, 5.4%
- Paper, 3.1%
- Plastic, 3.3%
- Metal, 8.2%
- Glass, 1.3%
- Organics, 3.6%
- Wood, 18.6%
- Mixed MSW, 12.4%
- C&D Debris, 10.0%
- Furniture, 34.1%
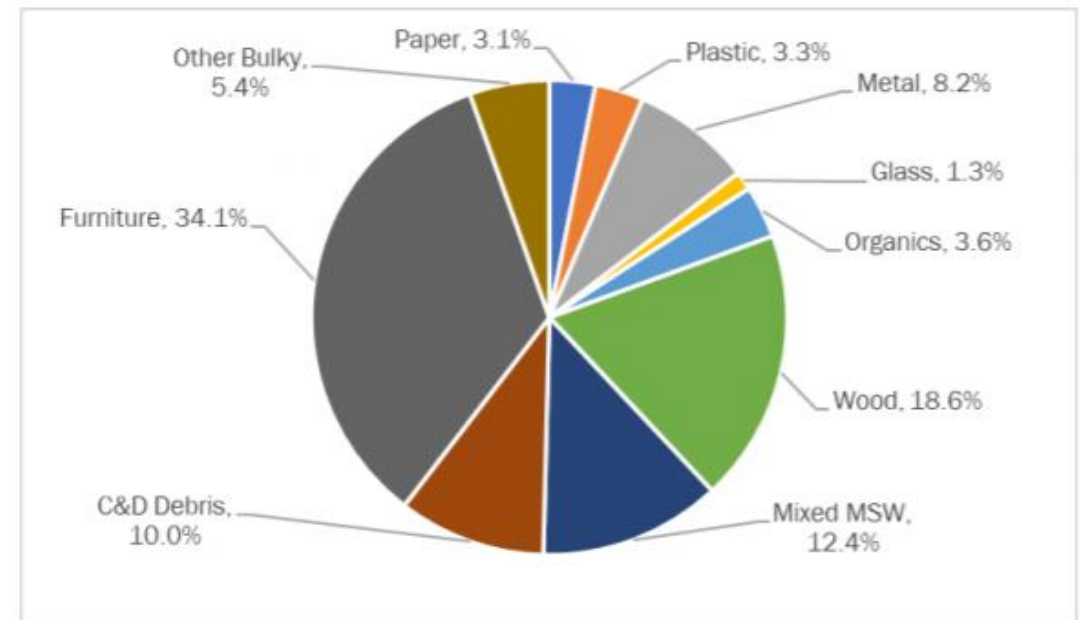
Results: Composition of C&D Waste

Figure 4-3 C&D Waste Composition by Recoverability Potential

Non-Recoverable, 34.0%
Waste Ban, 43.4%
Additional Recoverability Potential, 22.6%
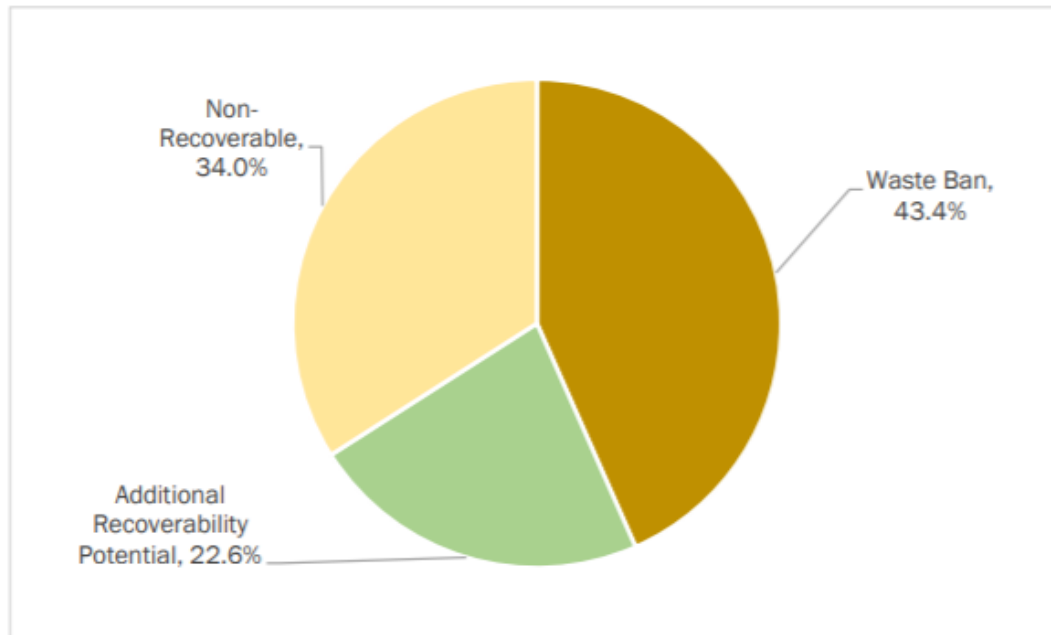
Figure 4-4 C&D Waste by Material Group Composition

