

Memo



To: Shannon Betts, Halifax Regional Municipality
From: Sarah Devereaux, Project Manager, Partner
Date: April 30, 2024
Subject: Solid Waste Strategy Review: P2-Benchmarking
Our File: 23-6547-1004

1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by the Halifax Regional Municipality (HRM) in July 2023 to support a review of HRM's Solid Waste Strategy. One of the key activities is a benchmarking exercise to compare HRM's solid waste management systems with 12 Canadian jurisdictions that have mature solid waste diversion programs. The review included a combination of research through a desktop study and direct jurisdiction responses to a standardized questionnaire.

1.1 Purpose

Typically, benchmarking exercises are a systematic process in which a municipality can compare its performance and process against those of other jurisdictions to support in identifying best practices, areas for improvement and potential opportunities. The goal of benchmarking is to gain insights to enhance program performance.

This benchmarking exercise is intended to provide HRM with a means to evaluate the efficiency of solid waste management programs and explore the available opportunities to improve the waste management programs for the residential and Industrial, Commercial, and Institutional (ICI) sectors.

1.2 Methodology

Dillon provided HRM with a list of 15 Canadian jurisdictions that could be researched including an overview of their program design, service levels and population. In consultation with HRM, Dillon refined the list of jurisdictions to 12 for benchmarking. More information on the jurisdiction selection is provided in **Section 5.1**.

This research gathered data and key performance indicators from 2019 to 2022 for the following indicators:

- Municipal Solid Waste (MSW) disposed per capita (residential and ICI);
- Diversion rate (residential and ICI);
- Weight of residential material collected and diverted per household/capita; and
- Cost per tonne of residential collection (per waste stream), disposed and diversion.

Participating jurisdictions were provided with a questionnaire to complete and were requested to participate in the benchmarking exercise via an email request. In addition to using data provided directly by jurisdictions, some additional data was drawn through desktop research, and in particular for Ontario jurisdictions, Resource Productivity and Recovery Authority (RPPRA) Datacall data was used.

In addition to the benchmarking exercise, Dillon provided an overview of HRM's current solid waste management system and population in **Section 2.0**, waste generation in **Section 3.0** and waste projections for HRM in **Section 4.0**. These sections were completed based on information provided to Dillon by HRM.

In **Section 5.3**, key themes and findings from the benchmarking are provided, including analysis on HRM's performance relative to other jurisdictions.

HRM's Waste Management System

This section of the memo outlines HRM's current solid waste management system and future solid waste generation forecast. This includes information on the following:

- Program design and service levels;
- Population;
- Current waste generation; and
- Waste generation forecast.

Program Design and Service Levels

HRM's solid waste collection service is provided for three streams:

- Garbage (e.g., refuse, trash, and discarded materials);
- Organics (e.g., food waste, leaf, and yard waste); and
- Recyclables (e.g., plastic, metal, glass containers and paper and cardboard).

For the purposes of collection, HRM has been divided into eight collection areas. **Table 1** summarizes the waste collection services provided in HRM, including the acceptable items, frequency of collection and acceptable set out and limits for collection.

Table 1: Summary of Waste Collection Services in HRM

	Garbage	Recyclables	Organics
Materials collected	Garbage, bulky items, and appliances	Two-stream collection: Plastic, metal, glass containers in a separate bag from paper products and cardboard.	Food waste and leaf and yard waste (no grass clippings).
Frequency of collection	Bi-weekly	Biweekly	Bi-weekly, except for during July, August, and September, when it is collected weekly.
Acceptable set out and limits – single-family	Garbage is to be set out for collection in clear bags, with one black privacy bag allowed. Bags can be placed in garbage cans. Bags cannot weigh more than 25kg. Limited to 6 bags per week. Bundles of construction and demolition debris may be placed out for collection, with a limit of 5 bags being substituted for bundles. Bulky item and white goods collection is limited to one item per collection day.	Recyclables must be set out for collection in blue or clear bags, and corrugated cardboard may be bundled. There is no limit to the number of recyclables bags accepted.	HRM has provided 240L carts for organics collection and additional heavy paper bags may be used for leaf and yard waste. The maximum allowed weight is 100kg per green cart. Up to 20 leaf and yard waste bags, with a maximum weight of 25kg are accepted each green cart collection day. Tree waste can also be bundled, with a maximum of 5 bundles weighing 34kg per collection day.
Acceptable set out and limits – apartments up to 6 units	Garbage is to be set out for collection in clear bags, with one black privacy bag allowed per unit. Bags can be placed in garbage cans. Bags cannot weigh more than 25kg. Limited to 4 bags per unit per week. Bulky item and white goods collection is limited to 2 items per collection day. No construction and demolition debris allowed.	Same as above.	Same as above.

According to HRM projections, HRM has a current estimated population of 460,274 for FY 2021/2022. This is a 12.4% increase from 2016 when the population was 403,131.¹ This percent increase is higher than the percent increase in population as a whole for Canada, which was 5.2%.² Population growth in HRM is driven by a combination of natural growth (more births than deaths) and immigration, including international, interprovincial and within province migration.³ Compared to the rest of Canada, Halifax is the second fastest growing metropolitan area, following only Moncton.⁴ It is expected that over the coming years, HRM's population will continue to increase. Halifax's Inclusive Economic Strategy is targeting a population of 525,000 by 2027⁵ and the province of Nova Scotia is targeting a population of 2 million by 2060.⁶ HRM's total number of households was provided by HRM as the number of serviced units.

¹ [Statistic Canada – 2021 Census – HRM – statscan.gc.ca](https://statscan.gc.ca)

² [Statistic Canada – 2021 Census – Canada – statscan.gc.ca](https://statscan.gc.ca)

³ [Nova Scotia – Economics and Statistics – novascotia.ca](https://novascotia.ca)

⁴ [Nova Scotia – Economics and Statistics – novascotia.ca](https://novascotia.ca)

⁵ [Halifax Partnership – People. Planet. Prosperity. Halifax's Inclusive Economic Strategy 2022-2027 – halifaxpartnership.com](https://halifaxpartnership.com)

⁶ [CBC News “Nova Scotia's population is suddenly booming. Can the province handle it?” July 21, 2023 – cbc.ca](https://cbc.ca)

3.0

Waste Generation

HRM provided Dillon with monthly collected and disposed weights from fiscal year (FY) 2018/2019 through FY 2022/2023 for residential and commercial garbage, recyclables, and organics. This section of the report provides a summary of annual quantity of waste received.

3.1

Residential Waste Generation

A summary of total annual weights for the residential sector are provided in **Figure 1**.

