

Waste Stream Analysis Report

Prepared by the Minnesota Waste Wise Foundation

for

MPCA and MNDNR

following

Waste Sorts on March 29th and April 5th

400 Robert Street North, Suite 1500, Saint Paul, MN 55101

T: 651.292.4650 F: 651.292.4656

WWW.MNWASTEWISE.ORG

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1. Introduction

Minnesota Waste Wise performed waste stream analyses (also referred to as waste sorts) on March 29th and April 5th of 2017 for the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Natural Resources (DNR) respectively. Waste from the shared café was sorted on the same day as the MPCA's material. These waste sorts were conducted to establish baseline data for municipal solid waste (MSW), recycling, and organics recycling leaving the shared complex located on Lafayette Road in St. Paul. This data will be used to offer recommendations for recycling improvements and provide comparison data for the two different waste collection methods and education practices in place at MPCA and DNR. This data will also serve as a comparison to similar recycling initiatives that have recently been implemented across 17 buildings at the Minnesota Capitol Complex.

2. Methods

2.1 Sample

The waste stream sample was comprised of 2-day samples of trash, paper and cardboard recycling, single stream recycling, and organics recycling. The samples for each agency were collected on Monday and Tuesday of their respective waste sort weeks, and transported to the MN Department of Administration building located at 603 North Pine Street in St. Paul. It was determined by MPCA staff that these sample collection time frames were adequately representative of standard generation of waste and recycling for each agency.

2.2 Procedure

The sorts were performed by 3-4 Minnesota Waste Wise staff members and 1-2 MPCA employees. To establish a baseline, a pre-sort weight was recorded for each waste stream before Waste Wise thoroughly sorted through them.

MPCA

The two day pre-sort waste sample for the MPCA consisted of 55 bags of trash that weighed 139.5 pounds, 31 bags of single stream recycling that weighed 54.4 pounds, 93 compostable bags of organics recycling that weighed 365.4 pounds and loose paper and cardboard that weighed 463.3 pounds.

DNR

The two day pre-sort waste sample for the DNR consisted of 63 bags of trash that weighed 88.5 pounds, 31 bags of single stream recycling that weighed 37.9 pounds, 91 compostable bags of organics recycling that weighed 166.7 pounds and loose paper and cardboard that weighed 300.5 pounds. The project team determined that a small volume of material discarded in the trash dumpster was not included in the waste sort. However, the overall assessment remains informative but the numbers reflected here likely underestimate per capita waste generation and there was likely a slightly higher volume of recyclables and compostables in the trash than indicated by the data.

Café

The two day pre-sort waste sample for the shared café consisted of 3 bags of trash that weighed 5.6 pounds, 3 bags of single stream recycling that weighed 14.9 pounds, and 7 compostable bags of organics recycling that weighed 21.2 pounds.

The contents of the trash bags were emptied onto two 4 foot long tables and sorted into 5 gallon buckets and large plastic bags designated for distinct categories. This process enables a detailed characterization and analysis of the waste generated at each locale. Once a bucket or bag for each

category was full, it was weighed using a digital scale and recorded. The sorting categories for the samples are listed below in **Tables 1-3** and the category definitions are outlined in **Appendix A**.

Table 1: Waste Sort Categories

Trash Categories	
Paper Towels/Compostable Paper	Misc. Office Re-Usable
Food Waste	Cardboard/Paperboard
Misc. Trash	Aluminum Cans/Misc. Metal
Mixed Paper	Clean Plastic Film
Compostable Service ware	Cartons
Recyclable Plastics #1,2,4 & 5	Mixed Glass
Non-Compostable Service Ware	

Table 2: Recycling Categories

Recycling Categories	
Paper	Aluminum
Cardboard	Glass
Cartons	Plastics #1,2,4 & 5
Contaminants	

Table 3: Organics Recycling Categories

Organics Recycling Categories	
Compostable Service Ware	Food Waste
Paper Towel/Compostable Paper	Contamination/Non-Compostable

3. Results

3.1 Waste Diversion Data

Waste diversion is a statistic that represents the percentage of total waste (everything that leaves the building as either trash, recycling, or organics recycling) that gets diverted into recycling, commercial composting, or reuse applications. Diversion data is based on weight and does not capture a vital aspect of waste diversion, which is waste prevention. **Tables 4-9** and **Figure 1** will provide diversion data for both MPCA and DNR and also provide aggregate diversion data which will include the material captured in the shared café. Diversion data will be reported in two ways; diversion sent to each facility, and actual diversion (material sent minus contamination).

Table 4: MPCA Total Waste Generation – Material Discarded

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	152.10	14.12%
Paper & Cardboard	463.30	43.02%
Organics Recycling	391.30	36.33%
Cans Bottles Containers Recycling	70.30	6.53%
Totals	1077.00	100.00%
Diversion Rate		85.88%

Table 5: MPCA Waste Generation – Actual Diversion (accounts for contamination)

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	174.40	16.19%
Paper & Cardboard	463.30	43.02%
Organics Recycling	381.60	35.43%
Cans Bottles Containers Recycling	57.70	5.36%
Totals	1077.00	100.00%
Diversion Rate		83.81%

Table 6: DNR Total Waste Generation – Material Discarded

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	94.20	15.53%
Paper & Cardboard	300.50	49.55%
Organics Recycling	169.50	27.95%
Cans Bottles Containers Recycling	42.30	6.97%
Totals	606.50	100.00%
Diversion Rate		84.47%

Table 7: DNR Waste Generation - Actual Diversion (accounts for contamination)

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	107.30	17.69%
Paper & Cardboard	300.50	49.55%
Organics Recycling	164.00	27.04%
Cans Bottles Containers Recycling	34.70	5.72%
Totals	606.50	100.00%
Diversion Rate		82.31%

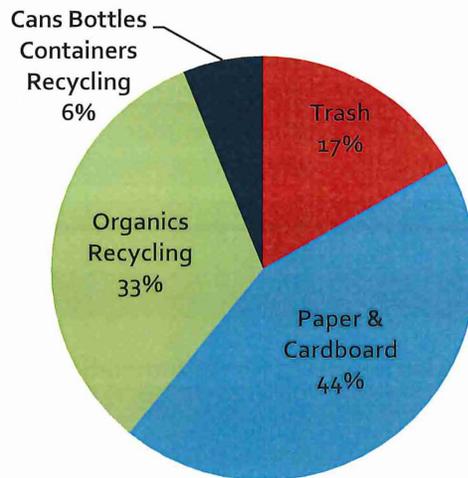
Table 8: Aggregate (includes café) Waste Generation – Material Discarded

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	251.90	14.58%
Paper & Cardboard	763.80	44.20%
Organics Recycling	584.80	33.84%
Cans Bottles Containers Recycling	127.40	7.37%
Totals	1727.90	100.00%
Diversion Rate		85.42%

Table 9: Aggregate (includes café) Waste Generation – Actual Diversion (accounts for contamination)

Diversion Category	Category Weight (lbs.)	Percent of Waste Stream
Trash	289.00	16.73%
Paper & Cardboard	763.80	44.20%
Organics Recycling	568.90	32.92%
Cans Bottles Containers Recycling	106.20	6.15%
Totals	1727.90	100.00%
Diversion Rate		83.27%

Figure 1: Aggregate Waste Generation (Accounts for Contamination)



3.2 Waste Sort Data

Data was collected as a two day sample. This information will also be broken down into daily estimates and projected into weekly, monthly, and annual estimates. The data gathered from sorting and weighing the samples of trash, recycling, and organics recycling are detailed below in **Tables 10-21** and **Figures 2-13**.

