NYU Waste Characterization Study Report
Spring 2008

Study Results

(1) About three-fifths (59.2%) of NYU's landfilled waste is compostable. Collecting and composting organic materials represents a significant opportunity to increase landfill diversion rates, reducing both ecological and budget impacts. Doing so would require NYU to establish and implement new programs to recover these materials.

(2) While significant improvement has been made over the past six months, 28% of NYU's landfilled waste is comprised of recyclable materials. These materials are recoverable through expansion of existing programs, including bin deployment and outreach/education.

(3) The remaining material categories that comprise the class Landfill are difficult to recycle resulting in very low marketability. Reductions in this material class are best achieved through source reduction. Partnering with Purchasing Services may be one method to achieve progress in this area.

Study Background and Purpose

This was the first waste characterization study performed at New York University. This study focused on NYU's Washington Square campus, located in the neighborhood surrounding Washington Square Park, home to the largest number of undergraduate and graduate programs and departments. During the fall 2007 semester, this campus generated an average of 347 tons of solid waste and 142 tons of recycling per month. In an effort to learn more about the University's solid waste stream at the Washington Square campus and to ultimately reduce recyclable and compostable material going to landfills, NYU's Recycling Shop conducted a waste characterization study in spring 2008. The waste characterization study was set up to fulfill the following objectives:

- Examine the composition and quantity of recyclable materials being disposed of;
- Evaluate the effectiveness of existing waste reduction and recycling programs; and,
- Identify opportunities for increased material recovery.

The University has a contract with a private hauling company that collects solid waste and recycling from all NYU-owned buildings. Buildings leased by NYU are serviced by the New York City Department of Sanitation, if it is a housing building, and a separate private hauler for commercial spaces. This study only focused on NYU-owned buildings as NYU has direct control over the solid waste and recycling programs offered at these locations. Solid Waste is delivered by the carter to a transfer station, and then sent to landfills and incineration facilities in New Jersey and Pennsylvania. Recycling is delivered to local recycling centers which sort and transport the material to reprocessing

facilities. Detailed information is provided to the University on separated recyclables; therefore those streams were not included in this study.

Summary of Study Methods

The survey area encompassed approximately 5.3 million square feet of building space. To capture the make up of the solid waste stream the buildings were categorized into five generator groups: Academic, Academic/Administration, General Use, Residence Hall, and Residence Hall/Dining Facility. To ensure adequate representation of each generator group a waste sample from each group was identified and sorted.

At the onset of the study, the University's private hauler provided a complete list of all collection sites and performed a manual bag count over the course of three days in one week. Containers were identified and their size was recorded. An average count from three containers at separate collection locations was used to determine the conversion factor of containers to bag number. The campus has two compactors, servicing residence halls; based on their dump weight and percentage of overall waste stream, the conversion factor of compactor to bag number was determined. Based on the bag count the percentage of solid waste generated by each generator group was determined (see Table 1.1, Generator Groups). This count was also used to collect and sample 25 percent of the solid waste at each site surveyed in this study.

Table 1.1 Generator Groups

Generator Groups	% of Washington Square Campus waste generated
Academic	38.43%
Academic/Administration	14.10%
General Use	16.68%
Residence Hall	10.87%
Residence Hall w/ Dining Facility	19.92%

A total of five sampling loads, one from each generator group, were scheduled over 4 days. All sampling activities occurred during the spring semester and on days that did not fall on a holiday or during a holiday week, spring break or mid-term or final exams to ensure that the sampling results were representative of normal University operations during the school year.

Waste Sampling Procedures

The methodology and procedures for this study were derived from the review of waste characterization studies performed at Universities and Counties, including the Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste (ASTM D 5231-92). All samples were hand sorted into 12 waste categories listed in Table 1.2 Solid Waste Material Classes and Categories. The material class

describes which material categories are compostable, recyclable or neither thus landfilled. Table 1.3 Compositions of Material Categories shows the observed composition of each material category. Collected sample loads were sorted into labeled buckets or bins with known weights. When a container was full, it was weighed and the data was recorded on a field collection form. The container was emptied and reweighed prior to returning to the sorting area for continued use.