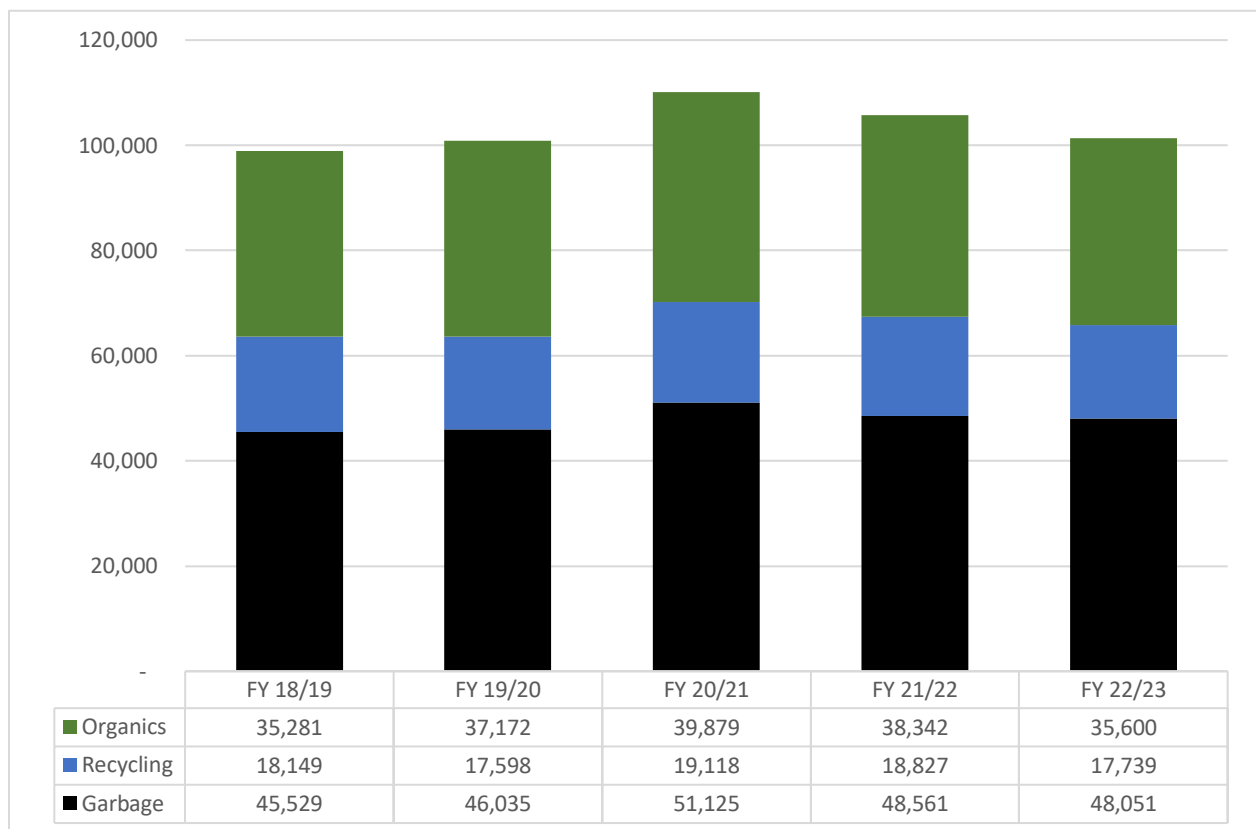


Figure 1: Annual Quantity of Residential Waste (tonnes)

The annual kilograms of residential waste per capita were also calculated for FY 18/19 to FY 22/23 for HRM. These results are outlined in **Figure 2**. Per capita waste generation is important to review as it can help identify trends in waste generation within a specific population. Per capita waste generation also allows HRM to compare waste generation to other municipalities. The trends observed in HRM include a general and ongoing decrease year over year with the exception of FY 20/21 where waste increased. This is likely due to the shift to work from home due to the COVID-19 pandemic. Waste generation decreases indicate current curbside programs are working well.

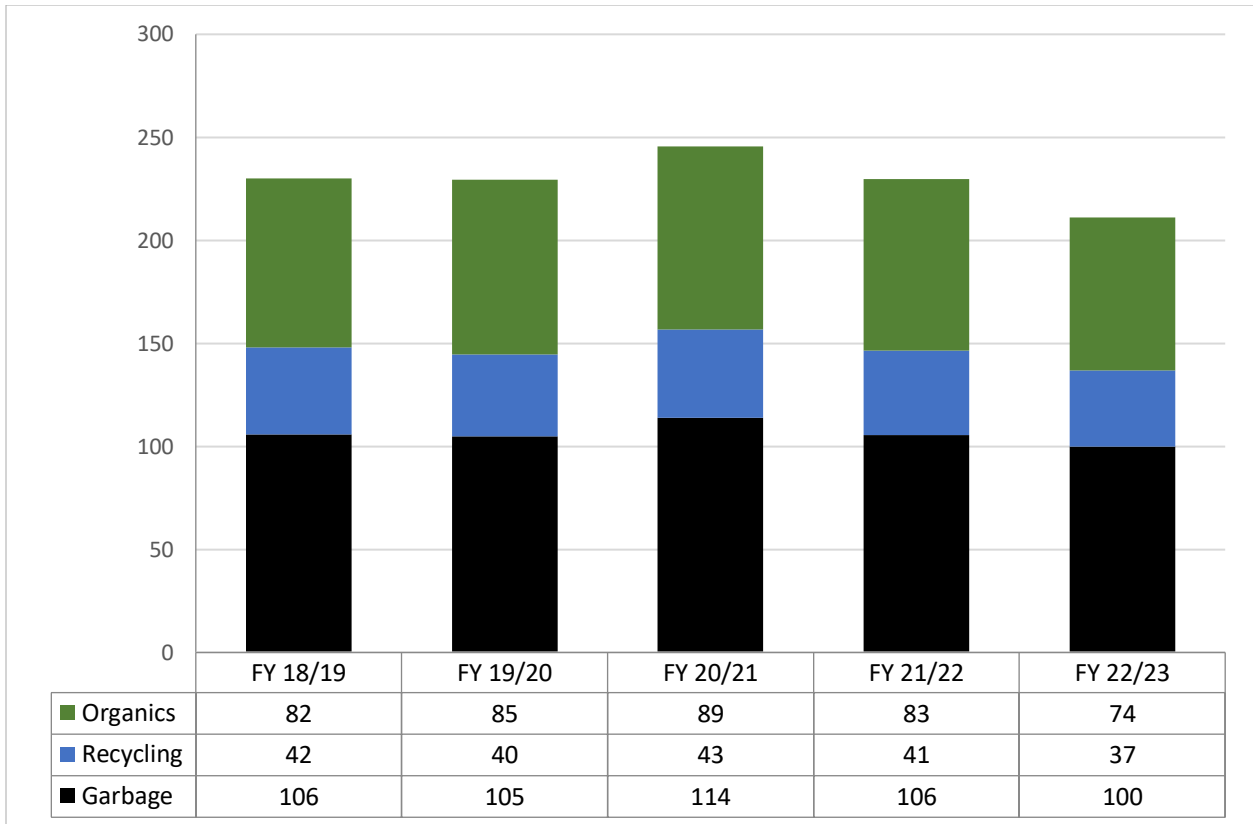


Figure 2: Annual Quantity of Residential Kilograms Per Capita, kg/person

The annual kilograms of residential waste per household were also calculated for these same fiscal years for HRM. These results are outlined in **Figure 3**. Household numbers were provided by HRM and based on the number of serviced units. Typically, waste generation decreases year over year, with the exception of FY 20/21. As noted above, this is likely due to the COVID-19 pandemic and the required shift to work from home.

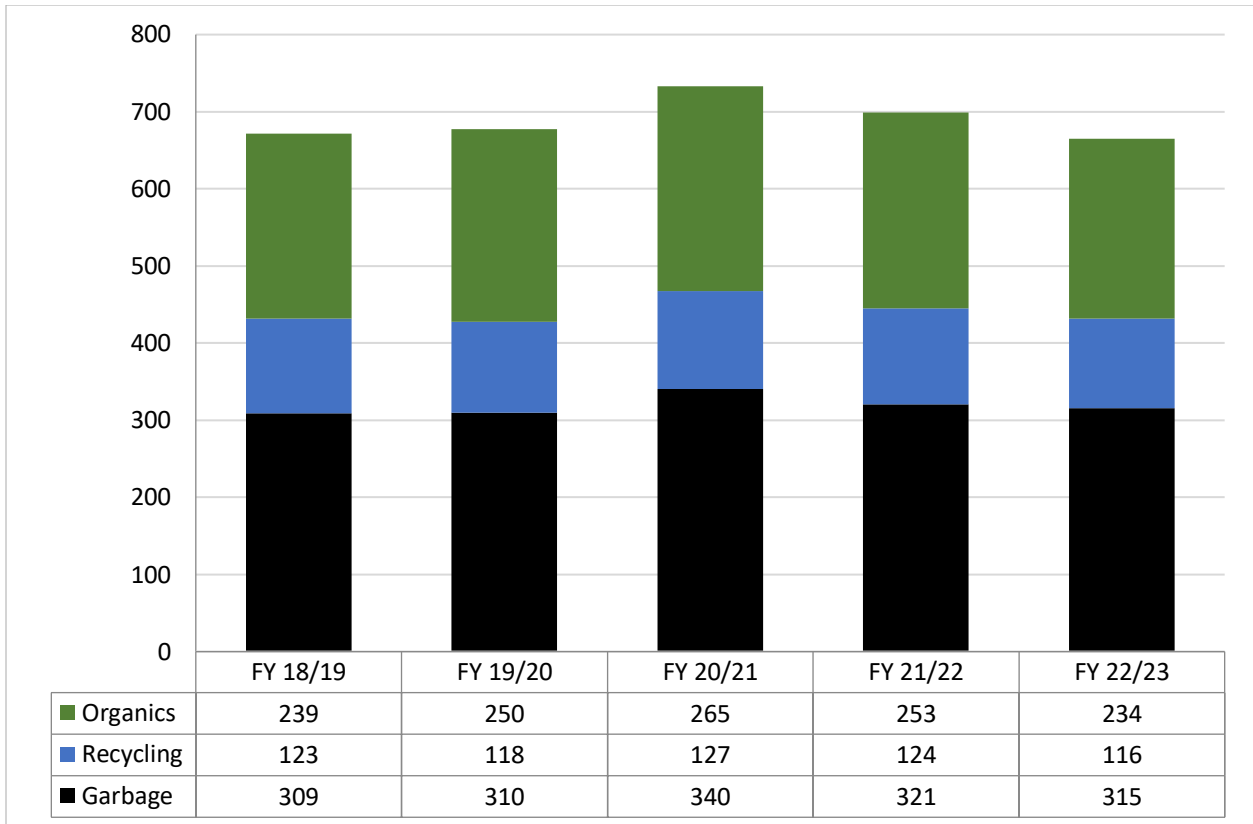


Figure 3: Annual Quantity of Residential Kilograms Per Household, kg/household

3.2 ICI Waste Generation

Annual ICI weight of waste for construction and demolition (C&D) materials, ICI garbage, recyclables and organics are and illustrated in **Figure 4**. C&D materials include disposed materials due to how HRM collects this data. This tonnage represents less than 25% of the total C&D received as per By-Law L-200 licencing requirements for C&D diversion.