Table 10: Trash Composition - MPCA

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper Towels/Compostable Paper	10.00	6.57%
Food Waste	24.50	16.11%
Misc. Trash	77.80	51.15%
Mixed Paper	9.20	6.05%
Compostable Service Ware	8.00	5.26%
Recyclable Plastics #1,2,4 & 5	10.40	6.84%
Non-Compostable Service Ware	0.00	0.00%
Misc. Office Re-Usable	5.40	3.55%
Cardboard/Paperboard	1.60	1.05%
Aluminum Cans/Misc. Metal	1.30	0.85%
Clean Plastic Film	1.60	1.05%
Cartons	2.20	1.45%
Mixed Glass	0.10	0.07%
TOTAL	152.10	100.00%

Table 11: Trash Composition - DNR

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper Towels/Compostable Paper	9.20	9.77%
Food Waste	15.60	16.56%
Misc. Trash	35.40	37.58%
Mixed Paper	11.40	12.10%
Compostable Service Ware	2.60	2.76%
Recyclable Plastics #1,2,4 & 5	4.80	5.10%
Non-Compostable Service Ware	2.00	2.12%
Misc. Office Re-Usable	7.40	7.86%
Cardboard/Paperboard	2.30	2.44%
Aluminum Cans/Misc. Metal	0.80	0.85%
Clean Plastic Film	1.50	1.59%
Cartons	0.70	0.74%
Mixed Glass	0.50	0.53%
TOTAL	94.2	100.00%

Table 12: Trash Composition - Cafe

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper Towels/Compostable Paper	0.60	10.71%
Food Waste	1.50	26.79%
Misc. Trash	2.10	37.50%
Mixed Paper	0.40	7.14%
Compostable Service Ware	0.00	0.00%
Recyclable Plastics #1,2,4 & 5	0.50	8.93%
Non-Compostable Service Ware	0.00	0.00%
Misc. Office Re-Usable	0.00	0.00%
Cardboard/Paperboard	0.20	3.57%
Aluminum Cans/Misc. Metal	0.00	0.00%
Clean Plastic Film	0.00	0.00%
Cartons	0.30	5.36%
Mixed Glass	0.00	0.00%
TOTAL	5.6	100.00%

Table 13: Trash Composition – Total

Waste Category	PCA	Café	DNR	Total	% of Total
Paper Towels/Compostable Paper	10.00	0.60	9.20	19.80	7.86%
Food Waste	24.50	1.50	15.60	41.60	16.51%
Misc. Trash	77.80	2.10	35.40	115.30	45.77%
Mixed Paper	9.20	0.40	11.40	21.00	8.34%
Compostable Service Ware	8.00	0.00	2.60	10.60	4.21%
Recyclable Plastics #1,2,4 & 5	10.40	0.50	4.80	15.70	6.23%
Non-Compostable Service Ware	0.00	0.00	2.00	2.00	0.79%
Misc. Office Re-Usable	5.40	0.00	7.40	12.80	5.08%
Cardboard/Paperboard	1.60	0.20	2.30	4.10	1.63%
Aluminum Cans/Misc. Metal	1.30	0.00	0.80	2.10	0.83%
Clean Plastic Film	1.60	0.00	1.50	3.10	1.23%
Cartons	2.20	0.30	0.70	3.20	1.27%
Mixed Glass	0.10	0.00	0.50	0.60	0.24%
TOTAL	152.10	5.60	94.20	251.90	100.00%

Figure 2: Trash Percentage Composition – MPCA

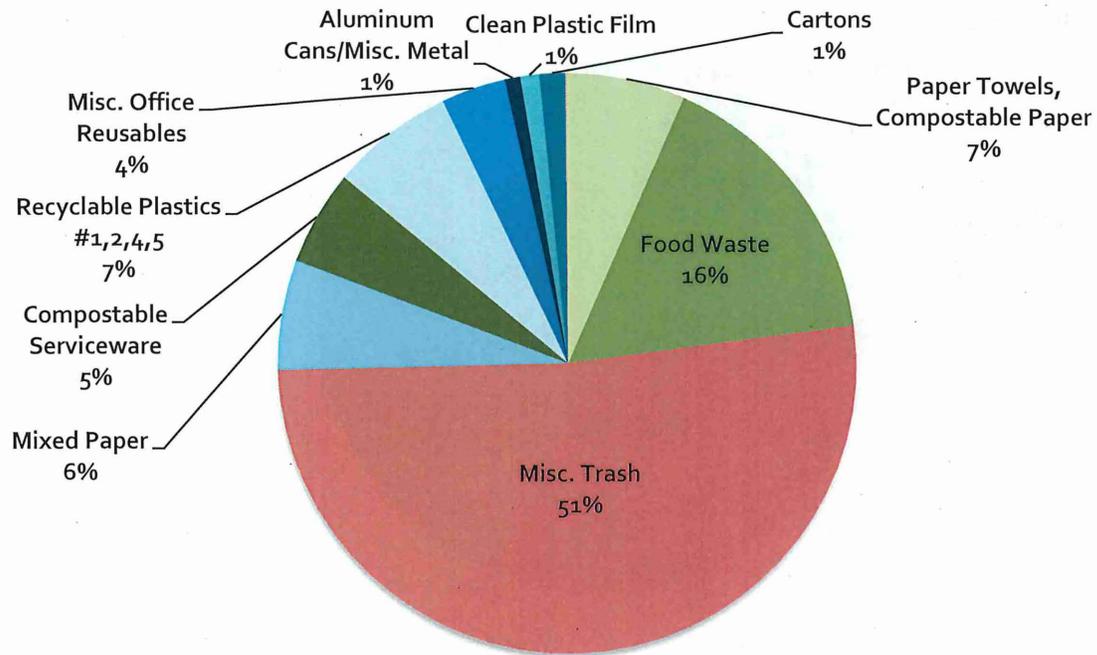
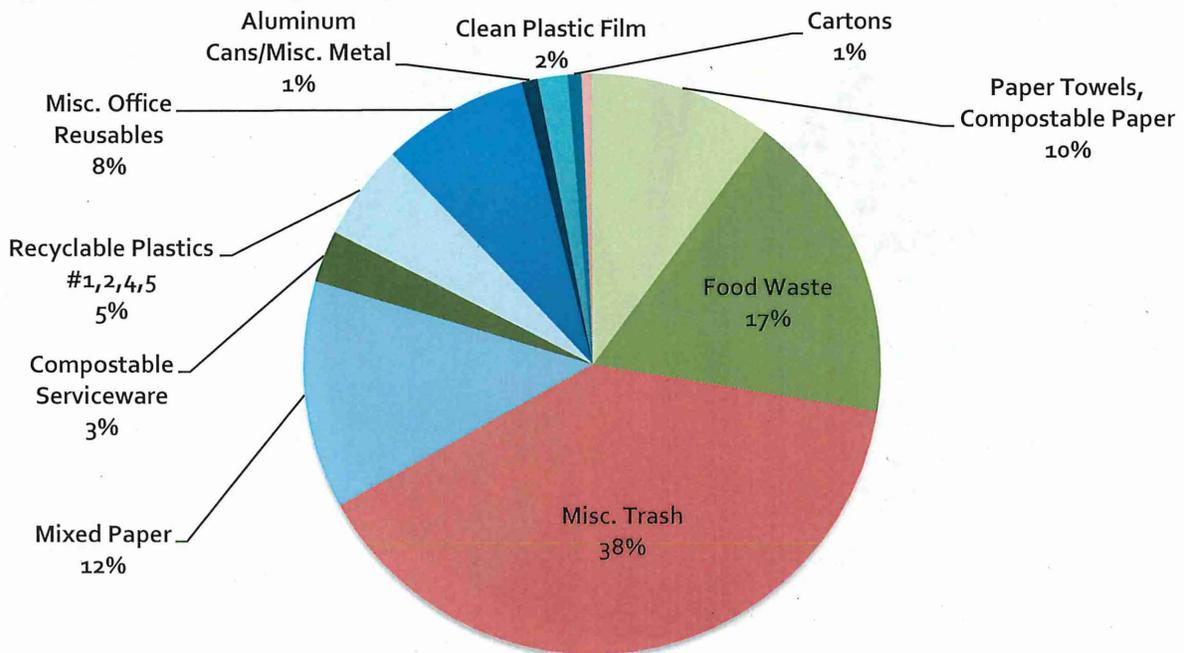


