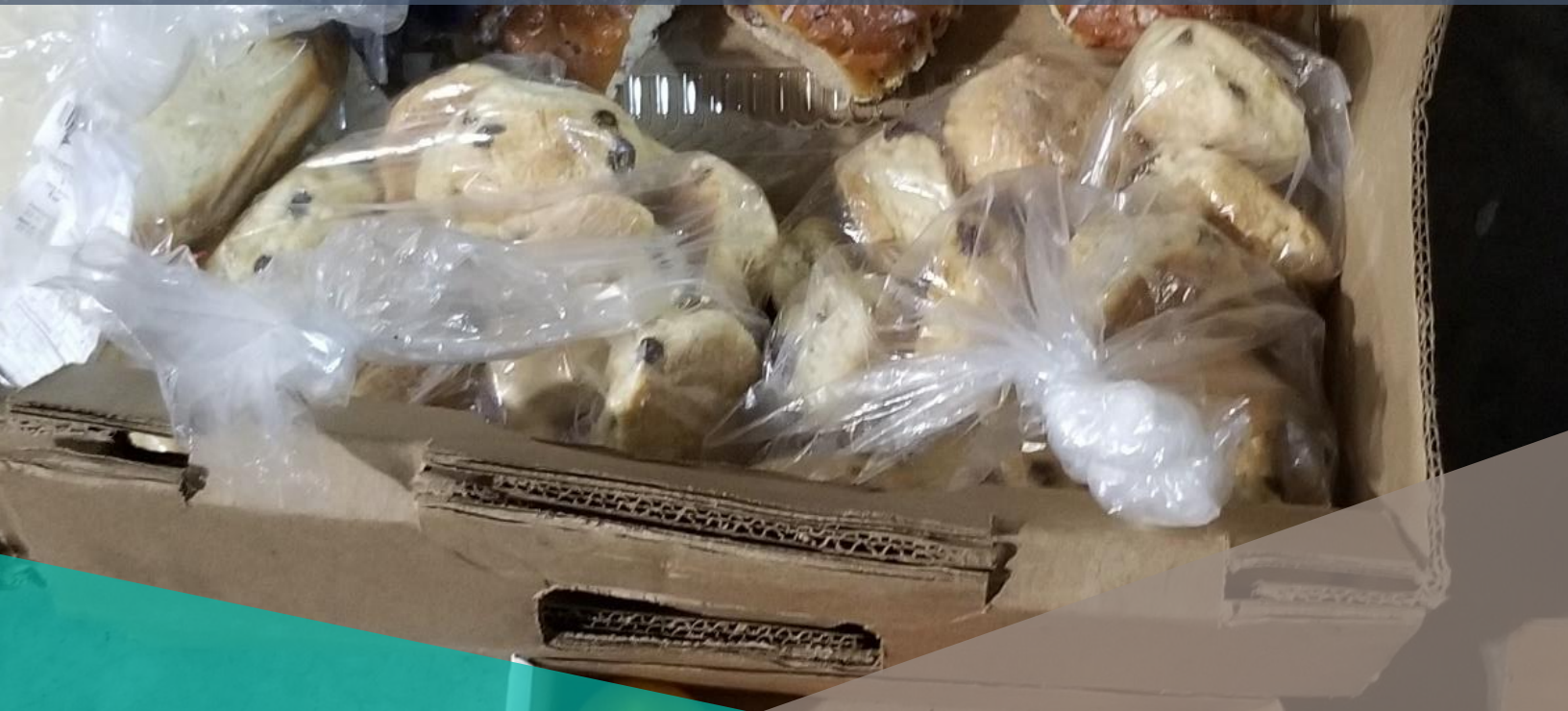Central Newfoundland Waste Management

Central Newfoundland Curbside Waste Audit

October 2022

mmsb

guiding our province
to a greener future

Important Notice

This report was prepared by the Multi-Materials Stewardship Board (MMSB) with the support of Central Newfoundland Waste Management (CNWM). The quality of information, conclusions and estimates contained in the report is based on information available at the time.

The information contained in this report can be used by CNWM for its own purposes, including publication. The MMSB reserves the right to release the report and/or use the data in other analysis and reports.

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Definitions

- Capture Rate – The percentage of recyclable materials that are captured in the recycling stream. Capture rate measures the effectiveness of a recycling program. Achieving a capture rate of 100% requires that all recyclables be placed in the recycling stream and that the waste stream consist solely of non-recyclable materials. For example, to calculate the capture rate of recyclable paper, add the weight of paper recycled and the weight of paper disposed to determine total paper generation. Then divide the weight of paper recycled into the total paper generated. When calculating capture rate, an audit is required as the amount of recyclable material remaining in the clear bag must be known.

- Central Newfoundland Waste Management (CNWM) – Is the operational entity of the Central Regional Service Board (CRSB), which was established in 2008 and is governed under the Provincial Regional Service Board Act 2012 (revised 2019). CRSB's powers include the construction and operation of the regional solid waste disposal site and seven waste management facilities. It is empowered to set and charge user fees to municipal authorities, local service districts and unincorporated areas benefited by a regional infrastructure as required. For the purposes of this report, CNWM will be the entity referred to.

- Contamination – Material placed in the incorrect bag (i.e., recyclable materials in the clear bag or garbage in the blue bag).

- Disposal Rate – The average weight of garbage disposed, per resident. To calculate the disposal rate, divide the weight of garbage disposed by the population.

- Diversion Opportunity – The percentage of the waste stream that could be recycled if participation and user efficiency are maximized (in other words, if the capture rate is at one hundred per cent). To calculate diversion opportunity, divide the weight of recyclable materials into the total weight of waste generated. When calculating diversion opportunity, an audit is required as the amount of recyclable material remaining in the clear bag must be known.

- Diversion Rate –How much of the generated waste stream is being diverted from the landfill. To calculate diversion rate, divide the weight of material recycled into the total weight of waste generated. *Diversion rate can be calculated using scale data alone.

- Divertible - Refer to waste streams that can be reused and recycled (can be diverted from disposal).

- Extended Producer Responsibility (EPR) - Is a policy approach in which a producer's responsibility (physical and/or financial) for a product is extended to the post-

consumer stage of a product's life cycle. EPR shifts responsibility upstream in the product life cycle to the producer and away from municipalities. As a policy approach, it intends to provide incentives to producers to incorporate environmental considerations in the design of their products.

- Metric Tonne (MT) – A metric unit of mass equal to 1,000 kilograms or 2,205 pounds.

- Materials Recovery Facility (MRF) – A facility that receives, separates, and prepares recyclable materials for shipment to markets. For purposes of this report, the MRF located at Norris Arm is owned by Central Regional Service Board and is on contract to Heberts Recycling Inc.

- Packaging and Paper Products (PPP) – Packaging is a material, substance or object that is used to protect, contain or transport a commodity or product, or attached to a commodity or product or its container for the purpose of marketing or communicating information about the commodity or product. Printed Paper is paper that is not packaging but is printed with text or graphics as a medium for communicating information, and includes telephone directories, but does not include other types of bound reference books, bound literary books, or bound text books.

- Tipping Fee - A fee paid to recycle or dispose of waste at a waste management facility. Usually, this fee is based on the weight of the waste per Metric Tonne and supports the operating costs of a landfill or waste facility. The tipping fee for central Newfoundland is currently $136 per tonne.

- User Efficiency – A function of how well a household does with placing waste materials in the correct bag (e.g., non-recyclable plastic bags in the garbage bag or recyclable plastic containers in the recycling bag).

- World Office - An Enterprise Resource Planning software which preforms many tasks including Accounting, Billing, Payroll, Preventive Maintenance, Work Orders, as well as recording weights at the Scale.

- Scale Data - Actual waste data received at CNWM facilities and is expressed in Metric Tonnes.

Executive Summary

MMSB conducted its fifth audit of curbside waste for CNWM during October 2022. The purpose of the audit was to assess and monitor the performance of the Sort It Central Program. A combined weight of 2,393.97 lb. of waste was examined. Data from the audit was used to analyze waste generation and diversion practices by community and the region. Findings were also applied to residential scale data for 2021 to provide annual estimates around waste generation. For this audit, MMSB developed a new sorting guide to provide a more detailed view of contents and diversion opportunities.

Key highlights from the report include:

- The largest component of the overall clear bag garbage landfilled by primary category was organics (37.18%), followed by other materials (22.46%), special care waste (19.41%), textiles (6.00%), paper (5.78%), plastic containers (3.22%),glass containers (2.00%), metal containers (1.75%), household hazardous waste (1.54%), paper containers (0.34%) and construction, renovation, and demolition waste (0.31%).

- Weekly household waste generation was down by 1.26 lb. per household from the previous audit (25.95 lb. in 2020; 24.69 lb. in 2021).

- Waste disposed per capita decreased from 1.13 lb. per day in 2020 to 1.10lb. per day in 2021.

- The waste diversion rate decreased by almost 2% compared to the previous audit - from 9.40% to 9.26%.

- Capture rate of recyclable paper, plastics and metal decreased by almost 7% compared to the previous audit - from 56.62% to 48.67%.

- Contamination rate in blue bags increased by almost 11% from the previous audit – from 26.67% to 29.59%.

- Contamination in clear bags increased by 2.3% from the previous audit – from 12.51% to 12.80%.