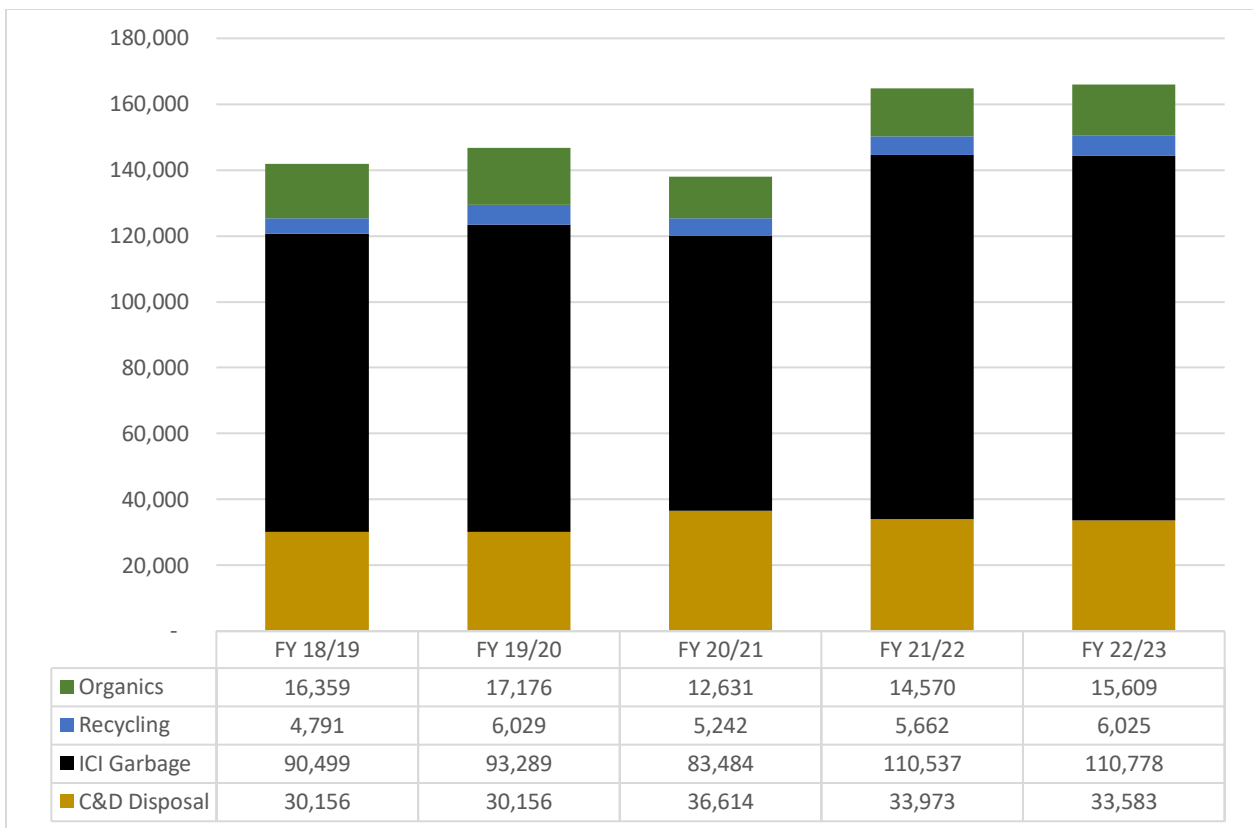


Figure 4: Annual Quantity of ICI Waste (tonnes)

The annual kilograms of waste per capita were also calculated for FY 18/19 to FY 22/23 for HRM's ICI sector. These results are provided in **Figure 5**.

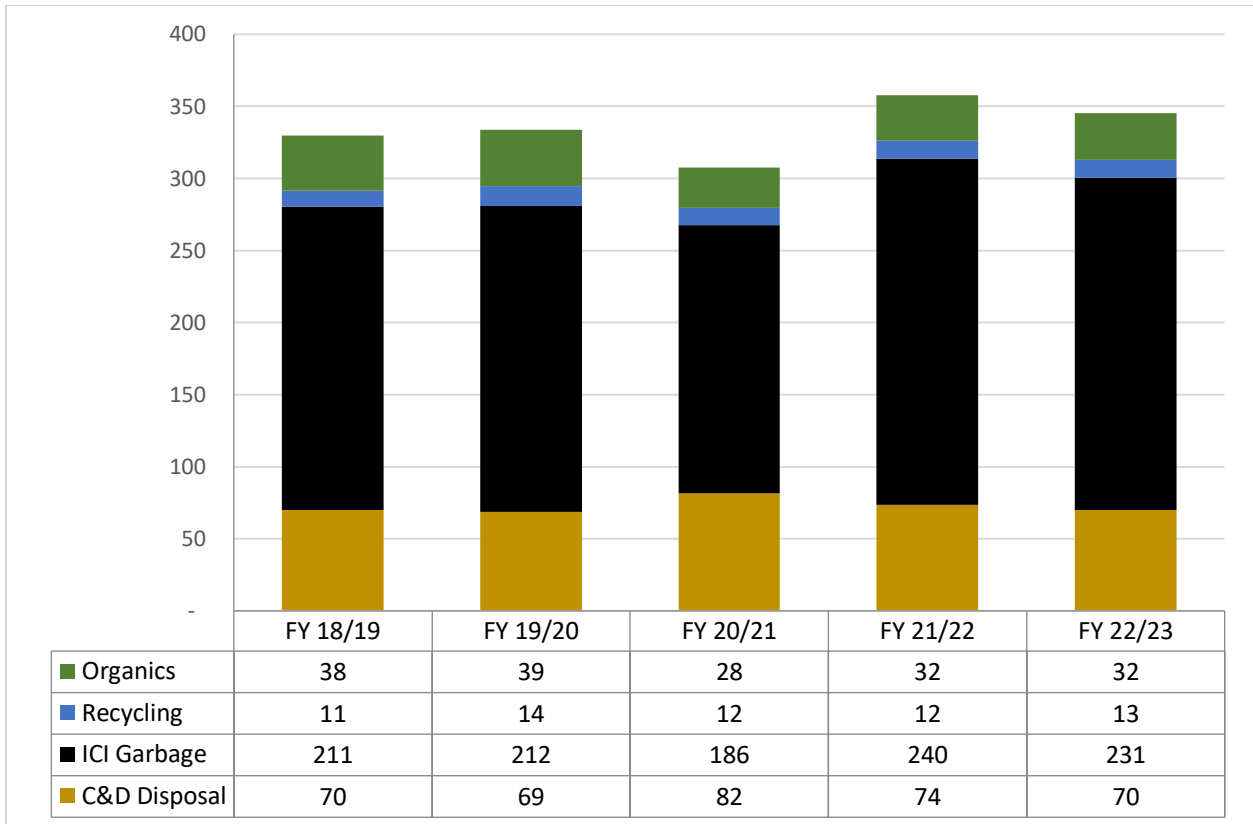


Figure 5: Annual Quantity of Waste Kilograms Per Capita, ICI (kg/person)

3.3

Overall Waste Generation

Figure 6 highlights the overall annual quantity of waste for both the residential and ICI sectors combined. FY 21/22 had the largest generation rate at 588 kg/person. FY 20/21 had the lowest with 553 kg/person.