Figure 3: Trash Percentage Composition – DNR



Mixed glass (pink) comprises .53% of the DNR's MSW composition

Figure 4: Trash Percentage Composition – Café

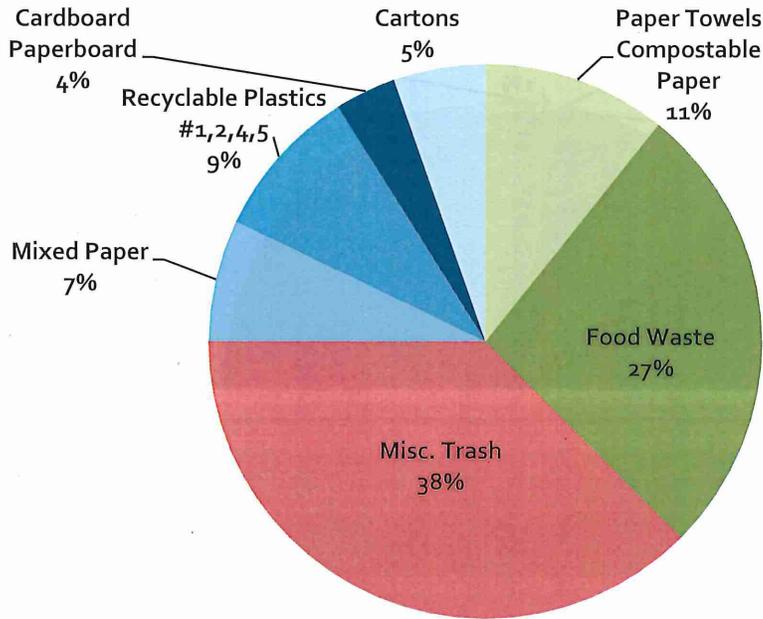
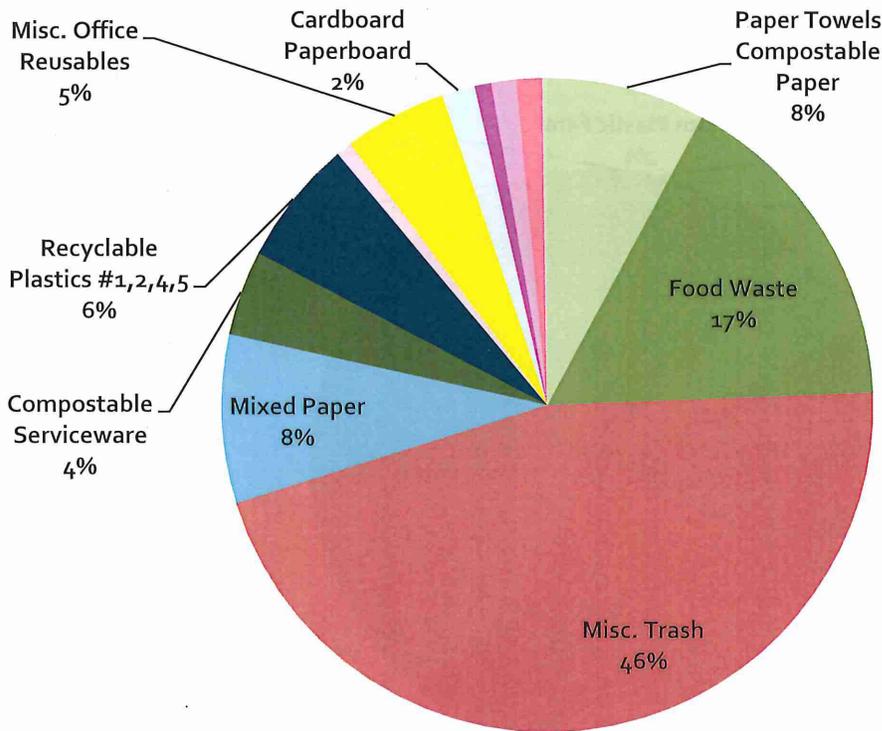


Figure 5: Trash Percentage Composition – Total



Recyclable Plastics, Aluminum, Clean Plastic Film, Cartons and Mixed Glass (shades of pink) all comprise 1% or less of the total MSW Composition.

Table 14: Recycling Composition - MPCA

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper	377.60	70.76%
Cardboard	85.70	16.06%
Cartons	1.50	0.28%
Contaminants	12.60	2.36%
Aluminum	22.70	4.25%
Glass	9.10	1.71%
Plastics #1, 2, 4 & 5	24.40	4.57%
TOTAL	533.60	100.00%

Table 15: Recycling Composition – DNR

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper	274.60	80.11%
Cardboard	25.90	7.56%
Cartons	0.00	0.00%
Contaminants	7.60	2.22%
Aluminum	10.60	3.09%
Glass	8.70	2.54%
Plastics #1, 2, 4 & 5	15.40	4.49%
TOTAL	342.80	100.00%

Table 16: Recycling Composition – Café

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper	0.00	0.00%
Cardboard	0.00	0.00%
Cartons	0.10	0.68%
Contaminants	1.00	6.76%
Aluminum	9.90	66.89%
Glass	0.00	0.00%
Plastics #1, 2, 4 & 5	0.00	0.00%
TOTAL	14.80	100.00%

Table 17: Recycling Composition – Total

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Paper	652.20	72.58%
Cardboard	111.60	12.42%
Cartons	1.60	0.18%
Contaminants	21.20	2.36%
Aluminum	43.20	4.81%
Glass	17.80	1.98%
Plastics #1, 2, 4 & 5	15.40	1.71%
TOTAL	898.60	100.00%

Figure 6: Recycling Percentage Composition – MPCA

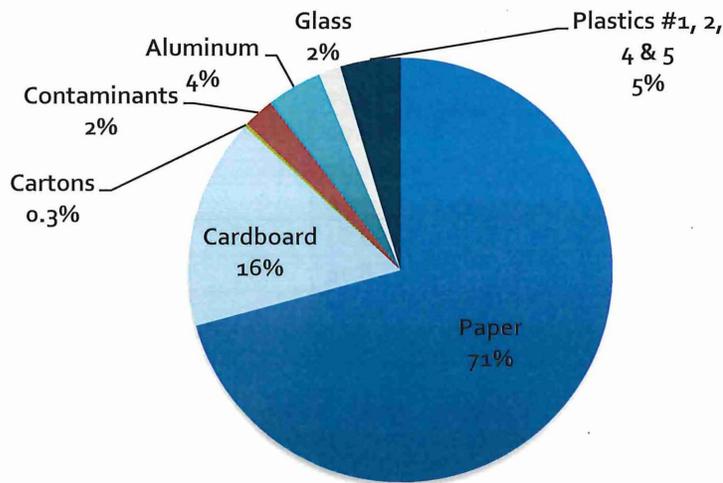


Figure 7: Recycling Percentage Composition – DNR

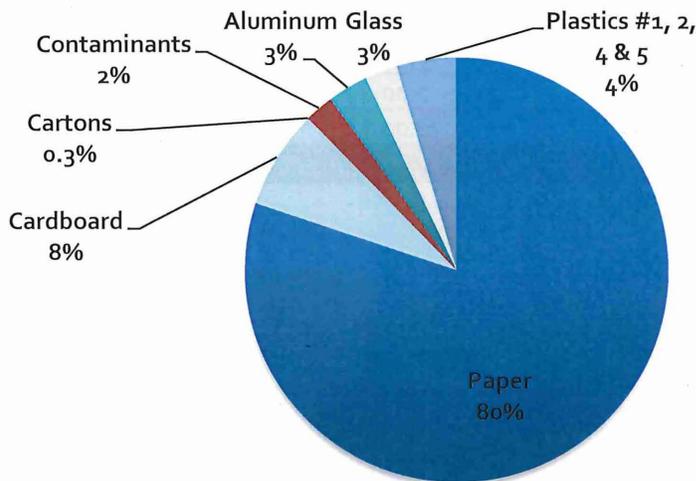
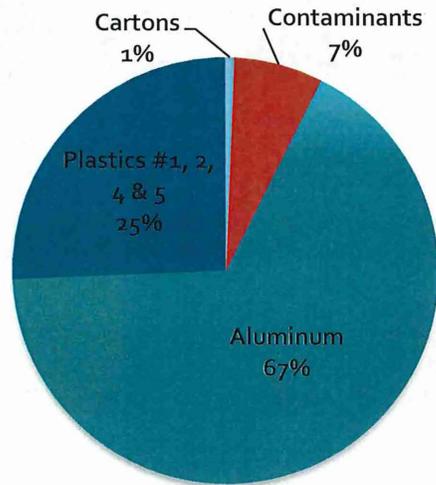
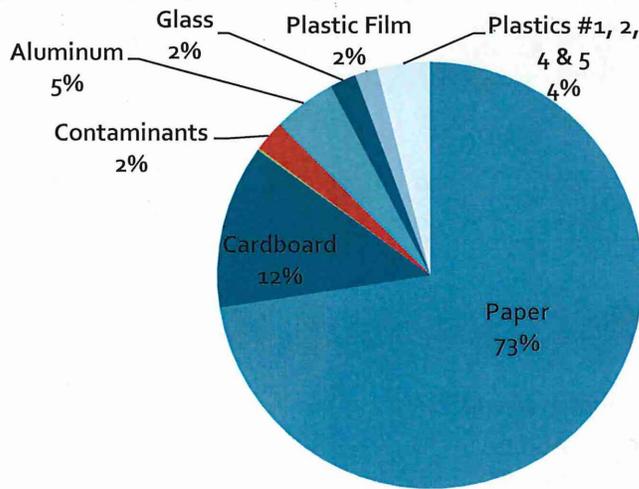