- There was almost as much landfilled paper (760.94 MT) as recycled paper (791.21 MT). There was almost twice as much landfilled plastic containers (424.70 MT) as recycled plastic containers (261.18 MT).

If it evident in the report that program metrics are trending in the wrong direction. The Sort It Central program has been in operation since 2015 and the findings of this audit represent an opportunity for CNWM to pause and reset. MMSB has offered a number of recommendations to inform CNWM on actions that can increase participation in, and effectiveness of its program. Recommendations are focussed around enforcement, education and program development.

1. Background

The central region of Newfoundland is home to 72,500 people living in approximately 32,500 households in 99 communities. Residential waste management in the region is overseen by CNWM through the 'Sort It Central' program which was launched in 2015. Sort It Central is a mandatory waste management program that requires residents to properly sort their waste using transparent blue bags for recyclables and clear bags for garbage. Both paper and recyclable containers are accepted in the same blue bag and collected weekly. Non-curbside conducive waste can be dropped off at any of the seven transfer station sites in the region or at the Public Drop Off site at Norris Arm.

In order to deliver its waste management programs, the current infrastructure deployed by CNWM includes:

- Regional waste management facility in Norris Arm which includes an engineered landfill with leachate treatment, a materials recovery facility (MRF), public drop off and a CRD laydown area.

- Seven waste transfer stations (Buchan's Junction, Point Leamington, New World Island/Twillingate, Fogo Island, Gander Bay, Indian Bay and Terra Nova).

- CNWM provides weekly waste collection for 62 communities (63%) in the region; which includes 18,438 households (58% of households in the region).

When the Sort It Households program was launched in 2015, it was envisioned that the new service would increase the diversion of recyclables. Chart 1 shows the garbage and recycling tonnages managed through CNWM's curbside program since the launch of the mandatory program. A quick analysis indicates that garbage in clear bags is steadily increasing, and the recycling volumes are decreasing.

Chart 1: Central NL Curbside Waste (MT)
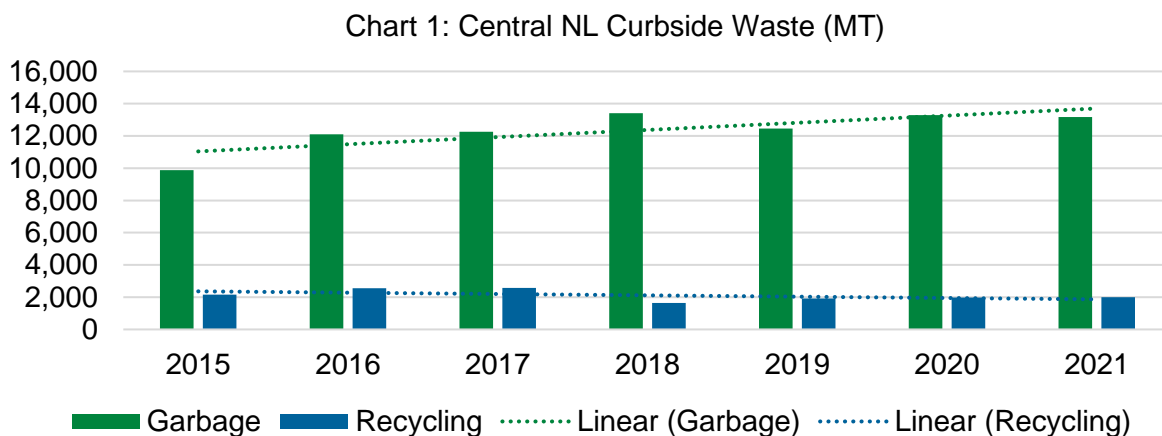
Waste audits have been conducted by MMSB to establish a baseline for future performance measurement and provide CNWM with information on the success of its Sort It Households program. Audits were completed in 2015, 2016, 2017, and 2020.

2. Methodology

In previous audits, clear and blue bags from 100 households within the central region were assessed separately for contamination. The scope of these audits included establishing a household waste generation rate, a capture rate of recyclable materials and areas for improvement in the curbside recycling program. For the 2022 audit, the same methodology and scope was utilized, however due to operational issues samples were not collected from the Town of Appleton and the Town of Peterview was selected instead. The following table shows the five communities that were part of the audit, including the number of clear and blue bags and associated weights.

Table 1: Audited Waste by Community

Community	# of Households	Clear Bags		Blue Bags	
		# of bags	Weight (lb.)	# of bags	Weight (lb.)
Peterview	20	47	469.60	11	66.53
Badger	20	69	627.72	16	83.63
Gander	20	30	250.82	14	70.82
Grand Falls Windsor	20	34	346.64	7	22.71
Norris Arm	20	41	466.70	12	63.84
Total	**100**	**221**	**2,161.48**	**60**	**307.53**

2.1 Sampling Categories

Bags from the selected households were brought to the audit site at the Norris Arm MRF and grouped by community for sorting. To provide a more detailed view of existing and potential future diversion opportunities, a new waste characterization tool was developed which made changes to some terminology and waste sorting categories. For example, samples are now placed in primary (formerly called major) and secondary categories. Garbage samples were sorted into 11 primary categories, and a total of 62 secondary categories compared to four main categories and roughly 30 subcategories in previous audits.

The new primary categories include paper, paper containers, plastic containers, glass containers, metal containers, special care waste, CRD waste, textiles, HHW, organics, and other materials. Within the glass containers category, there are both divertible and landfilled secondary categories. All secondary categories in the HHW category are divertible and the remaining categories are typically landfilled as garbage. Please see Appendix A for a description of all categories.

Some notable category changes from the previous waste composition studies include:

- The addition of secondary categories within the organics primary category for the identification of food waste as avoidable or unavoidable[1].

- Deposit bearing glass containers were removed from the previous other waste category and are now categorized under the primary category of Glass containers, along with non-deposit bearing.

Once all the clear bags for an individual community were examined, the weight of contaminants in each subcategory was subtracted from the weight of the entire bag and results were recorded in a spreadsheet. For all blue bags, contaminants were removed and sorted into 33 different categories to detail the origins of contamination. Each category was documented by weight.

2.2 Data Analysis

The waste composition results are reported as percentage of total by primary category of waste audited. In the tracking performance section, results from the audit are applied to scale data to derive key program metrics. Note that all key metrics must be based in 12 months of data which cannot be older than the past three years. Accordingly, depending on the dates when the audit was conducted and the report subsequently written, in order to estimate key performance metrics, scale data from the most recent calendar year is used.

2.3 Limitations

Though this audit provides valuable information on the state of waste composition and diversion within the central region, there are limitations to the analysis of the data:

- The sampling period used in this audit provides a look at waste composition and does not consider weekly variations between communities or households.

- Waste generation is known to vary throughout the year, so it is realistic to expect variance between audits carried out at different times.

- Although the mandatory recycling program covers both single and multi-dwelling homes, samples assessed were from single unit homes.

- For the section detailing waste generation by community, it is important to note that while the community analysis can provide some high-level insights, definitive conclusions should not be drawn from such a small sample size (20 homes).

- Blue bags are collected weekly in central and western Newfoundland but bi-weekly from households in the City of St John's. Accordingly, blue bag data is adjusted to allow for appropriate comparison in the regional comparison section.

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[1] Definitions for avoidable and unavoidable food waste are available on page 4 and 5 of this report.

3. Waste Composition Results

3.1 Clear Bags

Auditors sorted 221 clear bags weighing 2,161.48 lb. into 11 primary categories. The results are provided in the following tables. Note that most of the tables are generally self-explanatory as such are not explained or referred to in the text.

Table 2: Clear Bag Composition by Category

Primary Category	Weight (lb.)	% of Total Clear Bag
Organics	803.67	37.18%
Other Materials	485.52	22.46%
Special Care Waste	419.53	19.41%
Textiles	129.71	6.00%
Paper[2]	124.83	5.78%
Plastic Containers	69.67	3.22%
Glass Containers	43.30	2.00%
Metal Containers	37.74	1.75%
Household Hazardous Waste	33.37	1.54%
Paper Containers	7.40	0.34%
CRD Waste	6.74	0.31%
Total	**2,161.48**	**100%**

Primary categories were further broken down into 62 secondary categories which are detailed in the following tables.

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[2] Refers to recyclable paper.