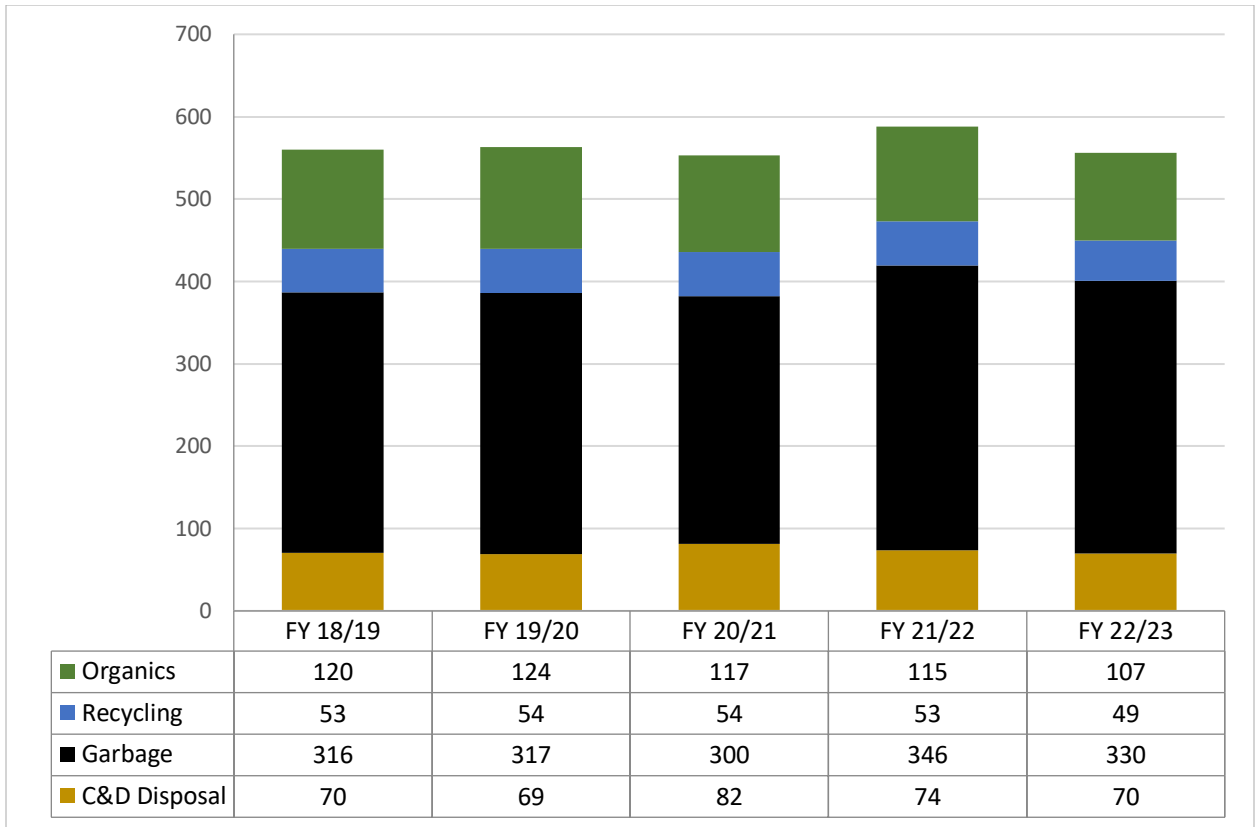


Figure 6: Overall Annual Quantity of Waste Kilograms Per Capita, HRM Total (kg/person)

Waste Generation Forecast

Monthly and annual received weights of waste outlined in **Section 3.0** were used to develop solid waste projections from FY23/24 to FY 51/52. HRM provided annual population planning projections for Dillon to use in the analysis. These projections were provided year over year. Overall, there were four scenarios of population growth considered including:

1. **Low Growth Scenario:** Based on an average population growth of 0.6% on an annual basis;
2. **Moderate Growth Scenario:** Based on an average population growth of 1.6% on an annual basis. This scenario is considered to be the most likely based on HRM's 1.82% per year of growth between 2016 and 2021;
3. **High Growth Scenario:** Based on an average population growth of 2.6% on an annual basis; and
4. **Nova Scotia Targeted Migration (NSTM):** Based on an average population growth of 3.1%.

Each scenario considers growth in both the residential and ICI sectors. Each sector's waste generation forecast is described in the subsections below. Tables with the annual weight projections for each scenario and waste stream from FY22/23 to FY 51/52 are provided in **Appendix A**.

Residential Waste Generation Forecast

For the residential sector the following assumptions for each waste stream are assumed, which were determined in consultation with HRM:

- Annual Per Capita Change in Garbage Stream: -1.0%;
- Annual Per Capita Change in Recycling Stream: -1.0%; and
- Annual Per Capita Change in Organics Stream: -0.2%.

Residential values are inclusive of a conservative median annual decrease in waste generation from FY 08/09 to FY 22/23. Through collaboration with HRM, outliers were identified in the data set and removed. On average, between FY 08/09 and FY 22/23, residential garbage decreased by 1.2%, recycling reduced by 2.5% and organics reduced by 0.2%. Typically, garbage is approximately 50% of the entire waste stream by weight for HRM. The low, moderate, high and NSTM growth scenarios are outlined in **Figure 7** through **Figure 10**, respectively. Overall, the figures illustrate the annual change in each waste stream over the planning period. As population growth rates increase, so do waste generation tonnages. Considering the annual change in each waste stream and the assumption that organics will have a lower annual change, organics generation is likely to exceed garbage generation rates with NSTM high growth rates.

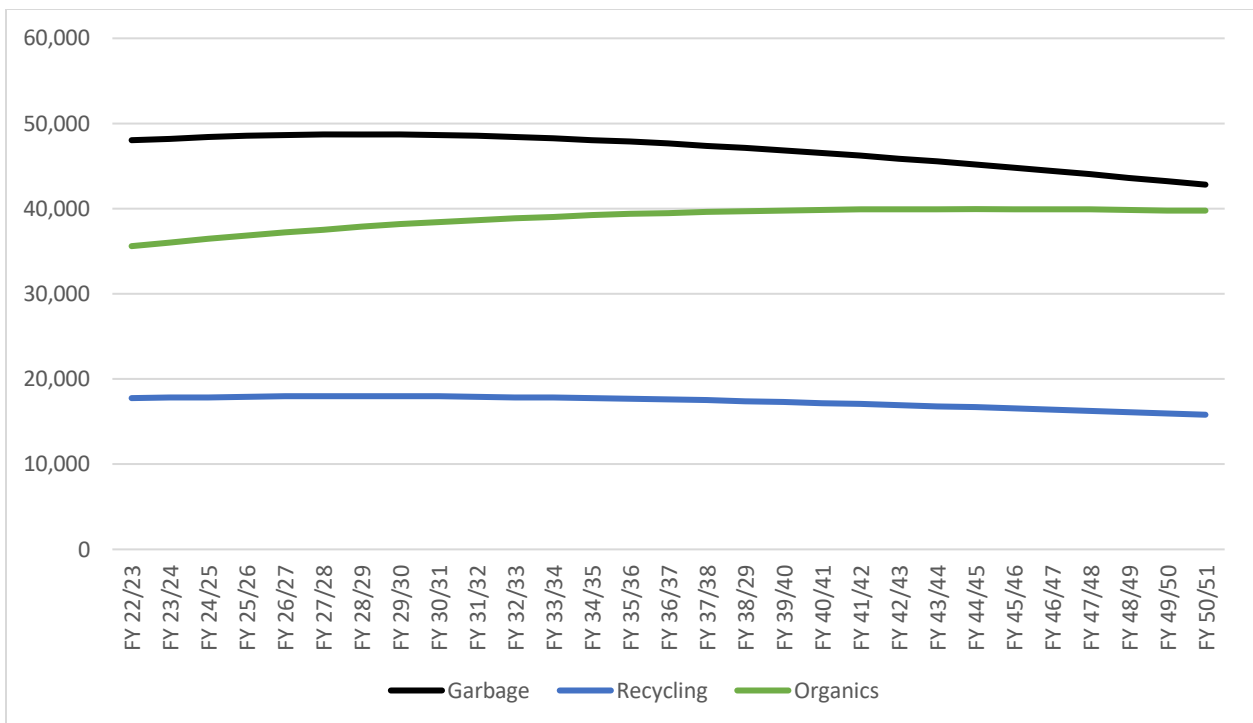


Figure 7: Low Growth Scenario – Waste Generation for Residential Projection (tonnes/year)