Figure 8: Recycling Percentage Composition – Café



Paper, Cardboard, and Glass comprised 0% of the Café recycling sample

Figure 9: Recycling Percentage Composition – Total



Cartons comprised 0.18% of the total recycling sample

Table 18: Organics Recycling Composition – MPCA

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Service Ware	31.20	7.97%
Paper Towel/Compostable Paper	111.50	28.49%
Food Waste	238.90	61.05%
Contamination/Non-Compostable	9.70	2.48%
TOTAL	391.30	100.00%

Table 19: Organics Recycling Composition – DNR

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Service Ware	14.20	8.38%
Paper Towel/Compostable Paper	81.90	48.32%
Food Waste	67.90	40.06%
Contamination/Non-Compostable	5.50	3.24%
TOTAL	169.50	100.00%

Table 20: Organics Recycling Composition – Café

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Service Ware	9.20	38.33%
Paper Towel/Compostable Paper	3.50	14.58%
Food Waste	10.60	44.17%
Contamination/Non-Compostable	0.70	2.92%
TOTAL	24.00	100.00%

Table 21: Organics Recycling Composition – Total

Waste Category	PCA	Café	DNR	Total	% of Total
Compostable Service Ware	31.20	9.20	14.20	54.60	9.34%
Paper Towel/Compostable Paper	111.50	3.50	81.90	196.90	33.67%
Food Waste	238.90	10.60	67.90	317.40	54.27%
Contamination/Non-Compostable	9.70	0.70	5.50	15.90	2.72%
Total	391.30	24.00	169.50	584.80	100.00%

Figure 10: Organics Recycling Percentage Composition – MPCA

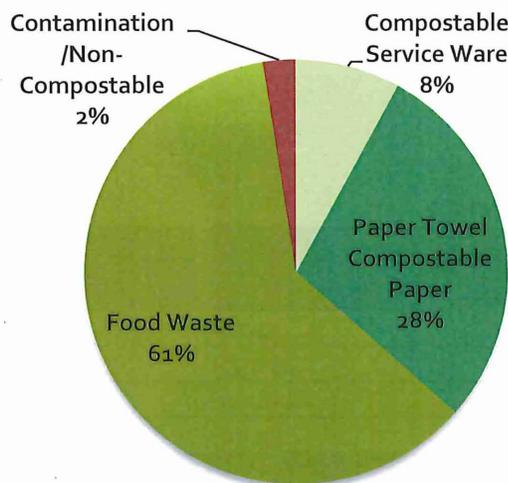


Figure 11: Organics Recycling Percentage Composition – DNR

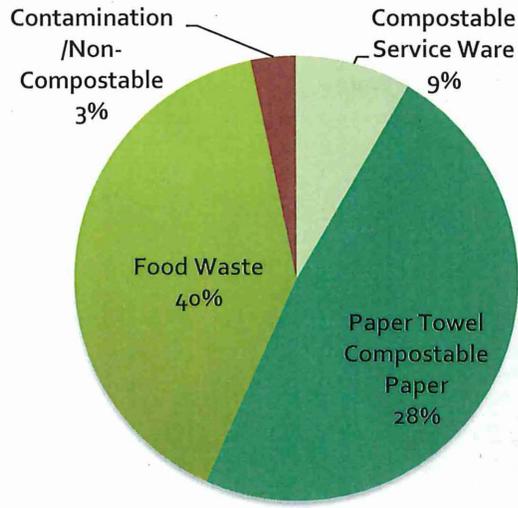


Figure 12: Organics Recycling Percentage Composition – Café

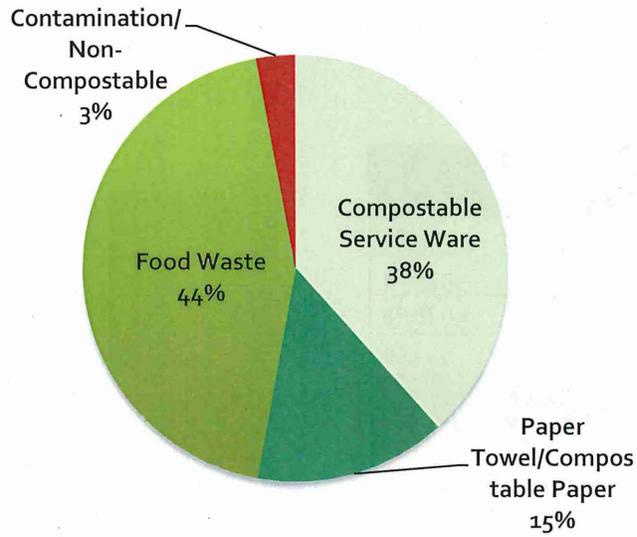
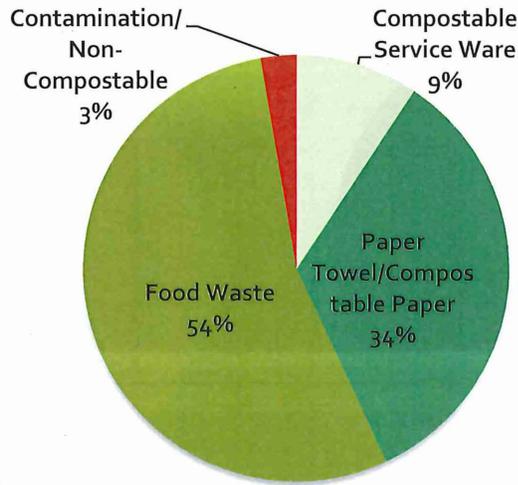


Figure 13: Organics Recycling Percentage Composition – Total



Tables 22-25 and Figures 14-17 show maximum achievable recycling rates for each facility and are aggregated as a whole. This is the maximum amount of material that could have been diverted into recycling streams had capture rates been at 100%.

Table 22: Potential Diversion MPCA

Waste Category	Total	% of Total
Trash*	100.10	9.29%
Organics**	424.10	39.38%
Recycling***	547.40	50.83%
Reusable****	5.40	0.50%
Total	1077.00	100.00%
MPCA Diversion Potential	976.90	90.71%

*Trash is equal to the total weight of trash, minus recyclable, compostable and reusable materials, plus contamination from recycling and organics recycling.

**Organics is equal to the weight of organics recycling, minus contamination, plus organics recycling found in the trash stream.

***Recycling is equal to the weight of recycling, minus contamination, plus recycling found in the trash stream.

****Reusable is equal to the weight of reusable materials found in the trash.

Figure 14: Potential Diversion MPCA

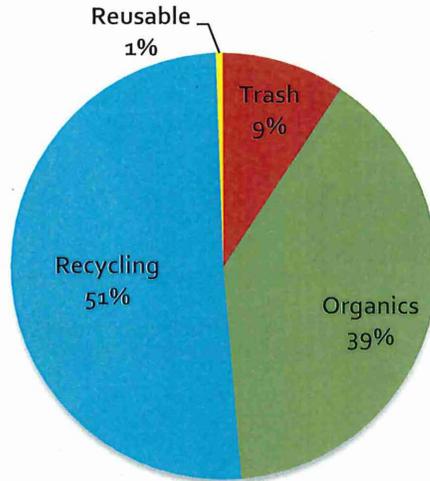


Table 23: Potential Diversion DNR

Waste Category	Total	% of Total
Trash*	50.50	8.33%
Organics**	191.40	31.56%
Recycling***	357.20	58.90%
Reusable****	7.40	1.22%
Total	606.50	100.00%
DNR Diversion Potential	556.00	91.67%

*Trash is equal to the total weight of trash, minus recyclable, compostable and reusable materials, plus contamination from recycling and organics recycling.