Furniture, 0.3%
Paper, 1.4%
Plastic, 1.2%
Metal, 6.1%
Glass, 0.7%
Other Bulky, 0.9%
Organics, 1.0%
C&D Debris, 52.8%
Wood, 31.3%
Mixed MSW, 4.3%
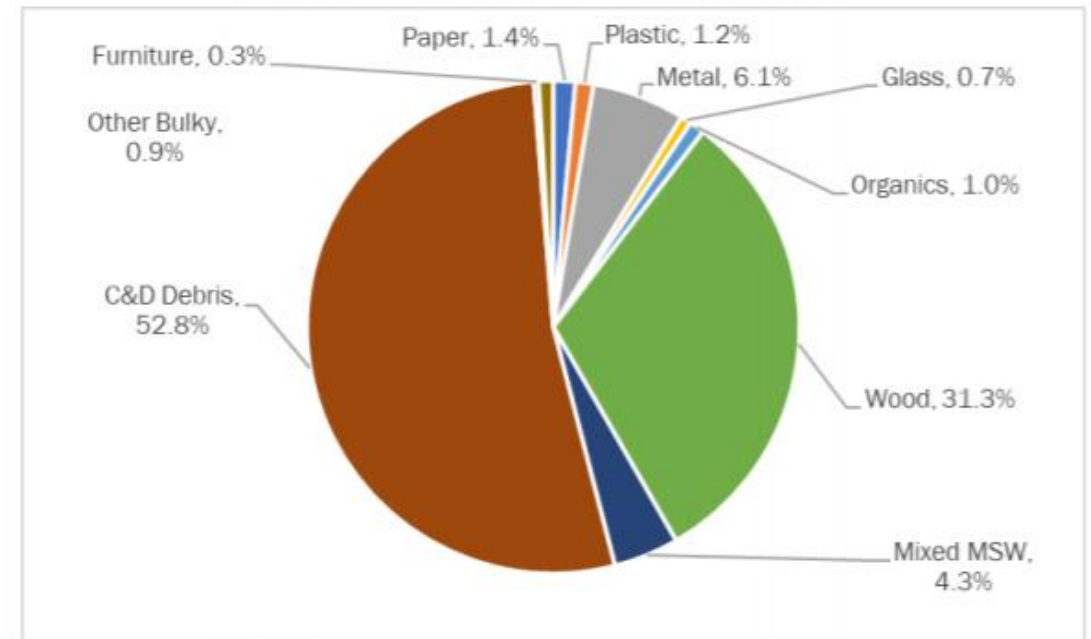
Results: Composition of Mixed Waste Loads

Figure 4-5 Mixed Load Composition by Recoverability Potential

Non-Recoverable, 29.2%
Waste Ban, 41.0%
Additional Recoverability Potential, 29.8%
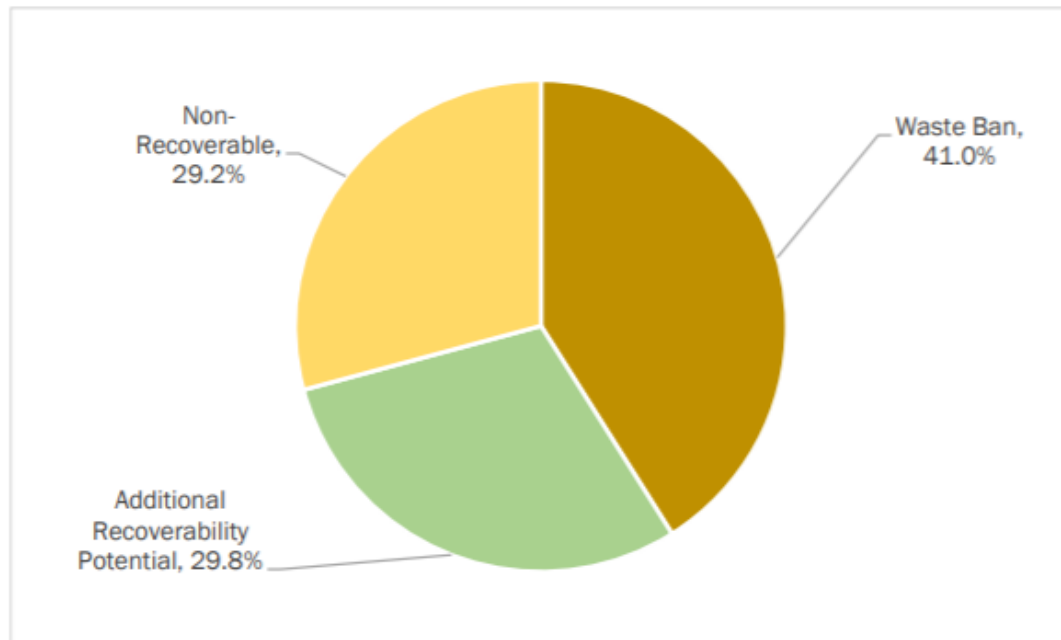
Figure 4-6 Mixed Loads Material Group Composition