Table 2a: Clear Bag Organics Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Organics	Food Waste - Unavoidable	413.78	51.49%	19.14%
	Food Waste - Avoidable	375.65	46.74%	17.38%
	Yard Waste	13.56	1.69%	0.63%
	Compostable Ware	0.68	0.08%	0.03%
	Total	**803.67**	**100%**	**37.18%**

Table 2b: Clear Bag Other Materials Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Other Materials	Non-Recyclable Paper	178.23	36.71%	8.25%
	Non-Recyclable Plastic Containers/Packaging	167.73	34.55%	7.76%
	Other Garbage	92.92	19.14%	4.30%
	Liquids in Closed Containers	18.80	3.87%	0.87%
	Other Glass and Ceramics	13.32	2.74%	0.62%
	Paper Packaging - Liquids - Paper Cups	11.42	2.35%	0.53%
	Non-Recyclable Metal	3.10	0.64%	0.14%
	Total	**485.52**	**100%**	**22.46%**

Table 2c: Clear Bag Special Care Waste Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Special Care Waste	Animal/Pet Waste	205.93	49.09%	9.53%
	Diapers	160.96	38.37%	7.45%
	Other (Bandages, IV bags, etc.)	40.72	9.71%	1.88%
	Hygiene Products	6.50	1.55%	0.30%
	Gloves	2.48	0.59%	0.11%
	Wipes	1.98	0.47%	0.09%
	Masks - Disposable	0.96	0.23%	0.04%
	Total	**419.53**	**100%**	**19.41%**

Table 2d: Clear Bag Textiles Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag

Textiles	Clothing	61.86	47.69%	2.86%
	Footwear	23.48	18.10%	1.09%
	Others	16.10	12.41%	0.74%
	Household Textiles	15.76	12.15%	0.73%
	Accessories	11.25	8.67%	0.52%
	Soft Toys	1.26	0.97%	0.06%
	Total	**129.71**	**100%**	**6.00%**

Table 2e: Clear Bag Paper Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Paper	Boxboard	52.34	41.93%	2.42%
	Printed Paper	34.46	27.61%	1.59%
	Newsprint	14.80	11.86%	0.68%
	Books (hard covers removed)	14.51	11.62%	0.67%
	Corrugated Cardboard	6.06	4.85%	0.28%
	Molded Pulp	2.66	2.13%	0.12%
	Total	**124.83**	**100%**	**5.78%**

Table 2f: Clear Bag Plastic Containers Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Plastic Containers	#1 PET (Non-Beverage)	23.56	33.82%	1.09%
	#5 PP (Non-Beverage)	18.30	26.27%	0.85%
	#2 HDPE (Non-Beverage)	13.06	18.75%	0.60%
	PET#1 (Beverage)	5.06	7.26%	0.23%
	#6 PS (Non-Beverage)	4.89	7.02%	0.23%
	#7 Other (Non-Beverage)	1.80	2.58%	0.08%
	#2 HDPE (Beverage)	1.56	2.24%	0.07%
	#7 Other (Beverage)	0.90	1.29%	0.04%
	#3 PVC (Non-Beverage)	0.54	0.78%	0.02%
	Total	**69.67**	**100%**	**3.22%**

Table 2g: Clear Bag Glass Containers Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Glass Containers[3]	Food Containers	39.74	91.78%	1.84%
	Deposit Bearing Containers	3.56	6.29%	0.16%
	Total	**43.30**	**100%**	**2.00%**

Table 2h: Clear Bag Metals Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Metal Containers	Steel cans	26.90	71.28%	1.24%
	Aluminum foil	4.00	10.60%	0.19%
	Aluminum cans	3.22	8.53%	0.15%
	Aluminum cans (Beverage)	1.98	5.25%	0.09%
	Aluminum trays	1.64	4.35%	0.08%
	Total	**37.74**	**100%**	**1.75%**

Table 2i: Clear Bag HHW Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
HHW	Electronic Waste	11.16	33.44%	0.52%
	Personal Care	7.81	23.40%	0.36%
	Aerosol cans	4.56	13.66%	0.21%
	Single Use Batteries	3.90	11.69%	0.18%
	Pharmaceuticals	3.86	11.57%	0.18%
	Car Care	1.62	4.85%	0.07%
	Paint cans	0.38	1.14%	0.02%
	Toner cartridges	0.08	0.24%	0.00%
	Total	**33.37**	**100.00%**	**1.54%**

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[3] Within this category, deposit bearing containers are not accepted curbside but can be recycled through MMSB's Used Beverage Container Recycling Program, whilst food containers are landfilled. In the calculation of clear bag contamination, food containers aren't included.

Table 2j: Clear Bag Paper Containers Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Paper Containers	Gable Top (Milk)	5.28	71.35%	0.24%
	Aseptic (Tetra) (Beverage)	0.90	12.16%	0.04%
	Gable Top (Beverage)	0.86	11.62%	0.04%
	Aseptic (Tetra) (Non-Beverage)	0.34	4.59%	0.02%
	Gable Top (Non-Milk)	0.02	0.27%	0.00%
	Total	**7.40**	**100%**	**0.34%**

Table 2k: Clear Bag CRD Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
CRD	Wood	4.50	66.77%	0.21%
	Vinyl Siding	1.82	27.00%	0.08%
	Flooring	0.42	6.23%	0.02%
	Total	**6.74**	**100.00%**	**0.31%**

3.2 Blue Bags

A total of 60 blue bags from the 100 households audited were also assessed. In total, these bags weighed 307.53 lb. Auditors identified 33 different types of contaminants[4] in the blue bags, which were sorted and weighed. The findings are detailed in the following tables.

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[4] Note that deposit bearing glass beverage containers are not accepted in blue bags at the curbside in the central region and are included as garbage in this section.

Table 3: Blue Bag Composition

Primary Category	Weight (lb.)	% of Total Blue Bag
Paper	121.90	39.64%
Other Materials	69.92	22.73%
Plastic Containers	40.24	13.08%
Metal Containers	38.18	12.42%
Glass Containers	16.82	5.47%
Paper Containers	16.21	5.27%
Textiles	1.54	0.50%
Household Hazardous Waste	0.90	0.29%
CRD Waste	0.66	0.21%
Organics	0.62	0.20%
Special Care Waste	0.54	0.18%
Total	**307.53**	**100%**

Primary categories were further broken down into 33 secondary categories that mirror clear bag items. These are detailed in the following tables.

Table 3a: Blue Bag Recycled Paper Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Paper	Boxboard	49.07	40.25%	11.14%
	Printed Paper	33.79	27.72%	15.96%
	Corrugated Cardboard	34.25	28.10%	10.99%
	Molded Pulp	4.79	3.93%	2.50%
	Newsprint	2.00	1.64%	0.65%
	Total	**121.9**	**100%**	**39.64%**

Table 3b: Blue Bag Other Materials Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Other Materials	Miscellaneous	49.18	61.23%	15.99%
	Non-Recyclable Plastic Containers/Packaging	11.62	14.46%	3.78%
	Non-Recyclable Paper	3.69	4.60%	1.20%
	Other Glass and Ceramics	2.90	3.61%	0.94%

	Non-Recyclable Metal	1.94	2.42%	0.63%
	Paper Packaging - Liquids - Paper Cups	0.59	0.73%	0.19%
	Total	**69.92**	**100%**	**22.37%**

Table 3c: Blue Bag Recycled Plastic Containers Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Plastics	Non-EPS (#2 HDPE)	15.25	37.90%	4.96%
	Non-EPS (#1 PET)	12.67	31.49%	4.12%
	Other Non-Beverage	6.68	16.60%	2.17%
	Deposit Bearing (PET#1)	5.34	13.27%	1.74%
	Deposit Bearing (#7 Other)	0.14	0.35%	0.05%
	Deposit Bearing (#2 HDPE)	0.16	0.40%	0.05%
	Total	**40.24**	**100%**	**13.08%**

Table 3d: Blue Bag Recycled Metal Containers Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Metal Containers	Steel/Tin - Non-Beverage	34.30	89.84%	11.15%
	Aluminum Cans	2.16	5.66%	0.70%
	Aluminum - Beverage	1.72	4.51%	0.56%
	Total	**38.18**	**100%**	**12.42%**

Table 3e: Blue Bag Glass Composition

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Clear Bag
Glass Containers	Food Containers	10.40	61.83%	3.38%
	Deposit Bearing	6.42	38.17%	2.09%
	Total	**16.82**	**100%**	**5.47%**

Table 3f: Blue Bag Recycled Paper Containers Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Paper Containers	Gable Top (Milk)	7.70	47.50%	2.50%
	Aseptic (Tetra) (Non-Beverage)	6.33	39.05%	2.06%

	Aseptic (Tetra) (Beverage)	2.18	13.45%	0.71%
	Total	**16.21**	**100%**	**5.27%**

Table 3g: Blue Bag Textiles Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Textiles	Accessories	1.20	77.92%	0.39%
	Clothing	0.34	22.08%	0.11%
	Total	**1.54**	**100%**	**0.50%**

Table 3h: Blue Bag HHW Containers Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
HHW	Aerosol cans	0.78	86.67%	11.15%
	Pharmaceuticals	0.12	13.33%	0.70%
	Total	**0.90**	**100%**	**0.29%**

Table 3i: Blue Bag CRD Waste Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
CRD Waste	Caulking	0.66	100%	0.21%
	Total	**0.66**	**100%**	**0.21%**

Table 3j: Blue Bag Organics Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Organics	Food in packaging (cookies)	0.62	99.68%	0.20%
	Food Waste (Avoidable)	0.002	0.32%	0.001%
	Total	**0.66**	**100%**	**0.20%**

Table 3k: Blue Bag Special Care Waste Composition by Sub-Category

Primary Category	Secondary Category	Audited (lb.)	% of Category	% of Total Blue Bag
Special Care Waste	Wipes	0.52	96.12%	0.17%
	Gloves	0.02	3.70%	0.01%
	Other (Bandages, IV bags, etc.)	0.001	0.18%	0.00%
	Total	**0.54**	**100%**	**0.18%**

3.3 Combined

In total 2,469.01 lb. generated by 100 households were reviewed during the audit. The table below shows the combined weight of clear and blue bags adjusted to reflect the contamination found in both waste streams.