Table 1.2 Hierarchy of Solid Waste Material Classes and Categories

Material Class	**Material Category**
Compostable	Organics
Recyclable	Glass
	Metal
	Paper (Mixed)
	Plastic #1 and 2
	Technoscrap
	Universal Waste
Landfill	Plastic #3-7
	Plastic Film*
	Textiles
	Trash
	Unknown Plastic

* Since this study was conducted, plastic bag recycling has been implemented on campus. Since this material category contained other types of plastic film that are not recyclable, it was kept designated as landfill.

Table 1.3 Compositions of Material Categories

Material Category	**Composition**
Organics	Food, Soiled paper products (coffee cups, take out containers)
Glass	Glass bottles
Metal	Aluminum cans, tin foil
Paper (Mixed)	Paper, cardboard
Plastic #1 and 2	All plastic labeled #1 or #2
Technoscrap	Jewel cases, cassettes, disks, CDs, cables and wire/wiring, ink cartridges
Universal Waste	Batteries
Plastic #3-7	All plastic clearly labeled #3-7
Plastic Film	Plastic bags*, packaging film
Textiles	Mop heads, rags, clothing, ribbon
Trash	All items not fitting into any other material category
Unknown Plastic	Plastic items not clearly labeled with a number, plastic servingware

* Since this study was conducted, plastic bag recycling has been implemented on campus. Since this material category contained other types of plastic film that are not recyclable, it was kept designated as landfill.

Following the completion of the waste sorts, all data recorded on the field forms were entered into a spreadsheet and reviewed to determine waste composition estimates for the Washington Square campus. Perfect sorting of materials is impossible due to time constraints, mixed/bonded materials, and human error. Based upon visual estimation of the sorting containers during weighing, accuracy for this study is estimated to be +/- 10%.

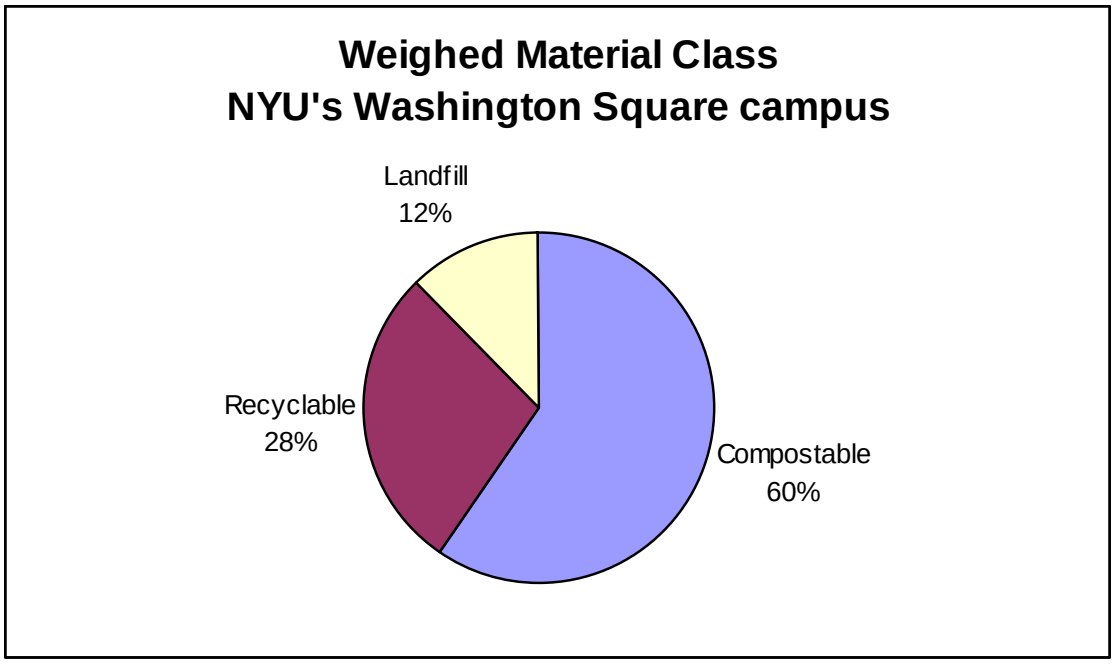
Waste Study Findings

The following results from the waste characterization study depict the composition of material that is disposed of and landfilled from the Washington Square campus.