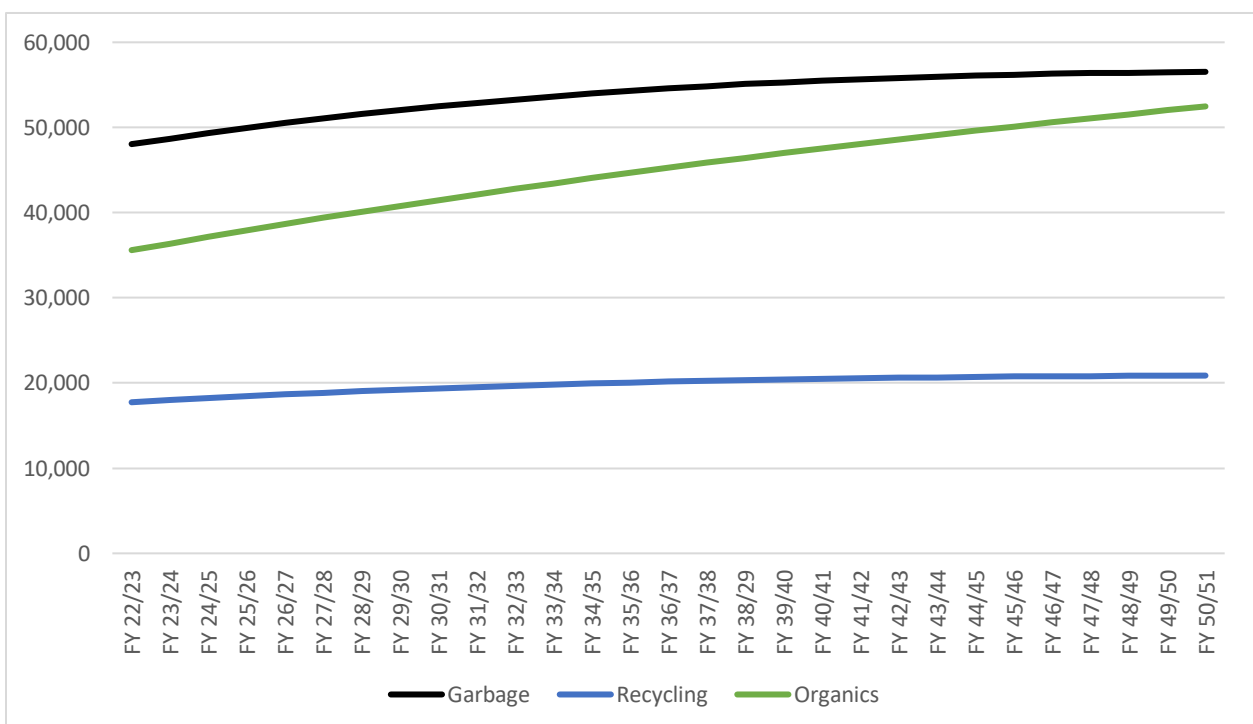


Figure 8: Moderate Growth Scenario – Waste Generation Residential Projection (tonnes/year)

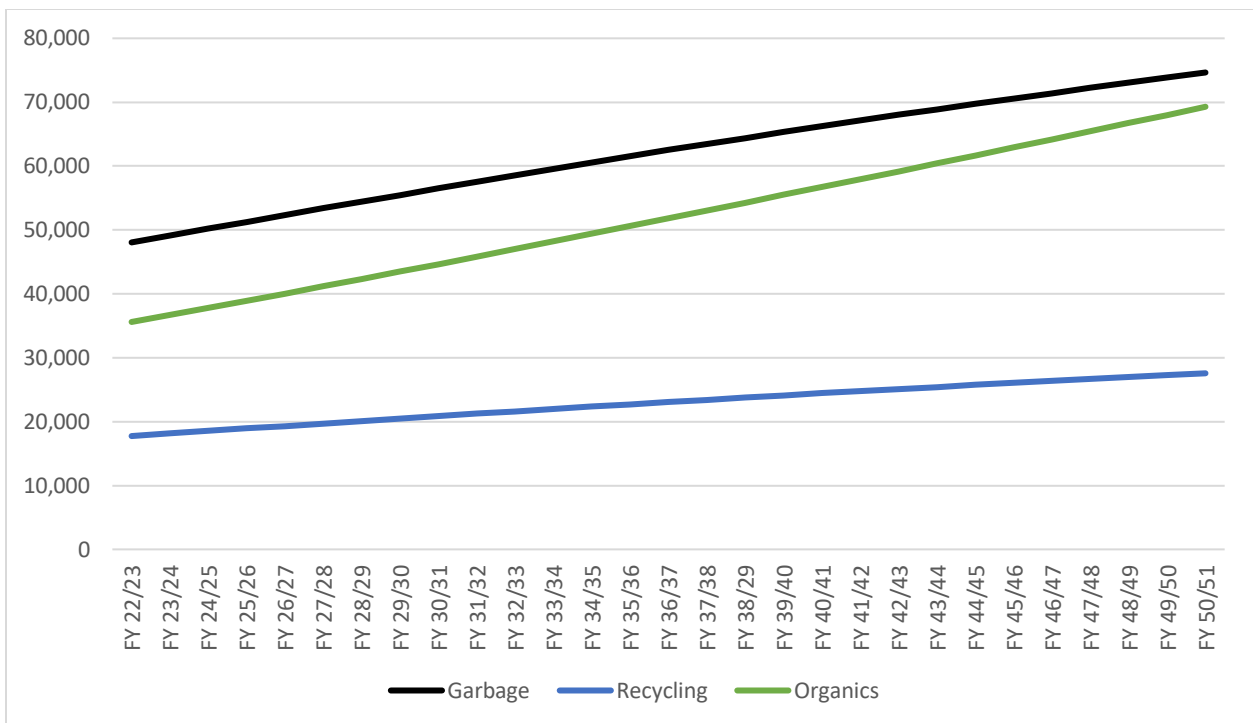


Figure 9: High Growth Scenario – Waste Generation for Residential Projection (tonnes/year)

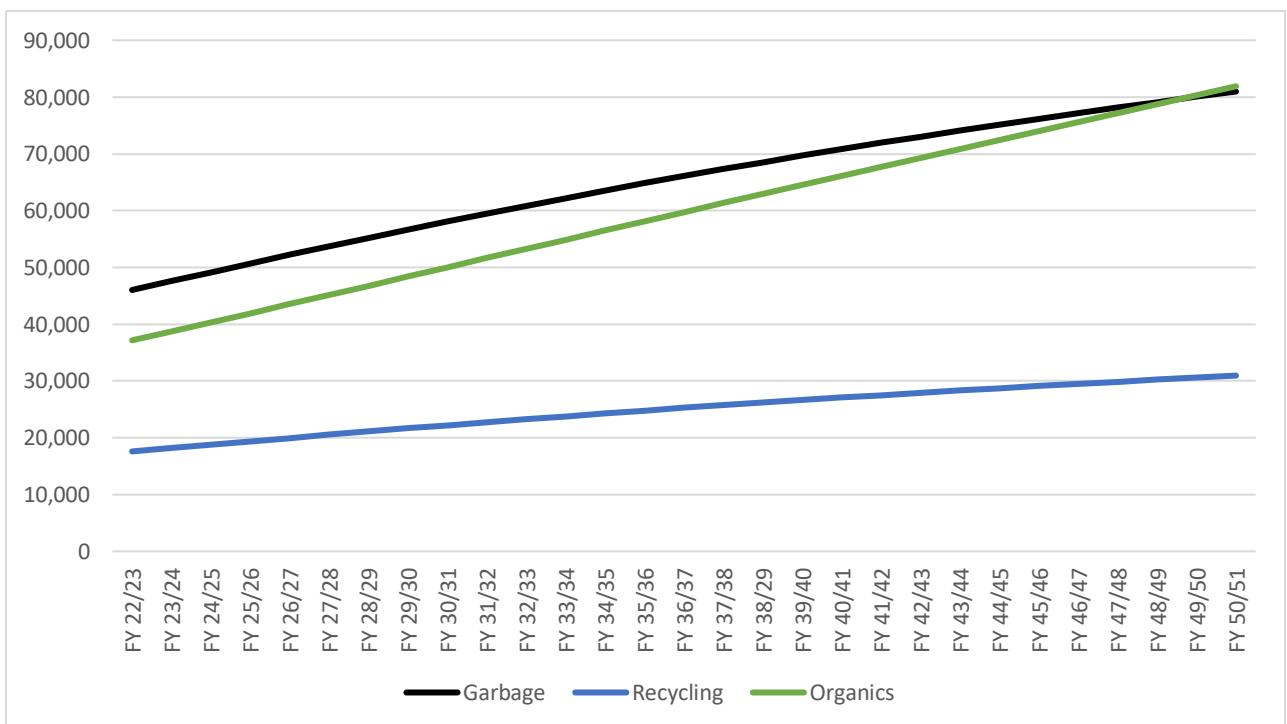


Figure 10: NSTM Growth Scenario – Waste Generation for Residential Projection (tonnes/year)

ICI Waste Generation Forecast

For the ICI sector the following are the assumptions for each waste stream:

- Annual Change Per Capita in Garbage Stream: -0.6%;
- Annual Change Per Capita in Recycling Stream: 1.6%;
- Annual Change Per Capita in Organics Stream: -0.6%; and
- Annual Change Per Capita in C&D Stream: 1.0%.