Table 4: Household Waste Composition (Clear and Blue Bags Combined)

Primary Category	Clear Bag Weight (lb.)	Blue Bag Weight (lb.)	Combined Weight (lb.)	% of Total
Organics	803.67	0.62	804.29	32.58%
Other Materials	485.52	69.92	555.44	22.50%
Special Care Waste	419.53	0.54	420.07	17.01%
Paper	124.83	121.90	246.73	9.99%
Textiles	129.71	1.54	131.25	5.32%
Plastic Containers	69.67	40.24	109.91	4.45%
Metal Containers	37.74	38.18	75.92	3.07%
Glass Containers	43.30	16.82	60.12	2.43%
Household Hazardous Waste	33.37	0.90	34.27	1.39%
Paper Containers	7.40	16.21	23.61	0.96%
CRD Waste	6.74	0.66	7.40	0.30%
Total	**2,161.48**	**307.53**	**2,469.01**	**100%**

3.4 Tracking Performance

All waste brought to CNWM's facilities is weighed and recorded using a system called World Office. In 2021, 13,175.41 MT was placed in clear bags while 1,996.08 MT was placed in blue bags amounting to 15,171.49 MT of waste placed at the curb for the region.

Table 5: Scale Data 2021 – Central NL Bagged Residential Waste

Waste Type	Weight (MT)
Clear Bags	13,175.41
Blue Bags	1,996.08
Total	**15,171.49**

With this data, it is possible to apply MMSB's waste audit findings to calculate the annual disposal and generation of each waste stream. The estimates are displayed in table 6.

Table 6: Household Waste Composition (Clear and Blue Bags Combined)

| Primary Category | Weight (MT) | | | | Rates (lb./person/year) | |
	Clear Bag	Blue Bag	Combined		Disposal	Generation
Organics	4,898.81	4.04	4,902.84	32.32%	149.11	149.11
Other Materials	2,959.51	521.31	3,480.82	22.94%	105.86	105.86
Special Care Waste	2,557.26	3.51	2,560.78	16.88%	77.88	77.88
Paper	760.91	791.21	1,552.12	10.23%	23.14	47.21
Textiles	790.65	10.00	800.65	5.28%	24.35	24.35
Plastic Containers	424.68	261.18	685.87	4.52%	12.92	20.86
Metal Containers	230.05	247.82	477.87	3.15%	7.00	14.53
Glass Containers	263.94	41.67	305.61	2.01%	8.63	9.29
Household Hazardous Waste	203.41	5.84	209.25	1.38%	6.36	6.36
Paper Containers	45.11	105.21	150.32	0.99%	1.37	4.57
CRD Waste	41.08	4.28	45.37	0.30%	1.38	1.38
Total	**13,175.41**	**1,996.08**	**15,171.49**	**100%**	**418.68**	**461.42**

3.4.1 Waste Disposed

With the scale data, it is also possible to provide CNWM with disposal rate as an additional indicator of progress. Defined as the average pounds of garbage disposed, per person, the disposal rate is significant because it provides a look at how much waste individuals in the community are generating. It is a metric that is within the control of individuals as such we can infer that lower rates of disposal are an indication of successful waste reduction and diversion programs through improved collection, processing, and recycling.

Based on the total weight of garbage (13,766.06 MT)[5] estimated to be disposed of in 2021, and the population of 72,500 residents in central NL, the total waste disposal rate is 418.68 lb./resident.

3.4.2 Waste Diverted

In 2021, an estimated 1,405.43 MT or 42.74 lb. per resident was diverted in central NL. The biggest contributors to waste diverted was paper accounting for over half of all materials diverted. The breakdown by percent of each material diverted shown in the table below.

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[5] Includes 590.65 MT of garbage in blue bags, landfilled through the MRF.

Table 7 Diverted Materials in 2021

Primary Categories	Landfilled Weight (MT)	Recycled Weight (MT)
Paper	791.21	56.30%
Plastic Containers	261.18	18.58%
Metal Containers	247.82	17.63%
Paper Containers	105.21	7.49%
Total Diverted	**1,405.43**	**100%**

3.4.3 Waste Generated

Combining waste disposed and diverted, residents of central NL generated 15,171.49 MT or 461.42 lb per person. Of that, 1,405.43 MT[6] (or 42.74 lb. per person) of paper, plastic containers, metal containers and metal containers were recycled, equating to a residential **curbside waste diversion rate of 9.26%.[7].**

3.4.5 Capture Rates

Although the waste diversion rate is an important performance measure, it does not give a complete picture of how a region or community is doing with its recycling programs. To evaluate the participation and user-efficiency of a program, it is important to investigate how much recyclable material is being generated and placed in clear bags to be landfilled. Capture rate refers to the overall quantity of material that is captured by a recycling program. A high capture rate means residents are using the program correctly; for instance, putting recyclables in the blue instead of the clear bags.

The 32,500 households in the central region generated an estimated 2,866.18 MT[8] of paper, paper containers, plastic, and metal containers in 2021. Of that, 1,405.43 MT was recycled while 1,460.75 MT was landfilled, equating to a **49.03% capture rate**[9]**.**

It is possible to delve deeper into capture rates of individual subcategories in order to understand where the Sort It Central program is doing well and where the opportunities for improvement and further capture resides. This analysis is shown in tables 8 to 10.

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[6] Calc: 791.21MT (Recycled Paper) + 261.18MT (Recycled Plastic Containers) + 247.82MT (Recycled Metal) + 105.21MT (Recycled Paper Containers)
[7] Calc: (1,405.43MT/15,171.49MT) *100
[8] Calc: 791.21MT (Recycled Paper) +760.91MT (Recyclable Paper) + 261.18MT (Recycled Plastic containers) + 424.68MT (Recyclable Plastic Containers) + 247.82MT (Recycled Metal Containers) + 230.05MT (Recyclable Metal Containers) + 105.21 (Recycled Paper Containers) + 45.11MT (Recyclable Paper Containers).
[9] Calc:1,405.43 MT/2,866.18 MT

Table 8: Capture Rate of Paper by Subcategory

Secondary Category	Landfilled Weight (MT)	Recycled Weight (MT)	Combined Weight (MT)	Capture Rate
Corrugated Cardboard	36.94	222.31	259.24	85.75%
Molded Pulp	16.21	31.09	47.30	65.72%
Boxboard	319.04	318.50	637.54	49.96%
Printed Paper	210.05	206.34	416.39	49.55%
Newsprint	90.21	12.98	103.20	12.58%
Books	88.45	0.00	88.45	0.00%
Totals/Combined Capture Rate	**760.91**	**791.21**	**1,552.12**	**50.98%**

Table 9: Capture Rates of Plastic Containers by Subcategory

Secondary Category	Landfilled Weight (MT)	Recycled Weight (MT)	Combined Weight (MT)	Capture Rate
#7 Other (Non-Beverage)	10.97	43.36	54.33	79.80%
#2 HDPE (Non-Beverage)	79.61	98.98	178.59	55.42%
PET#1 (Beverage)	30.84	34.66	65.50	52.91%
#1 PET (Non-Beverage)	143.61	82.24	225.85	36.41%
#7 Other (Beverage)	5.49	0.91	6.40	14.20%
#2 HDPE (Beverage)	9.51	1.04	10.55	9.85%
#5 PP (Non-Beverage)	111.55	0.00	111.55	0.00%
#6 PS (Non-Beverage)	29.81	0.00	29.81	0.00%
#3 PVC (Non-Beverage)	3.29	0.00	3.29	0.00%
Totals/Combined Capture Rate	**424.68**	**261.18**	**685.87**	**38.08%**

Table 10: Capture Rates of Metal Containers by Subcategory

Secondary Category	Landfilled Weight (MT)	Recycled Weight (MT)	Combined Weight (MT)	Capture Rate
Steel cans	163.97	222.63	386.60	57.59%
Aluminum cans (Beverage)	12.08	11.17	23.25	48.05%
Aluminum cans	19.63	14.02	33.65	41.67%
Aluminum foil	24.38	0.00	24.38	0.00%
Aluminum trays	10.00	0.00	10.00	0.00%
Totals/Combined Capture Rate	**230.05**	**247.82**	**477.87**	**51.86%**

Table 11: Capture Rates of Paper Containers by Subcategory

Secondary Category	Landfilled Weight (MT)	Recycled Weight (MT)	Combined Weight (MT)	Capture Rate
Aseptic (Tetra) (Non-Beverage)	2.07	41.09	43.16	95.20%
Aseptic (Tetra) (Beverage)	5.49	14.15	19.64	72.06%
Gable Top (Milk)	32.18	49.98	82.16	60.83%
Gable Top (Beverage)	5.24	0.00	5.24	0.00%
Gable Top (Non-Milk)	0.12	0.00	0.12	0.00%
Totals/Combined Capture Rate	**45.11**	**105.21**	**150.32**	**69.99%**