**Organics is equal to the weight of organics recycling, minus contamination, plus organics recycling found in the trash stream.

***Recycling is equal to the weight of recycling, minus contamination, plus recycling found in the trash stream.

****Reusable is equal to the weight of reusable materials found in the trash.

Figure 15: Potential Diversion DNR

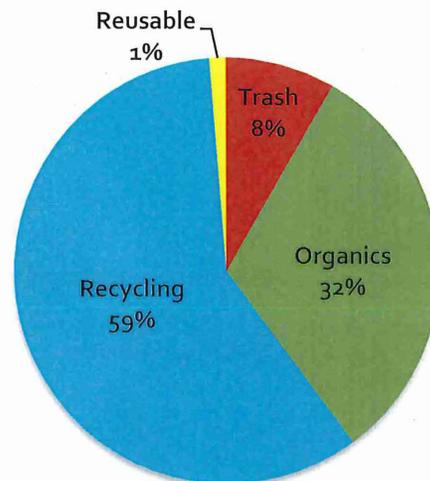


Table 24: Diversion Potential Café

Waste Category	Total	% of Total
Trash*	3.80	8.56%
Organics**	25.40	57.21%
Recycling***	15.20	34.23%
Reusable****	0.00	0.00%
Total	44.40	100.00%
Cafe Diversion Potential	40.60	91.44%

*Trash is equal to the total weight of trash, minus recyclable, compostable and reusable materials, plus contamination from recycling and organics recycling.

**Organics is equal to the weight of organics recycling, minus contamination, plus organics recycling found in the trash stream.

***Recycling is equal to the weight of recycling, minus contamination, plus recycling found in the trash stream.

****Reusable is equal to the weight of reusable materials found in the trash.

Figure 16: Diversion Potential Café

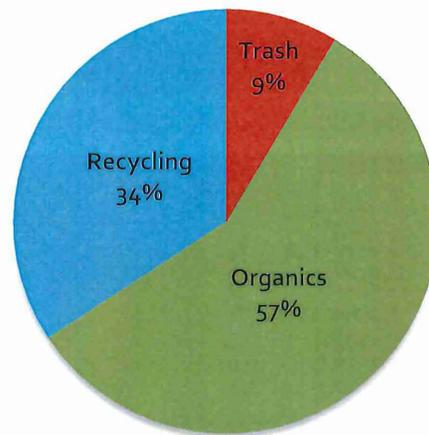


Table 25: Total Potential Diversion

Waste Category	Total	% of Total
Trash*	154.40	8.94%
Organics**	640.90	37.09%
Recycling***	919.80	53.23%
Reusable****	12.80	0.74%
Total	1727.90	100.00%
Cafe Diversion Potential	1573.50	91.06%

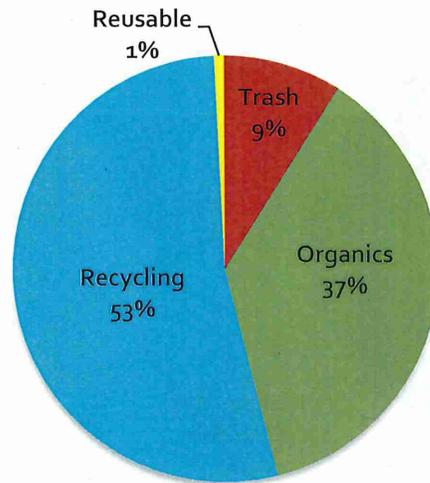
*Trash is equal to the total weight of trash, minus recyclable, compostable and reusable materials, plus contamination from recycling and organics recycling.

**Organics is equal to the weight of organics recycling, minus contamination, plus organics recycling found in the trash stream.

***Recycling is equal to the weight of recycling, minus contamination, plus recycling found in the trash stream.

****Reusable is equal to the weight of reusable materials found in the trash.

Figure 17: Total Potential Diversion



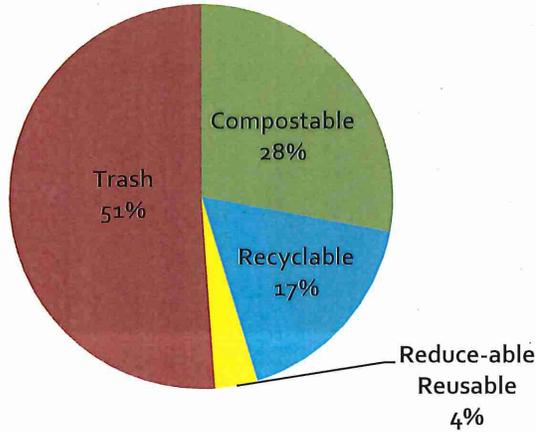
3.3 Waste Stream Composition – Recyclability

An initial step to increasing recycling and reducing waste is identifying materials in the trash that can be diverted from the landfill or waste to energy destinations. Tables 26 - 29 and Figures 18 – 21 highlight the materials Waste Wise sorted out of the trash that are compostable, recyclable, or could be reduced or re-used through changes in systems or behaviors. This analysis informs the facility’s recycling and waste diversion potential.

Table 26: Trash Composition- Recyclability - MPCA

Waste Category	Weight (lbs.)	Percentage of Trash
Compostable Materials	42.50	27.94%
Recyclable Materials	26.40	17.36%
Reduce-able or Reusable Materials	5.40	3.55%
SUBTOTAL (Diversion Potential)	74.30	48.85%
Need Alternative Recycling or Reuse Option/Garbage	77.80	51.15%
TOTAL	152.10	100.00%

Figure 18: Trash Percentage Composition – Recyclability - MPCA

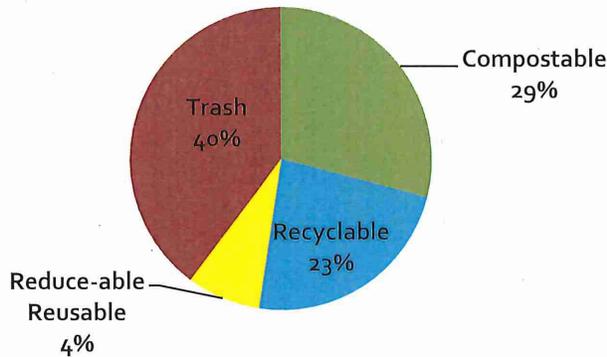


"Compostable Materials" include food waste, compostable paper, and compostable service ware. "Recyclable Materials" include plastics #1, 2, 4 & 5, aluminum, paper, cardboard, glass, and cartons. "Reduce-able or Reusable Materials" include misc. office reusable. "Need Alternative Recycling or Reuse Option or Garbage" include trash and plastic film.

Table 27: Trash Composition – Recyclability – DNR

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Materials	27.40	29.09%
Recyclable Materials	22.00	23.35%
Reduce-able or Reusable Materials	7.40	7.86%
SUBTOTAL (Diversion Potential)	56.80	60.30%
Need Alternative Recycling or Reuse Option/Garbage	37.40	39.70%
TOTAL	94.20	100.00%

Figure 19: Trash Percentage Composition – Recyclability – DNR



"Compostable Materials" include food waste, compostable paper, and compostable service ware. "Recyclable Materials" include plastics #1, 2, 4 & 5, aluminum, paper, cardboard, glass, and cartons. "Reduce-able or Reusable Materials" include misc. office reusable. "Need Alternative Recycling or Reuse Option or Garbage" include trash and plastic film.