Other Bulky, 2.7%
Paper, 1.6%
Plastic, 2.0%
Metal, 6.7%
Glass, 0.4%
Furniture, 11.2%
Organics, 1.8%
C&D Debris, 36.3%
Wood, 28.8%
Mixed MSW, 8.5%
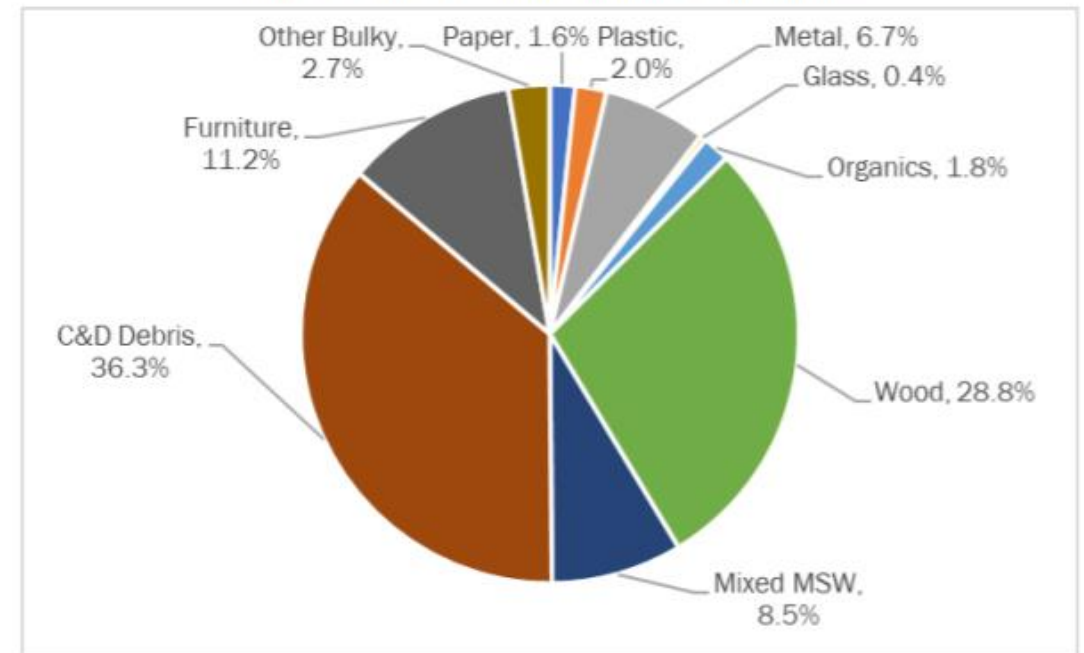
Bulky Waste Photos (1 of 3)

Household items such as furniture, file boxes, and tires are visible in these bulky waste loads.

Bulky Waste Photos (2 of 3)

Household items such as furniture, bed frames, and file boxes are visible in these bulky waste loads.

Bulky Waste Photos (3 of 3)

Household items such as furniture, file boxes, and bulky plastic items are visible in these bulky waste loads.

C&D Waste Photos

Typical C&D materials such as wood scrap, drywall scrap, and engineered wood are visible.

Mixed Waste Load Photos

Mixed loads are comprised of elements from both C&D and Bulky Waste loads. These photos show combinations of scrap wood material (fencing and wood fixtures) as well as bulky waste (furniture).

Conclusion

Figure 4-7 Comparison of Composition by Waste Type