3.5 Progress to Date

The overall estimated waste generation rate in central NL increased between 2016 and 2017 and has been generally declining slightly since then. Correspondingly, waste disposal rate has followed a similar pattern.
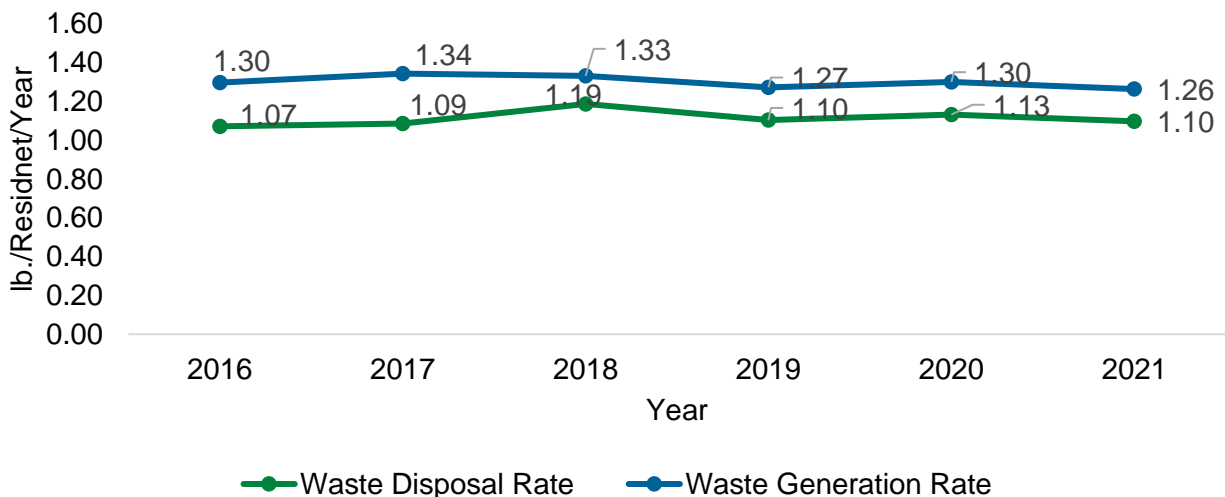
3.6 Diversion Opportunities

As previously noted, residents disposed of an estimated 1,460.75 MT of material that could have been recycled through a blue bag. Combining the total generation of blue bag material in table 6 shows that the curbside diversion opportunity is 18.89%[10]. This means that there is an opportunity to divert 9.63%[11] more waste to the MRF instead of the landfill. This opportunity increases even further when you consider other (divertible) waste. With the composition of the curbside waste stream in central NL, it is possible to make annual estimations specific to the total regional waste profile including new diversion opportunities.

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[10] Calc: 2,866.18 MT (total paper, plastics and metals generated)/ 15,171.49 MT (total waste generated)
[11] Calc: 18.89% (potential diversion rate) - 9.26% (current diversion rate)

3.6.1 Participation

Of the 100 households from which samples were collected in central NL, 221 clear bags of garbage were set out - almost four bags per household. Contrast this with 60 bags being set out by these same 100 households. Recognizing that a 100-household sample collected over a week isn't necessarily representative of the whole region, this is still a drop in participation in curbside recycling offered by CNWM. This point becomes even more pertinent when you look at the capture rates of individual subcategories in tables 8 to 11, where in many cases, the estimated amount of materials landfilled, exceeds the amount recycled.

3.6.1 Organics

By weight, organic waste represents the biggest opportunity to divert more waste from the landfill and should be noted even though the region currently has no curbside program to capture organic material. Within the clear bags audited, 803.67 lb. or 37.18% of waste was organic. Within the category, the largest component was unavoidable food waste at 51.49% followed closely by avoidable food waste at 46.74%. When this composition is applied to the annual tonnage of clear bag waste generated in the region, it equates to **4,898.81 MT** [12] of organic waste sent to landfill. Of this, 2,289.79 MT[13] was avoidable food waste. This is the equivalent of each person in the region trashing 69.64 lb.[14] of avoidable food waste in 2021.

An estimated 69.64 pounds of avoidable food waste was trashed by each person in central Newfoundland in 2021.

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[12] Calc: 38.05% X 13,175.41MT
[13] Calc: 17.38%*4,898.81 MT
[14] Calc: (2,522.21MT/72,500 persons) *2205

3.6.2 Packaging and Paper Products

It is seen that residents placed a total of 167.63 lb. of packaging and printed paper material (7.76% of clear bag from table 2b) which translates to an estimated annual generation of 1,021.84 MT. Although these materials are not accepted in the Sort It Central program, some are accepted in other jurisdictions. As such, this data can provide insight to CNWM on potential opportunities to expand the basket of goods they accept where feasible and operationally possible.

Table 12: Profile of PPP Materials in Clear Bags

Secondary Category	Audit Weight (lb.)	% of Clear Bag	Estimated Annual Weight (MT)
Film Packaging – (PETE, PVC, LDPE Stretch and PP Films, Multi-laminated plastic packaging)	51.48	2.38%	313.80
Film Packaging - #2 and #4 polyethylene film	56.98	2.64%	347.32
Glass Containers - Food Containers	39.74	1.84%	242.24
Durable Plastic Products (Other Plastics)	24.90	1.15%	151.78
Rigid Plastic Packaging (Uncoded)	15.38	0.71%	93.75
Rigid Plastic Containers - EPS (#6 PS)	8.74	0.40%	53.28
Other Packaging, no codes, mixed materials	8.55	0.40%	52.12
Rigid Packaging - EPS (#6 PS)	1.60	0.07%	9.75
	207.37	**9.59%**	**1,264.03**

3.6.3 Divertible Waste in Clear Bags[15]

Clear bags contained 276.57 lb. of material – 12.80% of the total contents – that could have been diverted from the landfill. Contaminants included:

- **Recyclable Paper** represented 45.13% of divertible, which translates to an estimated 760.94 MT that could have potentially been diverted from the landfill in 2021. In terms of secondary category, boxboard was the most common divertible material, followed by printed paper, newsprint, and books (see table 2e for more information).

- **Recyclable Plastic Containers** represented 25.19% of divertible material, which translates to an estimated 424.70 MT that could have potentially been diverted from the landfill in 2021. In terms of secondary categories, Non-EPS (#1 PET) was the most common, which includes containers for items like peanut butter, olive oil or dish soap (see table 2c for more information).

- **Recyclable Metal Containers** represented 13.65% of divertible materials, which translates to an estimated 230.06 MT that could have potentially been diverted from the landfill in 2021. The largest secondary category was steel cans (see table 2h for more information).

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[15] Note that these are materials for which programs for diversion from landfill exist in the region.

- **Household Hazardous Waste** represented 12.07% of divertible material and translates to an estimated 203.41 MT[16] that could have been diverted from the landfill in 2021. Though the quantity of hazardous material sent to the landfill appears small, the impact it can have on our environment is quite large. For example, when battery casings corrode in landfills, toxic heavy metals and reactive acids can leach into the soil and water supply. In total, 93 batteries were found in clear bags, which translates to an estimated 1,571,700 batteries[17] in 2021.

- An estimated 2.68% of divertible materials were **Recyclable Paper Containers** and this translates into 45.11 MT of recyclable paper containers sent to landfill. Looking further into the category, it is also seen that 0.24% of contaminants were Gable Top Containers (milk) which if diverted would provide an additional opportunity for income for CNWM. MMSB makes a financial contribution to CNWM for diverting milk containers at $500 per tonne. **Based on audit data, its estimated that 32.18 MT of milk containers were sent to the landfill in 2021, which means that CNWM could have earned an additional $16,092[18] if they were placed in the blue bag**.

- **Recyclable Deposit Bearing Glass** represented the smallest contributor to contaminants at 1.29%, which translates to an estimated 21.70 MT of deposit bearing glass that can potentially be diverted from landfill through the Green Depot network.

- **Other Deposit Bearing Beverage Containers** - 218 beverage containers were counted (excluding glass containers) in clear bags meaning that the region could have diverted an additional 3,684,200[19] containers through the MRF in 2021. Allowing for the contribution made by MMSB to the region for diverting deposit bearing containers, **CNWM could have netted over $147,368[20] in additional revenue in 2021.**

3.5.4 Textiles

In total, 129.71 lb. of textile waste was audited, and this represents 6% of clear bag waste generated. Applying this composition to scale data equates to an estimated **790.65 MT**[21] of textiles landfilled by residents of the central region in 2021. This is equivalent to every resident throwing away 24.05 lb.[22] of textiles in 2021.

Even though CNWM has no program for managing textile waste, there are opportunities to develop partnerships with organizations like the Salvation Army or Diabetes Canada who have a well-established model of used textiles recycling.