Table 28: Trash Composition – Recyclability – Café

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Materials	2.10	37.50%
Recyclable Materials	1.40	25.00%
Reduce-able or Reusable Materials	0.00	0.00%
SUBTOTAL (Diversion Potential)	3.50	62.50%
Need Alternative Recycling or Reuse Option/Garbage	2.10	37.50%
TOTAL	5.60	100.00%

Figure 20: Trash Percentage Composition – Recyclability – Café

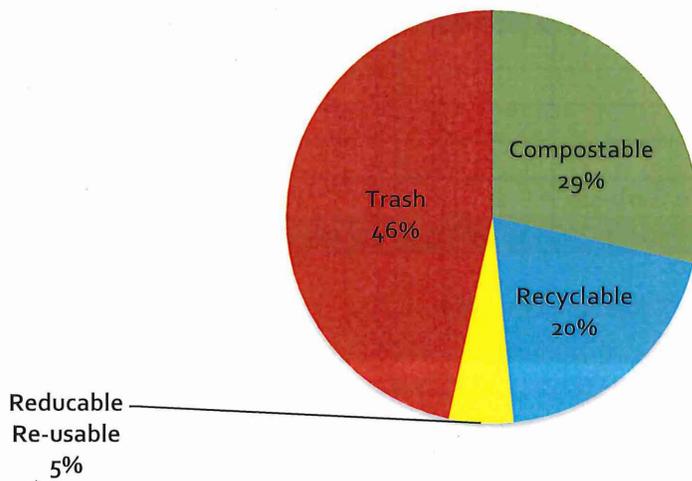


"Compostable Materials" include food waste, compostable paper, and compostable service ware. "Recyclable Materials" include plastics #1, 2, 4 & 5, aluminum, paper, cardboard, glass, and cartons. "Reduce-able or Reusable Materials" include misc. office re-usable. "Need Alternative Recycling or Reuse Option or Garbage" include trash and plastic film.

Table 29: Trash Composition – Recyclability - Total

Waste Category	Weight (lbs.)	Percentage of Waste Stream
Compostable Materials	72.00	28.58%
Recyclable Materials	49.80	19.77%
Reduce-able or Reusable Materials	12.80	5.08%
SUBTOTAL (Diversion Potential)	134.60	53.43%
Need Alternative Recycling or Reuse Option/Garbage	117.30	46.57%
TOTAL	251.90	100.00%

Figure 21: Trash Percentage Composition – Recyclability – Total



"Compostable Materials" include food waste, compostable paper, and compostable service ware. "Recyclable Materials" include plastics #1, 2, 4 & 5, aluminum, paper, cardboard, glass, and cartons. "Reduce-able or Reusable Materials" include misc. office re-usable. "Need Alternative Recycling or Reuse Option or Garbage" include trash and plastic film.

3.4 Estimated Annual Solid Waste and Recycling Data

MPCA representatives have indicated that the waste sample for the audit was indicative of an average two day period of waste and recycling generation. As such, Waste Wise can assume that in dividing the two day sample by a factor of two, we can accurately predict daily waste generation. Additionally, we assume that this data can be used to project weekly, monthly, and annual weights of waste and recycling generated at these facilities. These "Annual Estimation" tables will project weights for the total sample (MPCA + DNR + Café). The following calculations were used in the projections seen in **Tables 30-33:**

- Daily Average = Two day sample / 2 (sample days)
- Weekly estimate = Daily average x 5 (work days)
- Monthly estimate = weekly estimate x 4.33 (average number of weeks per month)
- Annual estimate = weekly estimate x 52 (weeks per year)

The MPCA has collected data on their annual recycling performance for a number of years. The projections below align relatively closely with waste generation rates in recent years. From 2010 through 2015 the MPCA's St Paul office (including cafeteria waste) generated between 173,000 and 223,000 lbs. of waste. The facility averaged 191,954 lbs. of waste annually over that same 6 year period.

Table 30: Annual Estimated Trash Composition

Waste Category	Estimated Daily Average (lbs.)	Estimated Weekly Weight (lbs.)	Estimated Monthly Weight (lbs.)	Estimated Annual Weight (lbs.)
Paper Towels/Compostable Paper	9.9	49.5	214.3	2,572.0
Food Waste	20.8	104.0	450.3	5,403.8
Misc. Trash	57.7	288.3	1,248.1	14,977.5
Mixed Paper	10.5	52.5	227.3	2,727.9
Compostable Service Ware	5.3	26.5	114.8	1,376.9
Recyclable Plastics #1,2,4,5	7.9	39.3	167.0	2,039.4
Non-Compostable Service Ware	1.0	5.0	21.6	259.8
Misc. Office Re-Usable	6.4	32.0	138.6	1,662.7
Cardboard/Paperboard	2.1	10.3	44.4	532.6
Aluminum Cans/Misc. Metal	1.1	5.3	22.7	272.8
Clean Plastic Film	1.6	7.8	33.6	402.7
Cartons	1.6	8.0	34.6	415.7
Mixed Glass	0.3	1.5	6.5	77.9
TOTAL	126.0	629.8	2,726.8	32,721.8

Table 31: Annual Estimated Trash Composition - Recyclability

Waste Category	Estimated Daily Average (lbs.)	Estimated Weekly Weight (lbs.)	Estimated Monthly Weight (lbs.)	Estimated Annual Weight (lbs.)
Compostable Materials	36.0	180.0	779.4	9,352.8
Recyclable Materials	24.9	124.5	539.1	6,469.0
Reduce-able or Reusable Materials	6.4	32.0	138.6	1,662.7
SUBTOTAL (Diversion Potential)	67.3	336.5	1,457.1	17,484.3
Need Alternative Recycling or Reuse Option/Garbage	58.7	293.3	1,269.8	15,237.3
TOTAL	126.0	629.8	2,726.8	32,721.8

Table 32: Annual Estimated Recycling Composition

Waste Category	Estimated Daily Average (lbs.)	Estimated Weekly Weight (lbs.)	Estimated Monthly Weight (lbs.)	Estimated Annual Weight (lbs.)
Paper	326.1	1,630.5	7,060.1	84,720.8
Cardboard	55.8	279.0	1,208.1	14,496.8
Cartons	0.8	4.0	17.3	207.8
Contaminants	10.6	53.0	229.5	2,753.9
Aluminum	21.6	108.0	467.6	5,611.7
Glass	8.9	44.5	192.69	2,312.2
Plastic Film	7.7	38.5	166.7	2,000.5
Plastics #1, 2, 4 & 5	17.8	89.0	385.3	4,624.4
TOTAL	449.3	2246.5	9727.3	116,728.1

Table 33: Annual Estimated Organics Recycling Composition

Waste Category	Estimated Daily Average (lbs.)	Estimated Weekly Weight (lbs.)	Estimated Monthly Weight (lbs.)	Estimated Annual Weight (lbs.)
Compostable Service Ware	27.3	136.5	591.0	7,092.5
Paper Towel/Compostable Paper	98.5	492.3	2,131.4	25,577.3
Food Waste	158.7	793.5	3,435.9	41,230.3
Contamination/Non-Compostable	8.0	39.8	172.1	2,065.4
TOTAL	292.4	1462.0	6330.5	75,965.5

4. Discussion

4.1 Waste Sort Results Analysis

A primary goal of this waste sort is to analyze how different approaches to recycling education and recycling collection impact actual diversion. Therefore, this discussion section will compare and contrast the MPCA and DNR's varying practices and waste sort results.

The MPCA has encouraged increased participation in recycling by implementing a "kick the can" approach, whereby employees are no longer provided a desk-side trash can and no longer receive desk-side collection of any waste streams. Employees are therefore responsible for transporting all of their waste to established recycling stations throughout the office. As a slight contrast, the DNR offered an incentive (a cookie) for employees to opt in, and turn in their trash can. The DNR did not receive very high opt in rates for this, and many employees still utilize their desk side trash receptacles, though these employees also do not receive desk-side collection of any waste streams.

These slight differences in collection practices correspond with slight differences in waste diversion achieved. **The MPCA diverted 83.81%** of their total waste generation whereas **DNR diverted 82.31%** of their total waste generation. This very slight difference in total waste diversion corresponds with the very slight difference in capture rates. The MPCA captured **95.2%** of their recyclable material and

90.0% of their compostable material. The DNR captured 93.8% of their recyclable material and 85.7% of their compostable material. These capture rates are outlined in Table 34.

Table 34: Capture Rates of Recycling and Organics Recycling by Agency

Agency	Total Recyclable Material Generated (lbs.)	Total Recyclable Material Captured (lbs.)	Recycling Capture Rate
MPCA (Recycling)	547.4	521.0	95.2%
DNR (Recycling)	357.2	335.2	93.8%
MPCA (Organics)	424.1	381.6	90.0%
DNR (Organics)	191.4	164.0	85.7%

Each agency had high capture rates, meaning that the vast majority of recyclable material actually made it into its proper recycling outlet. Along the same lines, contamination in each agency's recycling streams was extremely low as outlined in Table 35.