Table 1.4 Percentage of Material Class for Washington Square campus

Material Class	WSQ Campus
Compostable	59.2%
Recyclable	28.4%
Landfill	12.4%

Figure 1-1 Weighed Material Class at NYU's Washington Square campus



The following results depict the composition of material disposed of and landfilled for each generator group.

Table 1.5 Percentage of Material Class per Generator Group

Material Class	Academic	Academic/Admin	General Use	Residence Hall	Residence Hall/Dining Facility
Compostable	58.7%	63.2%	50.9%	55.9%	65.9%
Recyclable	29.8%	25.8%	35.0%	24.0%	24.4%
Landfill	11.4%	11.0%	14.1%	20.1%	9.7%

Figure 1-2 Percentage of Material Class per Generator Group

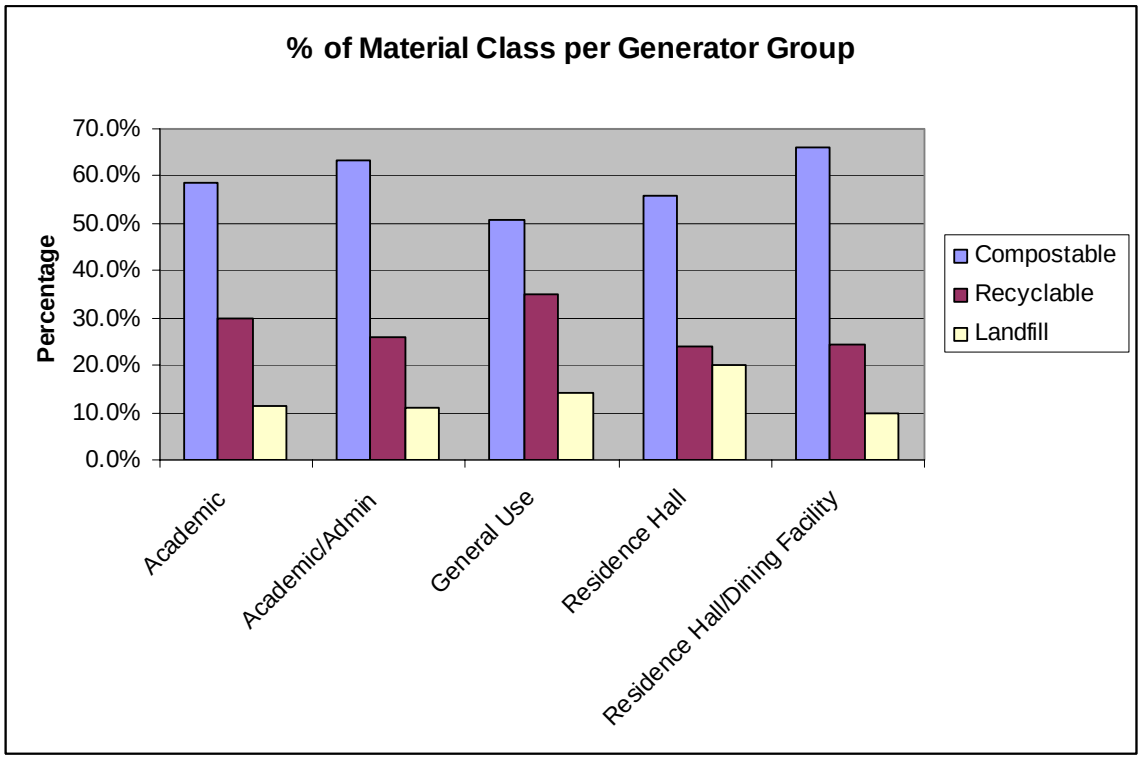


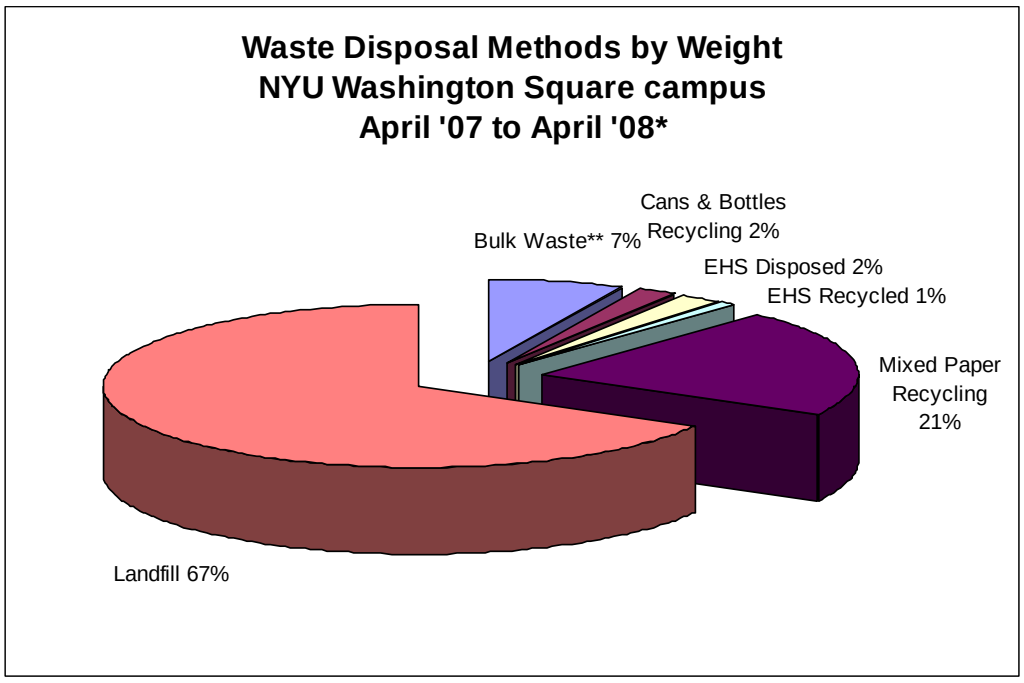
Table 1.6 Percentage Breakdown of Material Category per Generator Group