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[16] Calc: 1.54% X 13,175.41
[17] Calc: (93 (# of batteries landfilled)/100 * 32,500 (# of households in Central NL) X 52 (# of weeks in year)
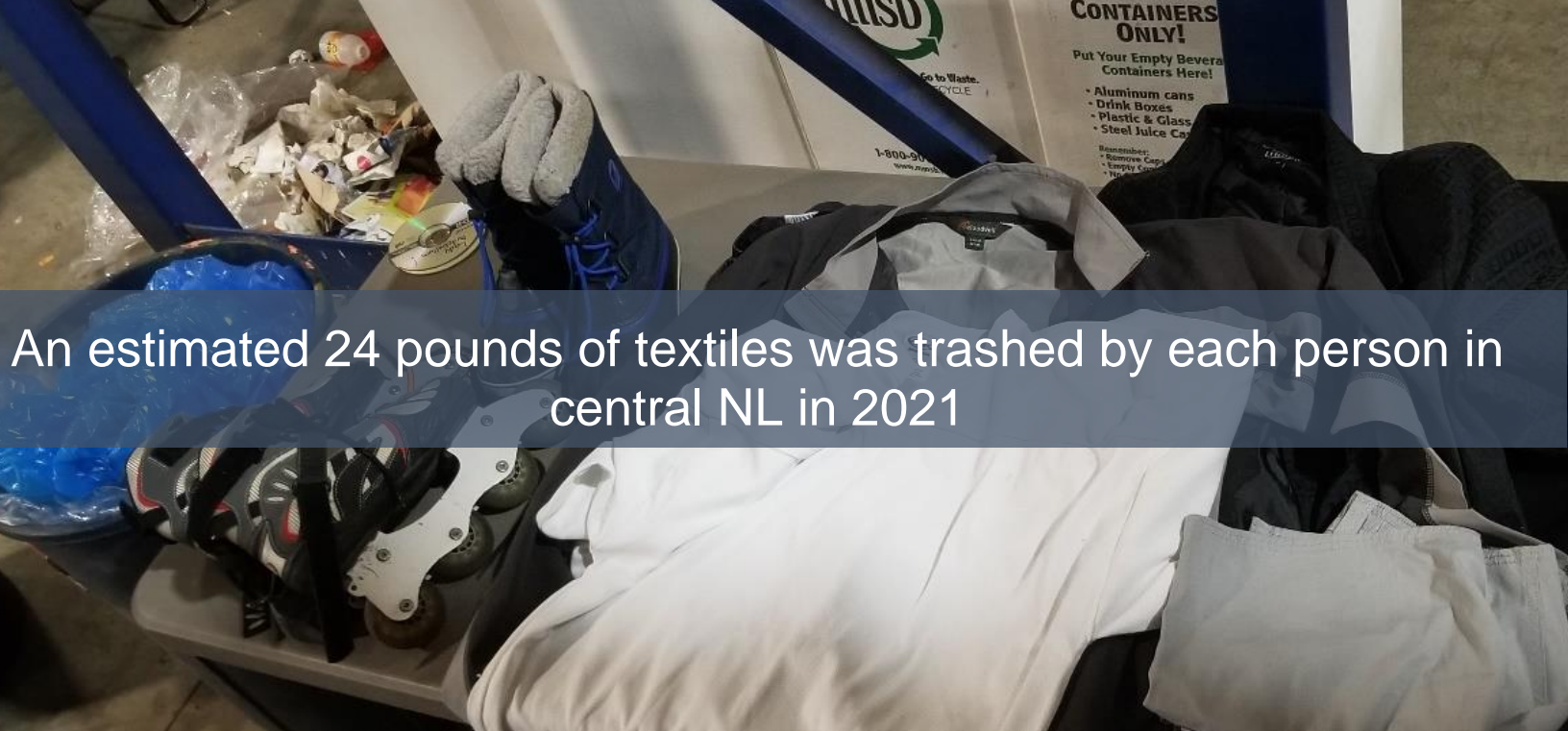[18] $500 X 32.18 MT
[19] Calc: 3,718,000 (total #) – 33,800 (glass #)
[20] Calc: 3,684,200(# of beverage containers excluding glass) * 4c (MMSB contribution)
[21] Calc: 6.00% * 13,175.41MT
[22] Calc: (790.65MT/72,500) *2205

An estimated 24 pounds of textiles was trashed by each person in central NL in 2021

3.7 Contamination in Blue Bags

A total of 91 lb. or 29.59% of material in the blue bags were deemed to be contamination. This translates to an estimated 590.65 MT of garbage in blue bags delivered to the MRF in 2021. Proportionally speaking, 29.59% of blue bags destined for the MRF were contaminated with garbage and CNWM is paying the MRF service provider a fee for sorting garbage versus sorting recyclables. Assuming a MRF tipping fee of $250 per ton, CNWM would have potentially paid the MRF service provider approximately **$147,663**[23] for separating garbage in 2021.

Almost a third of blue bags were contaminated with garbage in central Newfoundland.

[23] Calc: 590.65 MT X $250

3.8 Communities

Each of the communities included in the audit were assessed to explore variances in waste disposal practices (Table 13). Waste generation and diversion practices differ between and within communities and regions, possibly due to demographics (income level, living status) and/or location (urban and rural).

Table 13: Audited Waste by Community

| Route | Audited Waste (lb.) | | | Household Waste Generation (lb./week) | % Contamination | |
	Clear Bag	Blue Bag	Total		Clear Bag	Blue Bag
Badger	627.72	83.63	711.35	35.57	11.63%	19.19%
Peterview	469.60	66.53	536.13	26.81	11.27%	57.70%
Norris Arm	466.70	63.84	530.54	26.53	14.12%	25.33%
Grand Falls Windsor	346.64	22.71	369.35	18.47	16.66%	1.64%
Gander	250.82	70.82	321.64	16.08	10.77%	27.93%
Total	**2,161.48**	**307.53**	**2,469.01**			
Average	**432.30**	**61.51**	**493.80**	**24.69**	**12.79%**	**29.59%**

3.8.1 Waste Generation

Households from Badger had the highest per capita of waste generated with an estimated 35.57 lb. per week, which was 44.06%[24] more waste than the audited average. The community with the smallest waste generation rate per capita was Gander with 16.08 lb. per week.

3.8.2 Contamination

Clear bag contamination was found to be highest in households in Grand Falls Windsor (16.66%) and lowest in Gander (10.77%). Peterview had the highest blue bag contamination rate at 57.70%, while Grand Falls Windsor had the lowest at 1.64%. blue bag contamination rates in the other communities were high at between 19.19% (Badger) and 27.93% (Gander).

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[24] Calc: (35.57lb. – 24.69lb.)/24.69lb.

3.9 Comparisons - 2016, 2017, 2020 & 2022 Audits

Since the same methodology was used in four of the five audits[25] conducted for CNWM, comparisons can be made as detailed in Table 14.

Table 14: Comparison of All Central NL Curbside Waste Audits

	2016	2017	2020	2022
Curbside Household Waste Generation (lb./week)	27.95	25.38	25.95	24.69
Blue Bag Contamination	19.77%	18.32%	26.67%	29.59%
Clear Bag Contamination	8.46%	8.52%	12.51%	12.80%
Diversion Rate	12.60%	14.22%	9.40%	9.26%
Capture Rate	63.85%	66.90%	52.23%	49.03%
Diversion Opportunity	19.51%	21.26%	18.00%	18.89%
Clear Bag Contaminant Type				
Deposit Bearing Containers (#)[26]	135	202	183	220
Batteries (#)	29	21	40	93
Blue Bag Contaminant Type				
# Deposit Bearing Glass	12	20	49	6
# Glass Food Containers	26	9	5	15

When the Sort It Central program was implemented, one of its objectives was to increase the diversion of recyclables. Key takeaways from the data indicate that this objective is decreasing. When comparing 2016 results (baseline year) to the latest findings, it is seen that:

- Blue bag contamination rates have increased by almost 50%;
- clear bag contamination increased by over 51%;
- waste diversion rate decreased by almost 27%;
- capture rate decreased by over 23%; and
- diversion opportunity has reduced by over 3%.

The decline in program performance metrics should be concerning to CNWM. Positive data was seen after the 2017 audit; however key indicators have started trending in the wrong direction after that. A reflection of past activities around the 2016/17 timeframe may be useful to understand what activities were supporting program success at that time. Furthermore, data from audits can help in the development and maintenance of a strategy to enhance program performance.

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[25] The audit conducted in 2015 used a different methodology that did not allow accurate estimation of capture rates for appropriate comparison.
[26] Includes glass.

3.9.1 Individual Communities

Table 15 compares waste disposal practices between communities during the 2016, 2017, 2020 and 2021 audits.

Table 15: Comparison of Audited Waste by Community

| Community | Audit Year | Audited Waste (lbs.) | | | Household Waste Generation (lbs./week) | % Contamination | |
		Clear Bag	Blue Bag	Total		Clear Bag	Blue Bag
Badger	2016	423.08	89.32	512.40	25.62	8.36%	31.55%
	2017	457.68	61.80	519.48	25.97	10.50%	9.00%
	2020	496.17	73.45	569.62	28.48	10.75%	30.23%
	2022	627.72	83.63	711.35	35.57	11.63%	19.19%
Grand Falls Windsor	2016	494.20	76.80	571.00	28.55	7.95%	10.13%
	2017	487.40	82.98	570.38	28.52	9.99%	16.12%
	2020	412.75	66.88	479.63	23.98	16.12%	35.55%
	2022	346.64	22.71	369.35	18.47	16.66%	1.64%
Gander	2016	683.75	144.26	828.20	41.41	9.08%	12.14%
	2017	315.32	114.96	430.28	21.51	11.92%	20.23%
	2020	375.53	50.78	426.31	21.32	13.25%	14.14%
	2022	250.82	70.82	321.64	16.08	10.77%	27.93%
Norris Arm	2016	303.24	64.56	367.80	18.39	6.15%	36.86%
	2017	470.18	66.86	537.04	26.85	9.87%	21.15%
	2022	466.70	63.84	530.54	26.53	14.12%	25.33%
Appleton	2016	451.92	63.88	515.80	25.79	9.73%	14.81%
	2017	402.92	106.33	509.25	25.46	9.82%	21.61%
	2020	621.30	102.14	723.44	36.17	12.62%	22.71%

Gander is the only community that appears to be consistently showing a decrease in waste generation. On the other side, Badger consistently shows an increase in waste generation. Comparing to results of the most recent audit, the contamination of clear bags were seen to increase in Badger and Grand Falls Windsor, however, these two communities have shown decreases in blue bag contamination; Badger reduced its blue bag contamination by almost 37% and Grand Falls Windsor by about 46%.