ICI values are also inclusive of conservative median annual decreases in waste generation from FY 08/09 to FY 22/23. On average, between FY 08/09 and FY 22/23, ICI garbage decreased by 0.8%, recycling increased by 3.1%, Organics decreased by 0.1% and C&D increased by 1.2%. The low, moderate, high and NSTM growth scenarios for ICI are outlined in **Figure 11** through **Figure 14**, respectively. Overall, the figures illustrate the annual change in each waste stream over the planning period. Considering the annual change in each waste stream, and the assumed population growth changes, the material with the largest changes is C&D waste. Recycling has the largest assumed percentage increase; however, the initial tonnage is quite small compared to C&D.

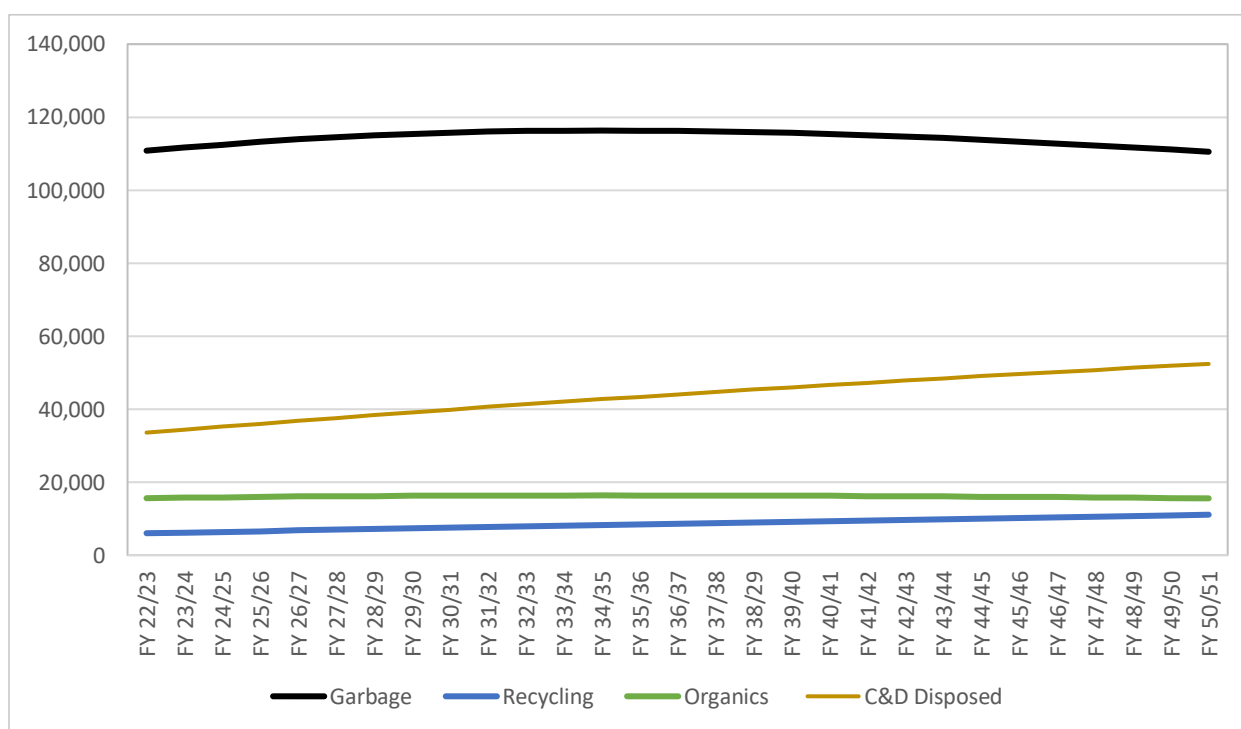


Figure 11: Low Growth Scenario – Waste Generation for ICI Projection (tonnes/year)

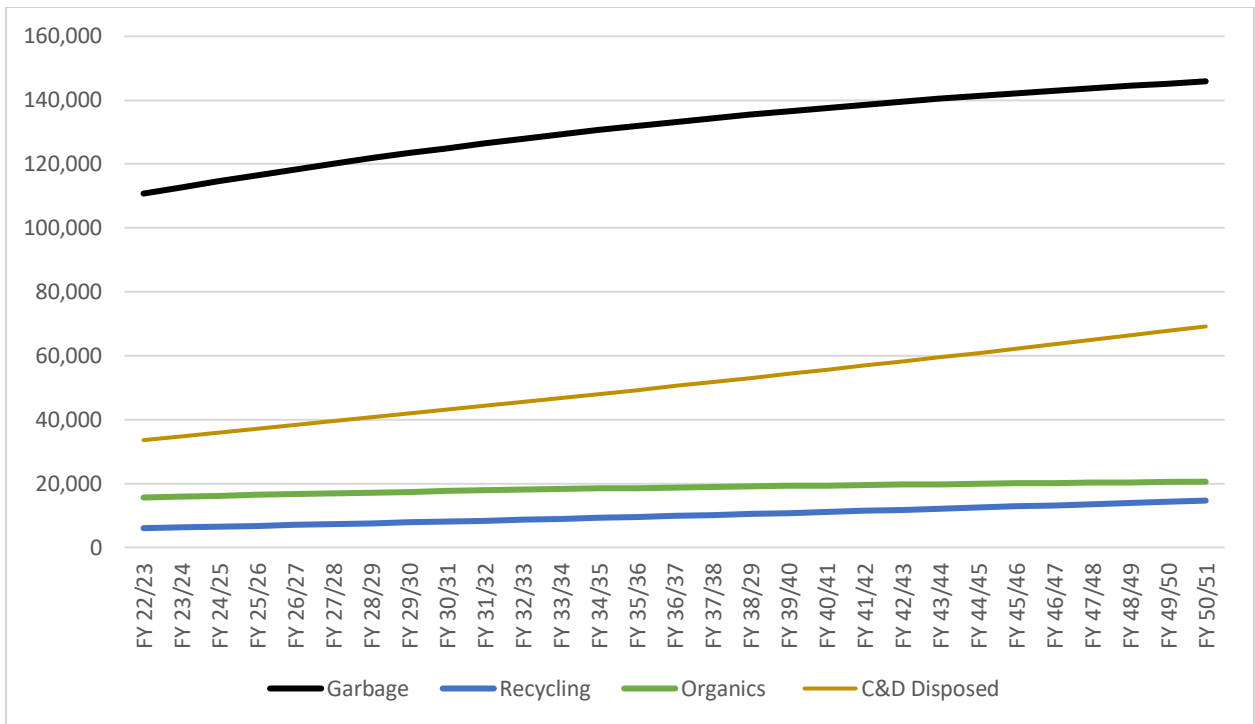


Figure 12: Moderate Growth Scenario – Waste Generation ICI Projection (tonnes/year)