Table 35: Contamination Percentage in Recycling and Organics Recycling by Agency

Agency	Contamination
MPCA (Recycling)	2.36%
DNR (Recycling)	2.22%
MPCA (Organics)	2.48%
DNR (Organics)	3.24%

In addition to capture rates, per capita waste and recycling figures help us to identify any differences in overall waste generation by taking into account the number of employees that each agency has within its building. Tables 36 and 37 will display per person generation of recycling, organics recycling, and trash. These tables will use 759 people for MPCA and 800 people for DNR as population figures.

Table 36: MPCA per Capita Waste Generation (759 people)

Waste Stream	Daily per Capita (lbs./person)	Annual per Capita (lbs./person)
Recycling – Cans/Bottles Containers	0.05	12.03
Recycling – Paper	0.31	79.29
Organics Recycling	0.26	66.97
Trash	0.10	26.03

Table 37: DNR per Capita Waste Generation (800 people)

Waste Stream	Daily per Capita (lbs./person)	Annual per Capita (lbs./person)
Recycling – Cans/Bottles Containers	0.03	6.87
Recycling – Paper	0.19	48.79
Organics Recycling	0.11	27.52
Trash	0.06	15.30

Based on this per capita information, the average DNR employee generates significantly less of all waste streams in a given day or year. These differences may be due to differences in purchasing or

waste generation practices; agency differences in time spent at the office, or could have resulted due to an anomaly in the amount of waste collected during the sample period. If these results are in fact due to employee differences in waste practices, it would be important to stress waste avoidance and reduction as a goal for the MPCA.

In order to understand opportunities for future education and improvement upon current capture rates and overall waste diversion, the following will outline in greater detail noteworthy categories found within the MSW stream:

Trash was the largest component within in the MSW stream at 45.77%. This material includes pre-packaged food wrapping, non-compostable service ware, and other various non-recyclable materials such as used pens, broken cups, and old shoes. Ideally trash would comprise 100% of the MSW stream, meaning that all potentially recyclable, compostable, and re-usable materials have been diverted into their appropriate recycling or reuse streams.

Food Waste was the second most prevalent component of MSW stream at 16.51% of the total, and consisted of food scraps that could be included in the organics recycling program. Most of this material was found within make-shift desk-side collection that was then not separated at recycling stations.

Mixed Paper comprised 8.34% of the MSW stream and was primarily found as food packaging boxes, junk mail, post-it notes, and small scraps of paper. This material could have been included in the paper recycling.

Mixed Plastics #1, 2, 4 & 5 represented a large volume of the MSW stream even though it only managed to comprise 6.23% of the weight. While most plastic bottles found their way into the recycling stream, many recyclable yogurt containers, cups, and other recyclable plastic food containers were found among the trash.

Miscellaneous Office Re-Usable material comprised 5.08% of the MSW stream and was largely found to be books, durable food service ware, clothing, and office supplies that were still in working order and could have been donated.

5. Recommendations

Data gathered during the waste sort shows that changes in employee education along with a few procedural changes to how waste and recycling is collected could serve to increase recycling and reduce overall waste generation

5.1 Ongoing Staff Training Regarding Recycling, Organics, and Re-Use

Both agencies demonstrated strong participation in their respective recycling programs with high capture rates (85-95%) and low levels of contamination in recycling streams (2.22-3.24%). However, it is important to continue to educate employees regarding the importance of recycling and encourage them to refrain from keeping their own makeshift collections at their desk.

Consistent ongoing education keeps the issue of recycling at the front of peoples' minds and also gets the attention of new employees coming to these agencies. Providing information in the café during the lunch hour, ensuring that recycling training is part of new employee training, and including recycling

briefs at agency and department meetings would all be helpful strategies to maintain and improve these capture rates and low contamination percentages.

Contamination in the organics stream was especially noticeable in the “back of house” collection of the food service provider. Ensure that ongoing staff training is occurring behind the scenes in the café as well in order to continue to provide clean recycling streams to recovery facilities.

In addition to education, ensuring that employees aren’t collecting waste in bulk at their work station, and then transferring all of that into the trash would serve to increase capture rates. Waste Wise noted that the bulk of recyclable and compostable material found in the trash stream was within plastic shopping bags or fast food bags that appeared to have been used to collect waste at work stations. These makeshift trash receptacles were then simply placed in the trash rather than sorted out based on individual material types. If employees are discouraged from participating in this practice, it is more likely that waste and recycling will be handled when it is generated, and more likely to find its way into an appropriate recycling stream if applicable.

5.2 Reduction and Re-Use of Materials

While waste diversion is comparatively high (82-85% depending on agency and measurement metric) and already meets the state goals for 2030, it is important to remember that waste diversion is a figure that is often boosted by a negative habit of overuse, especially with regards to paper. Paper recycling alone accounted for over a third (37.7%) of the total waste and recycling generated by these agencies. With this high use of paper in mind, it is important to remind employees to only print what is necessary, print on both sides of paper, to re-use scrap paper, and be mindful of their overall paper consumption.

Along the same lines, Waste Wise observed overuse of toilet paper by custodial staff. At both agencies, nearly full and partially full rolls of toilet paper were being disposed of in the organics recycling. While this serves to increase the recycling rate, it represents gross overuse of a resource with useful life remaining. Custodial staff should be trained to let toilet paper rolls fully expire. These are coreless rolls so a fully used roll should produce zero waste. While implementing this practice may require additional bathroom monitoring to ensure that toilet paper doesn’t run out, it would likely be worth the effort as over 30 full and partially full rolls were found in each agency’s 2 day waste sort sample.

Other office materials with usable life were found in the trash. Encourage employees to consider donating materials to a thrift store, or create a donation bin or area within each agency. This would allow people to reduce waste by deferring reusable goods to a re-use or thrift store outlet rather than placing them in the trash.

5.3 Purchase Compostable Materials for Internal Meetings and Events

Waste Wise observed a number of non-compostable and non-recyclable food service ware materials that were obviously generated within the building, likely for the use of a small meeting or event. The MPCA and DNR should provide office administrators with the state contract information for compostable service ware and require that only compostable or recyclable products are purchased for internal events. In doing so, this would eliminate a large portion of the contamination found within the organics recycling and increase the overall diversion rate by reducing the amount of non-recyclable material that currently must go in the trash.

6. Conclusion

In this Waste Stream Analysis Report, the Minnesota Waste Wise Foundation has provided the MPCA and DNR with data obtained during the waste sort at their facility. Waste Wise has also provided recommendations of possible methods for improving waste prevention and recycling programs, current environmental sustainability initiatives, improving upon existing recycling programs, and reducing negative environmental impacts. These state agencies remain responsible for being in compliance with all city, county, and state regulations, and any omission in this report does not relieve these agencies of their responsibility to comply with said regulations.

Minnesota Waste Wise

Jill Curran
Executive Director
(651) 292-4653
jcurran@mnchamber.com

Jon Klapperich
Senior Sustainability Specialist
(651) 292-4662
jklapperich@mnchamber.com

Greta Rittenhouse
Senior Sustainability Specialist
(651) 292-3915
grittenhouse@mnchamber.com

Allison Sawyer
Sustainability Specialist
(651) 292-4675
asawyer@mnchamber.com

Meredith Moore
Sustainability Specialist
(651) 292-3901
mmoore@mnchamber.com

Michelle Palm
Sustainability Specialist
(651) 292-3907
mpalm@mnchamber.com

Kendrick Paulsen
Sustainability Specialist
(651) 292-4667
kpaulsen@mnchamber.com

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The Minnesota Waste Wise Foundation is a 501(c) (3) nonprofit affiliate of the Minnesota Chamber of Commerce that provides environmental sustainability consulting for Minnesota businesses and organizations.

ENERGY
SMART

The Minnesota Energy Smart program assists Minnesota businesses in saving energy through direct and personalized assistance that helps businesses take full advantage of existing Minnesota energy utility Conservation Improvement Programs (CIP), as well as other products, resources and services that achieve energy efficiency and cost savings. Energy Smart provides business the information they need to make informed choice about their facilities' energy use and efficiency upgrade options, highlighting potential cost savings or available financial incentives.

APPENDIX A: DEFINITIONS

Aluminum Cans/Misc. Metal – Includes aluminum and tin cans from soft drinks, clean aluminum foil, canned foods and other metals accepted at materials recovery facilities.

Cardboard/Paperboard – Standard corrugated cardboard and non-corrugated paperboard from shipments and other packaging.