3.9 Regional Comparisons

MMSB used the same audit methodology across the province, allowing for regional comparison of the data collected. In making these comparisons, please note that blue bag collection is done biweekly by the City of St John's, as such the data for these two regions has been adjusted[27] to allow for appropriate comparisons. Table 16 provides detailed comparisons between regions audited within the province.

Table 16: Regional Comparison of Curbside Waste Audits

	Audit Year	Curbside Waste Generation (lb./hh/week)	Blue Bag Contamination	Clear/Black Bag Contamination	Curbside Diversion Rate	Curbside Capture Rate	Curbside Diversion Opportunity
CNWM	2022	24.69	29.59%	12.80%	9.26%	48.38%	19.03%
	2020	27.46	26.67%	12.51%	9.40%	52.23%	18.00%
	2017	25.66	18.32%	8.52%	14.22%	66.90%	21.26%
WRWM	2021	23.94	11.32%	11.54%	6.40%	39.37%	9.03%
	2020	25.95	6.35%	10.05%	8.41%	56.62%	14.85%
	2019	25.38	14.93%	7.33%	18.70%	77.82%	24.03%
St. John's	2020	31.13	4.91%	14.49%	12.64%	45.93%	19.56%
	2019	29.87	4.02%	17.17%	9.78%	41.38%	23.63%

Waste generation was the lowest in western. Blue bag contamination was highest in central with almost a third of the blue bag contents deemed as contamination.

In comparing the 2022 performance of central to other regions and the City of St. John's, capture rate is higher than the City of St John's. Previous provincial audit data and information from other provinces suggest that mandatory recycling programs strongly influence participation and efficiency.

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[27] As noted, central and western NL collect blue bags weekly, therefore, to compare appropriately, the City's blue bag data is halved.

4. Recommendations

The findings of this audit show that all key program metrics are trending in the wrong direction. The data collected from audits should be used to create a roadmap for continued improvement of the mandatory recycling program. MMSB offers the following recommendations to help inform opportunities and changes that will help increase diversion and capture rates.

Setting Goals and Monitoring Progress
There are clear opportunities to capture more recycling through the program. By setting internal goals for capturing more recyclable material, CNWM can implement the necessary steps to return to the success it had after the program was launched.

It would also be useful to monitor participation and set-out rates. With a ratio of almost four garbage bags to one recycling bag set out by 100 households during the week of the audit, it is evident that CNWM needs to review and address the levels of participation in its mandatory program.

CNWM could either conduct or work with community partners to complete a four to eight-week household recycling participation study to investigate whether households place blue bags at the curb each collection day, as well as how many bags are set-out. This information can be valuable in targeting education and enforcement activities. Research is the foundation of any effective strategy.

Public Education & Enforcement
MMSB encourages CNWM to share the findings of this audit with its residents, especially within the five communities audited. This can provide an educational opportunity to raise awareness about important topics such as contamination and what is accepted in the recycling stream.

MMSB is currently working with regional and municipal stakeholders to educate residents on blue bag programs. CNWM could also explore further partnership opportunities that would enhance touchpoints with residents. For example, partnering with Heberts Recycling to tell the story of what becomes of your recycling can help address skepticism amongst residents. Containing this information on your website will also provide a good resource to residents and stakeholders.

MMSB encourages CNWM to create a strategic public education plan to ensure awareness activities are sustained and continue to achieve results. A successful strategy should have clear objectives, key messages, and an actionable plan to effectively communicate with residents. These audits provide a means to measure success, as well as an opportunity to identify areas that may require more attention. For example, looking at the capture rates listed in tables 8 – 11, CNWM can design a

campaign to target materials with the largest quantities of recyclable materials in clear bags, many of which have less than 50% capture rate or materials with the lowest capture rates. A campaign could also be designed to target a particular waste stream, for example, recyclable paper which was almost six percent of waste assessed in clear bags. The plan should also address effective enforcement tactics that can be used to support awareness activities.

In terms of enforcement, bags that are clearly contaminated represent an opportunity for the collector to both educate and enforce non-compliance with the program. CNWM collects waste from 63% of communities within its operational area as such, has considerable opportunity to both educate and enforce at the curb. As noted earlier in the report, there were three blue bags which were likely garbage placed into recycling bags found in one community alone. CNWM collects from this community and is in a position to engage in way that minimizes future contamination. Utilizing educational tools that can be used to reject contaminated bags can help with the education of both the collector and resident.

Another potential enforcement action is to include spot checks/visual assessment of blue bags when they are tipped at the waste transfer stations, especially on loads coming from the other 37% of communities who do their own collection. If loads are deemed to be significantly contaminated, CNWM should inform the community and apply a non-compliance fee. These spot checks can be done at random or periodically and will send a strong message to all stakeholders.

Finally, in 2018, CNWM piloted the use of a dedicated resource for enforcement. Although the results of this pilot were mixed relative to its objectives, it did underpin the importance and pivotal role curbside enforcement has in decreasing contamination. CNWM should explore ways of taking lessons learned from this pilot to develop a curbside education and enforcement program. It could borrow from the experiences of WRWM who successfully piloted the use of a dedicated resource for public education, a pilot that has now become fully embedded in that organization's operations.

Bag Limits
Bag limits are a policy that simply restricts the number of bags/containers of waste that a household can set out for each collection cycle. Communities in the region (even those served by CNWM) set their own bag limits and at least two of the communities assessed have no bag limits. Permitting residents to set out unlimited waste creates no incentive to participate in recycling or any other waste diversion activities. It is recommended that this policy be reviewed especially where CNWM completes collections. Note that unless there is curbside enforcement, bag limits as a policy is ineffective.

Organics
Organic waste makes up over 38% of the contents in clear bags put to the curb in the region. In the absence of a regional organic waste diversion program, focus should be given to partnering with municipalities to develop community-based composting and actively promoting backyard composting within the region

Community composting is described as an environmental movement involving initiatives in a wide range of communities to close the loop on organics recovery. At its essence, community composting is about processing organic waste as close to the sources that generate them. Community composting includes a number of approaches, many of which are not new to Newfoundland and Labrador. For example, the MMSB Backyard Compost Bin Distribution Program[28] is an approach to community composting. Other approaches include the deployment of small-scale in-vessel systems in a number of settings including community gardens and schools.

These systems have been proven to work and present CNWM the opportunity to collaborate with its community partners by supporting and developing such programs as part of its service offerings.

Textiles
Textile diversion also represents a meaningful opportunity. An estimated 790.65 MT of textiles were landfilled by residents of central in 2021. CNWM should share information about the opportunity inherent in textiles with organizations like the Salvation Army or Diabetes Canada who have a well-established model of used textiles recycling.

Household Hazardous Waste
There was a total of 93 batteries[29] found in clear bags during the audit which extrapolates to 1,571,700 batteries landfilled in 2021. Hazardous waste may contain potentially harmful materials that can pollute the environment when not disposed of correctly. CNWM should consider strategic partnerships to increase accessibility to battery recycling. Even though the seven transfer stations and public drop off collect hazardous materials, CNWM could promote additional options for recycling available through Call 2 Recycle. There are some locations in the central region already partnering with Call 2 Recycle, however CNWM could engage with, and encourage additional communities and businesses to contact the organization and increase collection points.

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[28] Each year, MMSB partners with municipalities across the province to offer compost bins to residents at a reduced cost. Communities that participate in the Compost Bin Distribution Program are required to host free Learn to Compost information sessions to help residents learn to maintain their bins and gain the necessary knowledge to compost successfully.
[29] Note that batteries were found in bags from all five communities from which bags were sampled.

5. Conclusion

The objective of this audit was to assess the effectiveness of the mandatory clear and blue bag program implemented in central Newfoundland in 2015. Based on the results of the 2022 audit and the documented decline in diversion and capture rates, it can be concluded that the program could be more effective and requires improvements.

By carrying out work to bolster program specifics and robustly adopting the recommendations made in this report, MMSB believes that the diversion of additional waste is achievable. The results of this report should be used to support and direct campaigns to enhance capture rates and reduce contamination. MMSB looks forward to working with CNWM on future analysis and the recommendations contained within this report.