Material Category	**Weighted Average**	Academic/ Admin	General Use	Academic	Residence Hall/ Dining Facility	Residence Hall
Plastic #1,2	**7.2%**	8.20%	9.10%	7.00%	6.40%	5.00%
Plastic #3-7	**0.5%**	0.20%	0.50%	0.60%	0.60%	0.00%
Plastic Film	**4.5%**	2.10%	5.40%	3.40%	5.10%	9.00%
Unknown Plastic	**6.1%**	6.40%	5.10%	6.50%	3.90%	10.30%
Glass	**6.3%**	3.40%	3.50%	10.60%	4.70%	1.90%
Metal	**1.2%**	0.90%	1.10%	1.30%	0.60%	2.30%
Paper	**12.6%**	12.30%	21.30%	8.70%	12.40%	14.30%
Technoscrap	**1.0%**	0.00%	0.00%	2.20%	0.20%	0.50%
Universal Waste	**0.2%**	1.10%	0.00%	0.00%	0.10%	0.00%
Textiles	**0.8%**	2.10%	0.00%	0.90%	0.20%	0.80%
Organics	**59.2%**	63.20%	50.90%	58.70%	65.90%	55.90%
Trash	**0.5%**	0.00%	3.10%	0.00%	0.00%	0.00%

Results

Figure 1-3 shows the total annual waste stream by disposal category generated at NYU's Washington Square campus. It does not include construction and demolition waste or waste from special order containers.