Cartons – Includes aseptic and gable-top containers used to hold food and beverage items.

Compostable Materials – Include all compostable paper, food waste, and potentially compostable service ware which, if switched to a compostable option, could all be included in an organics recycling program.

Compostable Paper – Includes one-time-use paper towel and paper napkins from restrooms, office areas, break rooms, and the cafeteria, along with any low grade or soiled paper products which could be included in an organics recycling program.

Potentially Compostable Service Ware – Includes all disposable food service ware that was obviously generated from within these state agencies that could be switched to a compostable option. This includes internally generated disposable coffee cups and materials (primarily Styrofoam) that were obviously used for an internal party or event.

Food Waste – Includes all food scraps that would generally be accepted as part of the organics recycling program. This category does not include non-food, compostable materials.

Glass – Includes recyclable glass containers in all colors.

Office Paper – Includes a variety of paper items, such as office paper, junk-mail, magazines, and newsprint that are recyclable through the existing paper recycling program.

Plastic Film – Includes shopping bags, stretch wrap and other stretchy plastic film materials that could be collected separately from the single stream recycling and included in specialized recycling programs like "It's in the Bag."

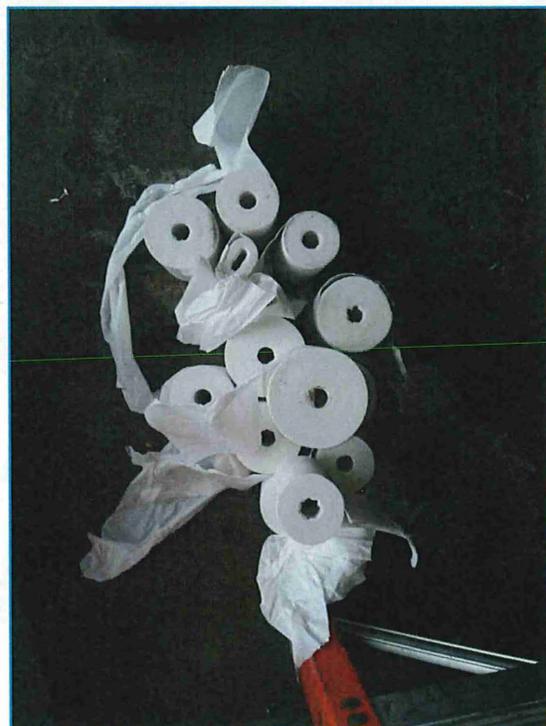
Recyclable Materials – Include recyclable plastics, aluminum, office paper, cardboard/paperboard, glass, and cartons which can be recycled through the existing single stream recycling program.

Reduce-able/Re-Usable – Includes all materials that maintain usable life that were included in waste or recycling streams. While primarily office supplies, this category also includes durable food service ware, clothing, and electronics.

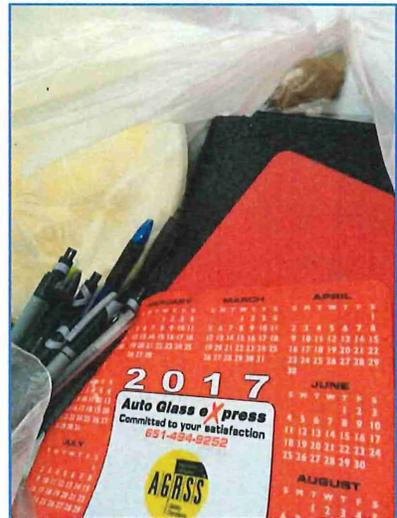
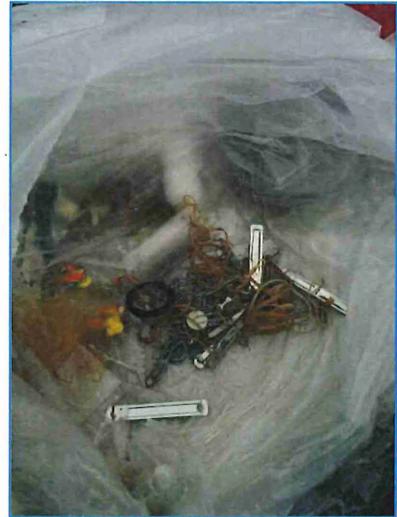
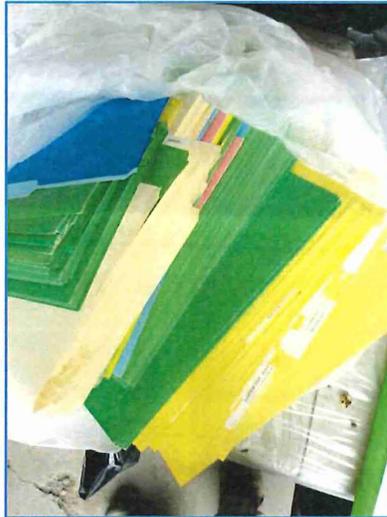
Trash – Includes materials discarded without a recycling intention. Materials in the trash stream are destined for landfill or waste to energy outlets.

APPENDIX B: PHOTOS

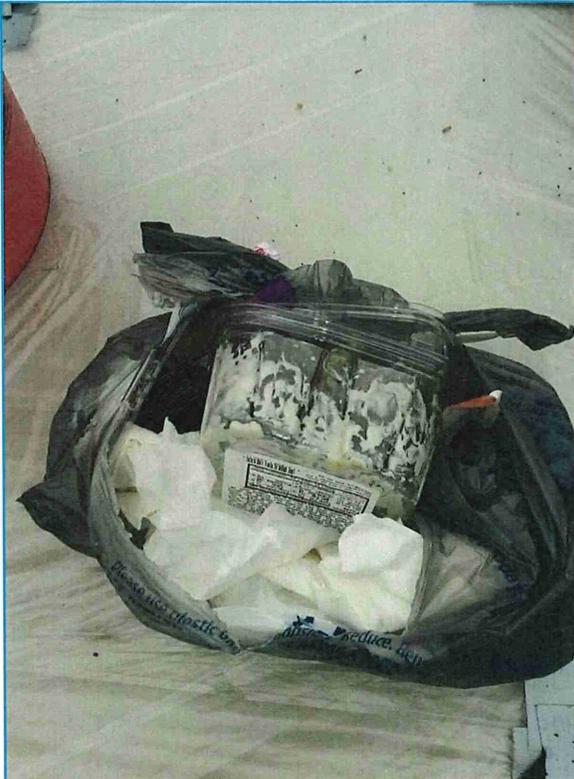
Usable Toilet Paper – This material was found in abundance at both sorts. Assuming that it is procedurally possible to do so, Waste Wise strongly encourages MPCA and DNR to retrain their custodial team to let toilet paper rolls fully expire prior to changing them out. This will result in significant reduction in waste as there were more than 30 rolls in each two day sort.



Re-Usable Office Supplies – Waste Wise found large volumes of folders, envelopes, paper-clips and books in both the trash and recycling that could be re-used internally or donated. Waste Wise recommends adding a donation or reuse area within each agency so that employees can responsibly rid themselves of still useful supplies, and also offer an area to find new supplies rather than purchasing externally.



Makeshift Desk-Side Trash Collection – Waste Wise found that a handful of employees at both agencies are still collecting trash at their desks (usually in a plastic shopping bag) and then transferring the entire contents of that bag to the trash without sorting. This eliminates the waste diversion benefit of eliminating desk side collection and establishing centralized waste and recycling stations. Waste Wise recommends that MPCA and DNR re-focus their discouragement of this practice and emphasize the various benefits of getting up to dispose of their waste (health and wellness, better recycling diversion, it's the policy, etc.).



Back of House Organics – We found a number of bags that were obviously generated in the kitchen at the café that displayed less than perfect grasp on the organics recycling program. Waste Wise recommends that the food service provider host a staff training regarding the organics recycling program and what materials are acceptable.



Label Backing in Organics – This material has a plastic coating and is not acceptable in the organics recycling or paper recycling. If possible, educate that label backing needs to be diverted into the trash.



Potentially Recyclable Testing Waste – Waste Wise encountered a bag full of plastic tubes likely used for water testing that could possibly be included in the recycling. Check with your recycling hauler to see if these are acceptable and if so, educate employees to dispose of these tubes in the blue “Cans, Bottles, and Containers” recycling bin with the caps placed back on the tubes.