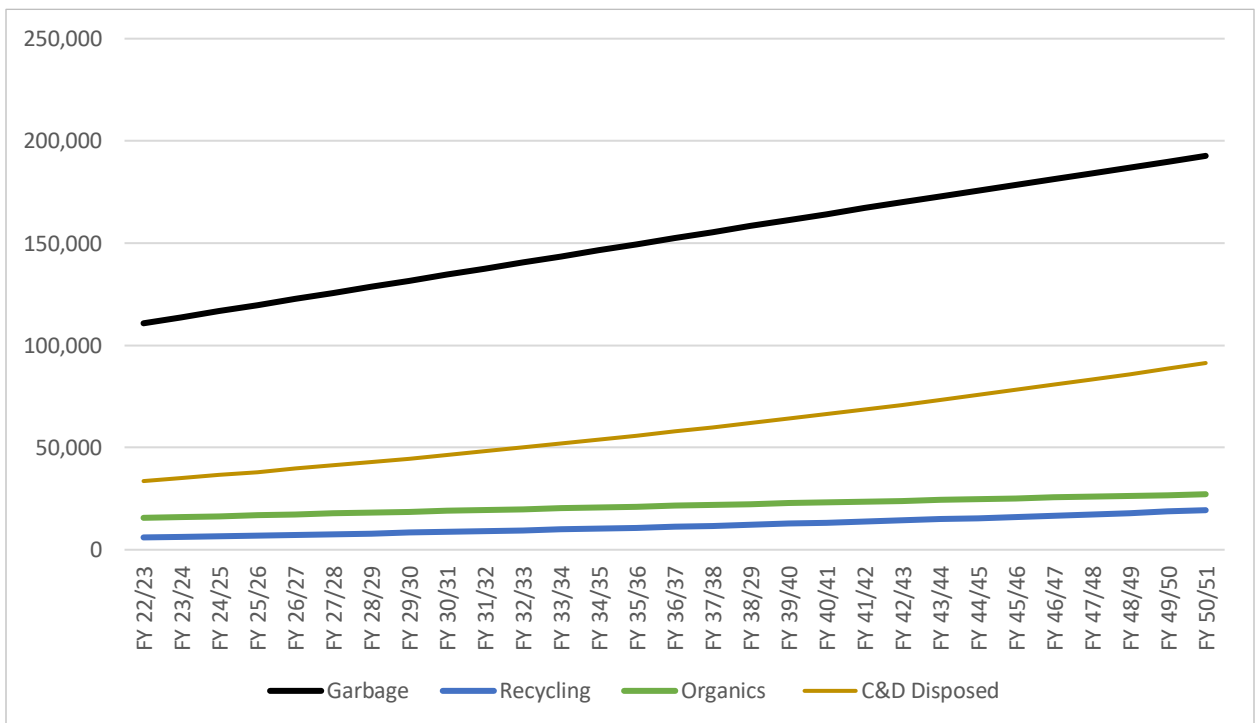


Figure 13: High Growth Scenario – Waste Generation for ICI Projection (tonnes/year)

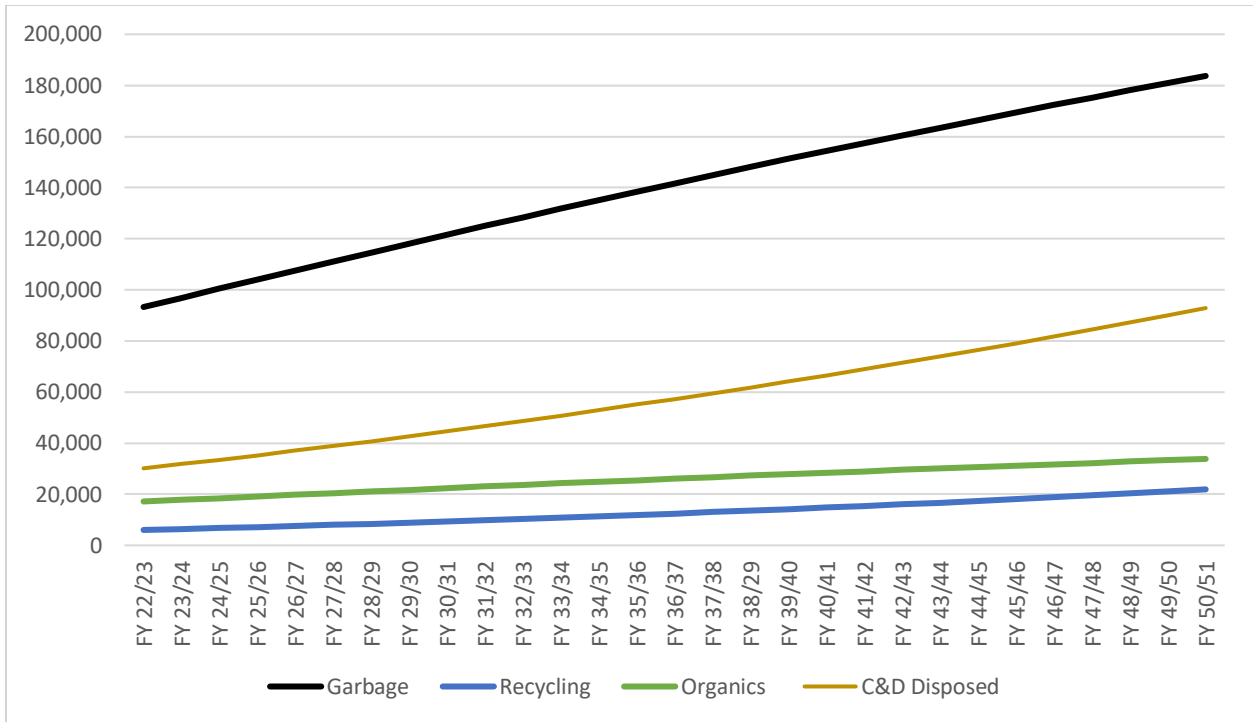


Figure 14: NSTM Growth Scenario – Waste Generation for ICI Projection (tonnes/year)

4.3

Overall Changes in Waste Generation Forecast

The changes to the weight of garbage, recyclables and organics projected between FY 22/23 and FY 51/52 in the low, moderate, high and NSTM growth scenarios are summarized in **Table 2**.

Table 2: Projected Weight of Waste FY 22/23 vs FY 51/52 (tonnes)

	FY 22/23 Weight (tonnes)	Low Growth Scenario FY 51/52 Weight (tonnes)	Moderate Growth Scenario FY 51/52 Weight (tonnes)	High Growth Scenario FY 51/52 Weight (tonnes)	NSTM Growth Scenario FY 51/52 Weight (tonnes)
Residential Garbage	48,051	42,820	56,535	74,652	80,978
Residential Recyclables	17,739	15,808	20,871	27,559	30,956
Residential Organics	35,600	39,743	52,473	69,288	81,915
Residential Total	101,390	98,371	129,879	171,500	193,849
C&D Disposed	33,583	52,393	69,175	91,343	92,868

	FY 22/23 Weight (tonnes)	Low Growth Scenario FY 51/52 Weight (tonnes)	Moderate Growth Scenario FY 51/52 Weight (tonnes)	High Growth Scenario FY 51/52 Weight (tonnes)	NSTM Growth Scenario FY 51/52 Weight (tonnes)
ICI Garbage	110,778	110,517	145,916	192,676	183,714
ICI Recyclables	6,025	11,095	14,649	19,343	21,915
ICI Organics	15,609	15,573	20,560	27,149	33,824
ICI Total	165,995	189,577	250,300	330,511	332,321
Total C&D	33,583	52,393	69,175	91,343	92,868
Total Garbage	158,829	153,337	202,451	267,328	264,692
Total Recyclables	23,764	26,903	35,520	46,902	52,871
Total Organics	51,209	55,316	73,033	96,438	115,739
Total Weight	267,385	287,948	380,179	502,012	526,170
Percent Changes	-	8% increase	42% increase	88% increase	97% increase

Considering the anticipated increase in the weight of waste materials, particularly that of the ICI sector, HRM will need to evaluate the possibility of increasing its processing capacity in terms of collection, depots, processing, and disposal facilities including landfills. The imminent shift to 100% extended producer responsibility (EPR) will impact HRM's responsibilities regarding the collection and processing of recyclables from residential and a limited scope of ICI sources (e.g., schools). Under 100% EPR, PROs will be required to confirm that the collection and processing of materials from these sources are carried out, and that sufficient capacity is in place. Additionally, there is a potential for reallocating some of HRM's financial and administrative capacity currently designated for recyclables collection to other waste streams and repurposing existing facilities.

Benchmarking Analysis

Dillon prepared a standardized questionnaire for benchmarking 12 municipal jurisdictions. The template questionnaire is available in **Appendix B**. An overview of the solid waste management programs available for each of the reviewed jurisdictions is provided in **Appendix C**. The questionnaires were pre-populated by Dillon based on a combination of publicly available information, knowledge based on Dillon's previous work with participating jurisdictions and direct input by the jurisdictions.

Of the 12 jurisdictions contacted, eight responded with answers to the questionnaires. Four jurisdictions did not respond to the questionnaire: Hamilton, Simcoe County, Region of Waterloo, and Niagara. Data for these four jurisdictions was taken from publicly available RPRA Datacall data and included in this benchmarking task. One jurisdiction in Ontario asked to remain anonymous in this report and throughout this report they will be referred to as "Anonymous".