6. Appendices

Appendix 1: Garbage Sorting Categories

Category 1: Paper	
Secondary Category	Description/Examples
Newsprint	Non-glossy; color flyers, daily papers
Printed Paper	Glossy; magazines and catalogues, telephone books, printer paper, envelopes, books if cover removed, shredded paper
Corrugated Cardboard	Corrugated cardboard boxes, pizza boxes and tubes
Boxboard	Thin paper board boxes (cereal, crackers, tissue, etc.)
Molded Pulp	Egg cartons, take-out beverage trays
Books	Books (hard and soft cover)

Category 2: Paper Containers	
Secondary Category	Description/Examples
Gable Top (Milk)	Milk
Gable Top (Non-Milk)	Non milk, egg whites, molasses, sugar
Aseptic (Tetra) (Non-Beverage)	
Gable Top (Beverage)	Juice cartons, almond beverage, cashew beverage
Aseptic (Tetra) (Beverage)	Juice boxes, wine cartons, etc.
Gable Top (Milk)	Milk

Category 3: Plastic Containers	
Secondary Category	Description/Examples
#1 PET[30] (Beverage)	Single-use water, juice, and pop bottles;
#2 HDPE[31] (Beverage)	Bottles and jugs
#3 PVC[32] (Beverage)	Clamshell packaging
#4 LDPE[33] (Beverage)	Bags, bottles, tubs, and containers
#5 PP[34] (Beverage)	Cups and take-out packaging, jugs, and tubs

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[30] Polyethylene Terephthalate
[31] High-Density Polyethylene
[32] Polyvinyl Chloride
[33] Low-Density Polyethylene
[34] Polypropylene

#7 Other[35] (Beverage)	Durable containers, packaging, polycarbonates and mixed resins, Deposit Beverage Pouches
Non-EPS[36] (#1 PET)	Rigid containers and jars - clear, colored, and black, thermoform - Other Bottles and Jars: #1, cooking oil, peanut butter, dish soap, mouthwash, etc. (excluding bottles that contained HHW), bakery, clamshells, trays, openable trays, egg cartons
Non-EPS (#2 HDPE)	Pails, buckets and drums > 5 liters, bottles/jugs [other bottles and jugs: #2, laundry soap, shampoo, windshield washer fluid, etc. (excluding bottles that contained HHW)], tubs/lids (wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.)
Non-EPS (#3 PVC)	Bottles and Jars: #3 bottles and jars, lotions, soaps, bug repellents, shampoos, etc.
Non-EPS (#4 LDPE)	Squeezable bottles and containers,
Non-EPS (#5 PP)	Pails, buckets > 5 liters
Non-EPS (#6 PS[37])	Trays, clamshells, lids, pill and vitamin bottles, seedling trays, medication bottles, coffee cup lids, cups, clamshells, take-out food packaging, etc. Etc.

Category 4: Metal Containers	
Secondary Category	Description/Examples
Aluminum cans (Beverage Cans)	Pop and juice cans
Aluminum cans	
Aluminum foil	Foil wrap
Aluminum trays	Catering trays, pie plates, etc.
Steel cans	Large soup cans
Steel cans (Beverage)	Juices, coconut water, beer, Chinese tea

Category 5: Glass Containers	
Secondary Category	Description/Examples
Glass Containers - Food Containers	Clear and colored , jam jars, pickle jars, seafood sauce, salsa jars
Glass Beverage Containers - Deposit Bearing	Refundable containers, beer, liquor, and pop (Jones Soda, Coke, Fanta etc.)

Category 6: Organics

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[35] BPA, Polycarbonate and LEXAN
[36] Expanded Polystyrene
[37] Polystyrene

Secondary Category	Description/Examples
Food Waste (Unavoidable)	Unavoidable food waste arising from food/drink preparation (bones, egg shells, tea bags, peels, oil, fats), coffee grounds and filters
Food Waste (Avoidable)	Plate scrapings, Unfinished meals, whole fruits/vegetables, whole meats/fish, baked goods, dairy (yogurt, cheese, butter), Candy/Snacks (chips, candy, nuts), Condiments/Sauces, pet food
Food Waste (Avoidable - Food in Sealed Containers)	Food in sealed containers (Sour cream container, dipping sauce containers), Liquids (drinks, oils in package),
Compostable Ware	Compostable packaging, coffee cups, cutlery; wooden stir sticks, bamboo, serve ware, wooden chopsticks, etc.
Yard Waste	Flowers, potted plants, dead leaves

Category 7: Textiles	
Secondary Category	Description/Examples
Clothing	Clothing, lingerie, socks, costumes, snowsuits, swimwear, etc.
Household Textiles	Linens, towels, curtains, tablecloths, pet clothes, etc.
Footwear	Footwear, sport shoes, insoles,
Accessories	Bags, purses, backpacks, gloves, mittens, hats, scarves, wallets, etc.
Soft Toys	Stuffed toys and animals
Others	Masks, pet collar and leashes

Category 8: Household Hazardous Waste (HHW)	
Secondary Category	Description/Examples
Batteries	Alkaline cells, Zinc-carbon cells, Mercury cells, Lithium cells, Silver-Oxide cells
Toner cartridges	Printer toner cartridges
Personal Care	Nail polish, Nail polish remover, Hair coloring, Mineral or baby oil, Petroleum jelly, Anti-bacterial and antihistamines, Medications and vitamins, Perfumes, and fragrances, Rubbing alcohol, Hydrogen peroxide, Ointments
Household Cleaners	Bleach, ammonia, mildew remover, all-purpose cleaner, tub and tile cleaners, drain openers, carpet and upholstery cleaners, glass cleaners, laundry products
Aerosol cans	Oven cleaner, insect spray, spray paint, air freshener spray, hair spray, hair mousse, shaving cream, spray foam insulation
Electronic Waste	Display devices such as TVs and monitors, phones (telephones, cellular & smart phone devices, pagers), home audio/video systems, desktop & portable computers, computers peripherals, desktop printers/multi-function devices (scanners, fax machines),

	personal/portable audio/video systems, home theatre in-a-box (HTB) systems, vehicle audio/videos systems (aftermarket), external storage drives & modems, global positioning systems (SPG) personal portable & vehicle (aftermarket), countertop, microwave ovens, tablets and electronic readers, video game device (consoles, handheld devices & controllers)
Lightbulbs	Compact fluorescent lightbulbs (CFLs),
Paint cans	Undercoat, Anti-rust paint, Block filler, Deck and Floor paint or coatings (including elastomeric), Drywall paint, Melamine, Stain blocking paint, Stucco paint, Swimming pool paint (only single component), Textured paint, Wood finishing oil, Wood preservatives, Water repellant, Aerosol paint (craft, automotive and industrial),
Pharmaceuticals	Sharps, medications
Car Care	Oils, filters, oil containers, aerosol containers, glycol (antifreeze), glycol (antifreeze) containers

Category 9: Special Care Waste	
Secondary Category	Description/Examples
Diapers	Children and adult
Hygiene products	Feminine hygiene products, cotton balls, dental floss, Q-tips, etc.
Animal/Pet Waste	Litter/Feces, Carcasses
Other	Bandages, IV bags, etc.
Masks - Disposable	Disposable surgical masks, N95s or similar
Masks - Reusable	Reusable masks and face coverings
Gloves	Nitrile or latex gloves
Wipes	Single-use disinfectant wipes, baby wipes

Category 10: CRD Waste	
Secondary Category	Description/Examples
Wood	Clean, painted/stained, Pressure-treated, Plastic wood
Wallboard	Clean, coated
Shingles	Asphalt, Other
Flooring	Wood and composite, tile, carpet, other
Insulation	Fiberglass, foam (polystyrene)
Glass	Window and door
Countertops	Laminate, slate, marble, granite

Ceiling Tile	Fiberglass/Cork/other

Category 11: Other Materials		
Secondary Category		Description/Examples
Other		Fines, mixed material items (binder), dentist masks, tape, glue, cig butts, elastics, rubber gloves, hand lotion, tubes, mop head, coffee cups, water bottles, office supplies, dryer, lint, gum, popcorn bags, black rot, aluminum foil with food stuck on it, painted wood, dental floss, LED light bulbs
Non-Recyclable Paper	Soiled Paper	Tissue paper, paper towels, napkins
	Other Paper	Cotton balls, cigarette foils, A&W wrappers, ice cream containers, dog food bags as they have a liner, waxy paper, paper coffee cups, ice cream box, tetra soup box, gift bags with tassels,
	Contaminated Recyclable Paper	
Paper Cups	Paper Packaging Liquids	
Liquids in Closed Containers		
Non-Recyclable Plastic	#2 and #4 polyethylene film	Stretchy plastic films - film wrap, grocery/retail carry out bags, Sandwich/Freezer Bags, Ziploc and other food use bags
	Other film packaging	Kitchen catchers, garbage bags, commercial wrap
	PET, PVC, LDPE Stretch and PP Films, Multi-laminated plastic packaging	Non-stretchy plastic films including Dry cleaning bags, bread bags, frozen food bags, milk bags, toilet paper and toweling over-wrap, lawn seed, soil, peat moss, fertilizer, multi- layer plastic films; meat, poultry, and fish wrap; vacuum sealed bacon; luncheon meat and cheese; cereal liners; chip bags and other snack food bags; candy wraps; pasta bags; boil in a bag; plastic based food pouches; bubble wrap; cling wrap; etc.
	Uncoded	Blister packaging, tubes for pharmaceutical & health care/cosmetic products, plant pots, unmarked/coded packaging, etc.
	Plastic Strapping	Plastic binding for newspapers, packages, etc.
	Other Plastics	Non-packaging such as VCR tapes, CDs, toys, games, plant

		pots, Tupperware, furniture, siding, plumbing pipes, etc., plastic straws, plastic utensils, Coffee Pods, Pens, tooth brushes, gift cards, straws, cutlery, etc.
	Compostable Plastics	Food ware, bags
	Contaminated Recyclable Plastics	
Other Glass and Ceramics		Cups, plates, mirrors, window glass, non-LED or fluorescent lightbulbs, candles, ceramic, and porcelain
Non-Recyclable Metal		Coat hanger and other metal