Figure 1-3 Waste Disposal Methods by Weight

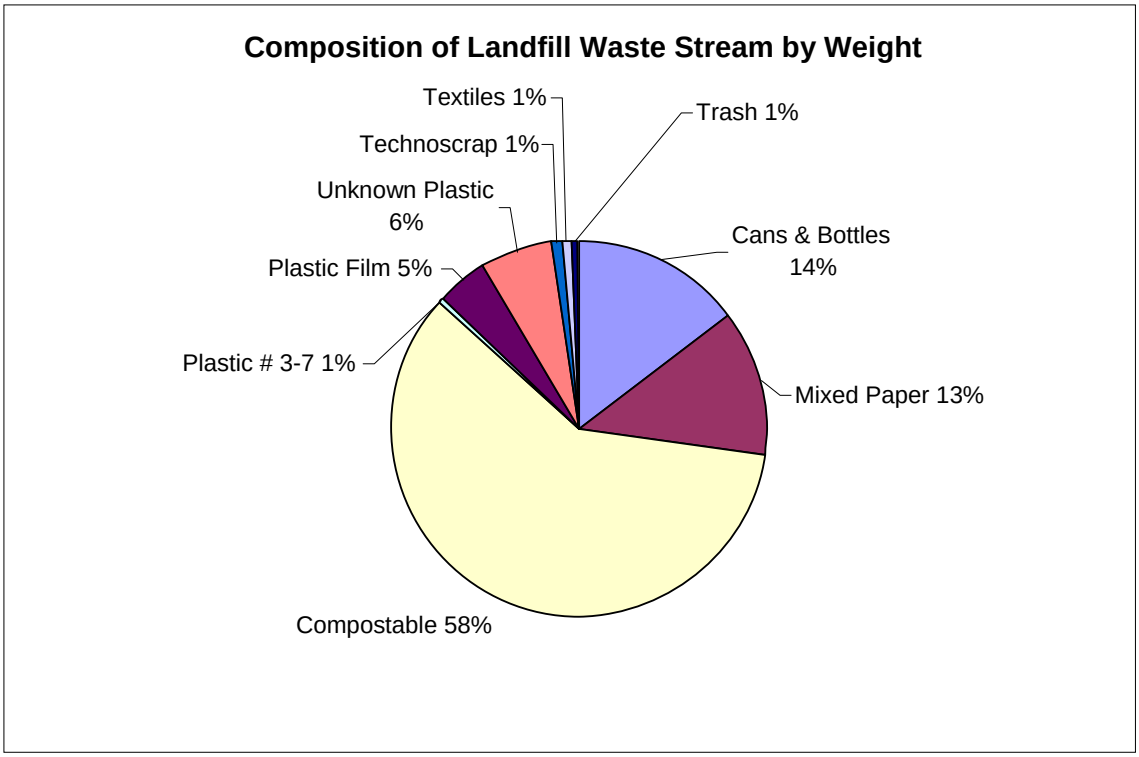


*Annualized based on period May 1, 2007 to March 31, 2008

** Bulk Waste includes large discarded items including, but not limited to, major appliances, furniture, and other oversize materials that can be dismantled into recyclable components.

Existing recycling programs captured and diverted 32% of the waste stream. This study analyzed the composition of material destined for the landfill generated from the campus to determine what and how much recyclable material is part of the that waste stream, Figure 1-4, Composition of Landfill Waste Stream shows the make up based on the study findings.

Figure 1-4 Composition of Landfill Waste Stream



The study results indicate that 28% of the landfilled waste stream can be recovered under existing recycling programs (see Table 1.7, Recyclable Materials Recoverable under Existing Recycling Programs).

Table 1.7 Recyclable Materials Recoverable under Existing Recycling Programs

Material Class	**Percentage**
Metal, Glass, Plastic #1&2	13.9%
Paper (mixed)	14.1%
Technoscrap	0.6%
Universal Waste	0.3%
Total Diversion	28.9%

An additional 59.2% of material can be diverted from the landfill waste stream through a compostable (organic) collection program. This program currently does not exist on campus.

Conclusion

Efforts to divert material from landfills and to reduce the amount of waste generated are being seen locally through sustainability initiatives adopted by the City, businesses and institutions. The fiscal year 2007 diversion rate for Manhattan was 24.2% and 16.5% for Citywide vs. 32% for NYU. This rate includes city residences, public schools and institutions the Department of Sanitation (DSNY) services. Diversion rates for local, comparable Universities were not available.

NYU has the opportunity to reduce its ecological footprint and be an environmental leader in the community by increasing its recycling rates through the expansion of existing programs, implementing new programs for increased material recovery, such as organic material, and identifying source reduction opportunities through out campus.