Jurisdiction Selection and Rationale

The final 12 jurisdictions scanned as part of this review and the rationale behind their selection is presented in **Table 3**.

Table 3: Selected Jurisdictions

Jurisdiction	Population	Rational for Selection/Relevance
Ottawa, Ontario	1,017,449	• Suggested by HRM as comparable • Mature recycling and organics programs • Comparable programs • Some information publicly available through Resource Productivity and Recovery Authority (RPRA) • Dillon has understanding of residential programs/services based on recent work
Edmonton, Alberta	1,010,899	• Suggested by HRM as comparable • Mature recycling programs • Some comparable programs
Vancouver, British Columbia	662,248	• Suggested by HRM as comparable • Mature recycling and organics programs • Comparable population and residential programs
Markham, Ontario	338,503	• Suggested by HRM as comparable • Mature recycling and organics programs • Comparable population and programs • Some information publicly available through RPRA

Jurisdiction	Population	Rational for Selection/Relevance
Anonymous	-	• Mature recycling and organics programs • Some comparable programs • Some information publicly available through RPRA • Dillon has understanding of residential and ICI programs/services based on recent work
Hamilton, Ontario	569,353	• Mature recycling and organics programs • Comparable population and some programs • Some information publicly available through RPRA • Dillon has understanding of residential and ICI programs/services based on recent work
Simcoe County, Ontario	533,169	• Mature recycling and organics programs • Comparable population and some programs • Some information publicly available through RPRA • Dillon has understanding of residential and ICI programs/services based on recent work
Region of Waterloo, Ontario	587,165	• Mature recycling and organics programs • Comparable population and programs • Some information publicly available through RPRA • Dillon has understanding of residential and ICI programs/services based on recent work
Halton, Ontario	596,637	• Mature recycling and organics programs • Comparable population and some programs • Some information publicly available through RPRA • Dillon has understanding of residential and ICI programs/services based on recent work
Richmond, British Columbia	209,937	• Mature recycling and organics programs • Some comparable programs • Dillon has understanding of residential and ICI programs/services based on recent work
Niagara, Ontario	484,840	• Mature recycling and organics programs • Comparable population and some programs • Some information publicly available through RPRA • Dillon has understanding of ICI programs/services based on recent work

Benchmarking Findings

Analysis of the benchmarking data are provided in the sub-sections below. In this benchmarking analysis the following metrics were reviewed:

- Residential disposed weight, including per capita and household (**Section 5.2.2**);
- Residential recyclables weight, including per capita and household (**Section 5.2.3**);
- Residential organics weight, including per capita and household (**Section 5.2.4**);
- Total weight of residential materials, including per capita and household (**Section 5.2.5**);
- Residential diversion rates (**Section 5.2.6**); and
- Costs per tonne of residential collection and diversion (**Section 5.2.7**).

Limitations

There are several limitations with the data presented in this benchmarking exercise. For data years, all jurisdictions except HRM provided data based on calendar years. HRM's data was provided based on fiscal years which run from April 1 to March 31. HRM's fiscal year data has been applied to the calendar year in which it starts, for example, 2020/2021 fiscal year is considered to be 2020 data.

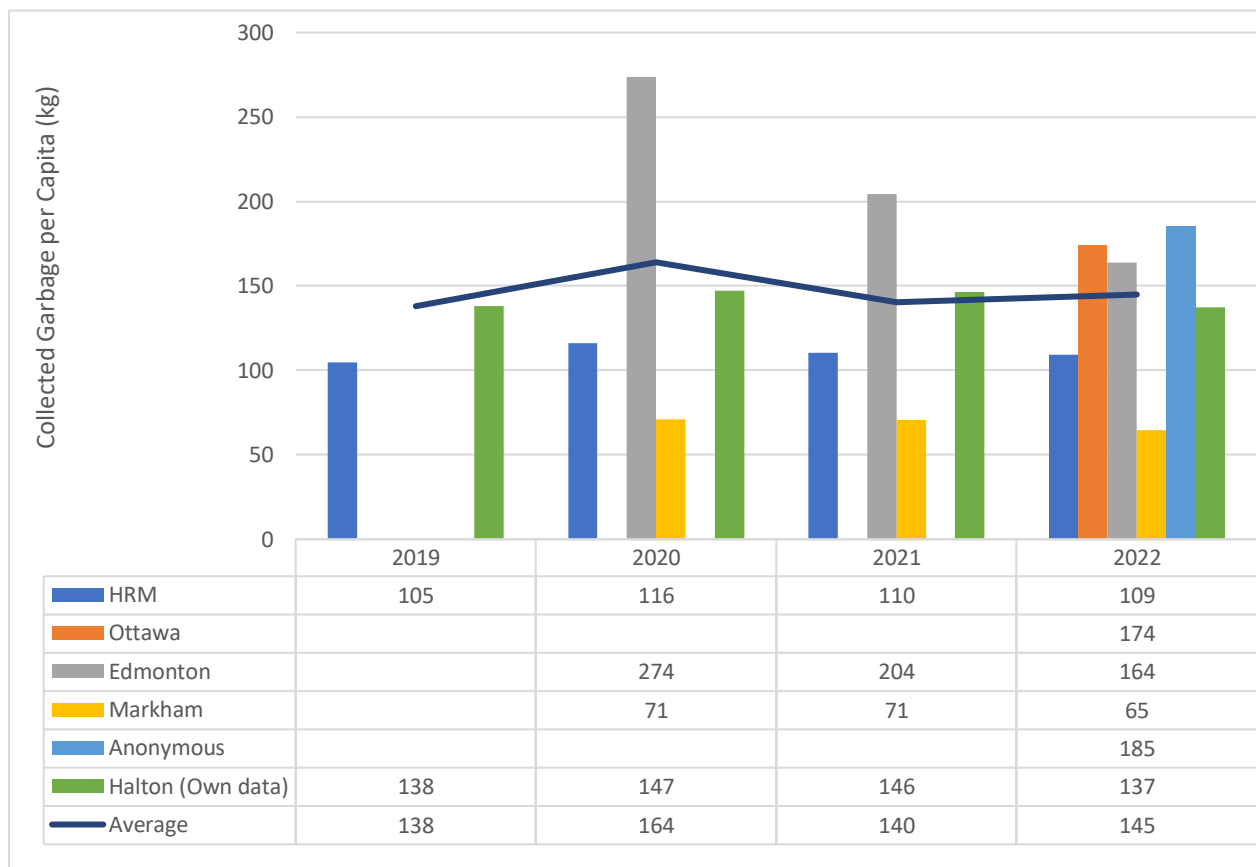
For the ICI sector, no jurisdictions that completed the questionnaire provided ICI data and therefore throughout the benchmarking only residential data has been reviewed. Another limitation with respect to ICI data is that in some collection systems ICI is co-collected with residential curbside and or multi-residential data, and therefore the residential data analyzed includes some ICI.

Some jurisdictions provided incomplete datasets and therefore no data is included for some years. Where there is no data presented, no suitable data was provided by the jurisdiction.

Different jurisdictions provided data differently, the types of information provided by jurisdictions, is discussed in more detail in **Section 5.2.2** and **Section 5.2.3** in which this issue arises. The issue is due to different information being available depending on how jurisdictions track and report information, and what information jurisdictions were able to provide for the purpose of this benchmarking exercise. HRM was able to provide datasets that matched the data available in other jurisdictions. Very few jurisdictions provided cost information; therefore, only a limited analysis was possible as described in **Section 5.2.7**.

For the weight of garbage materials from the residential sector, two types of data were used. First, jurisdictions provided their own data with respect to the weight of garbage materials collected, and second, a disposal weight was determined from RPRA Datacall data that includes the garbage collected and disposed, as well as processing residuals sent for disposal⁷. Each set of data is presented in separate figures. For the Ontario jurisdictions for which RPRA Datacall data was used the “Total Residential Waste Disposed” from the Residential Waste Diversion reports is the source of the data. This weight includes all disposed tonnes, including garbage and processing residuals from recycling and composting operations disposed at a landfill or Energy-from-Waste incineration facilities.⁸

The weight of garbage collected per capita was determined by dividing the weight of materials collected in a year by the population of the jurisdiction according to the 2021 census data. **Figure 15** shows the weight of garbage collected per capita, measured in kilograms.



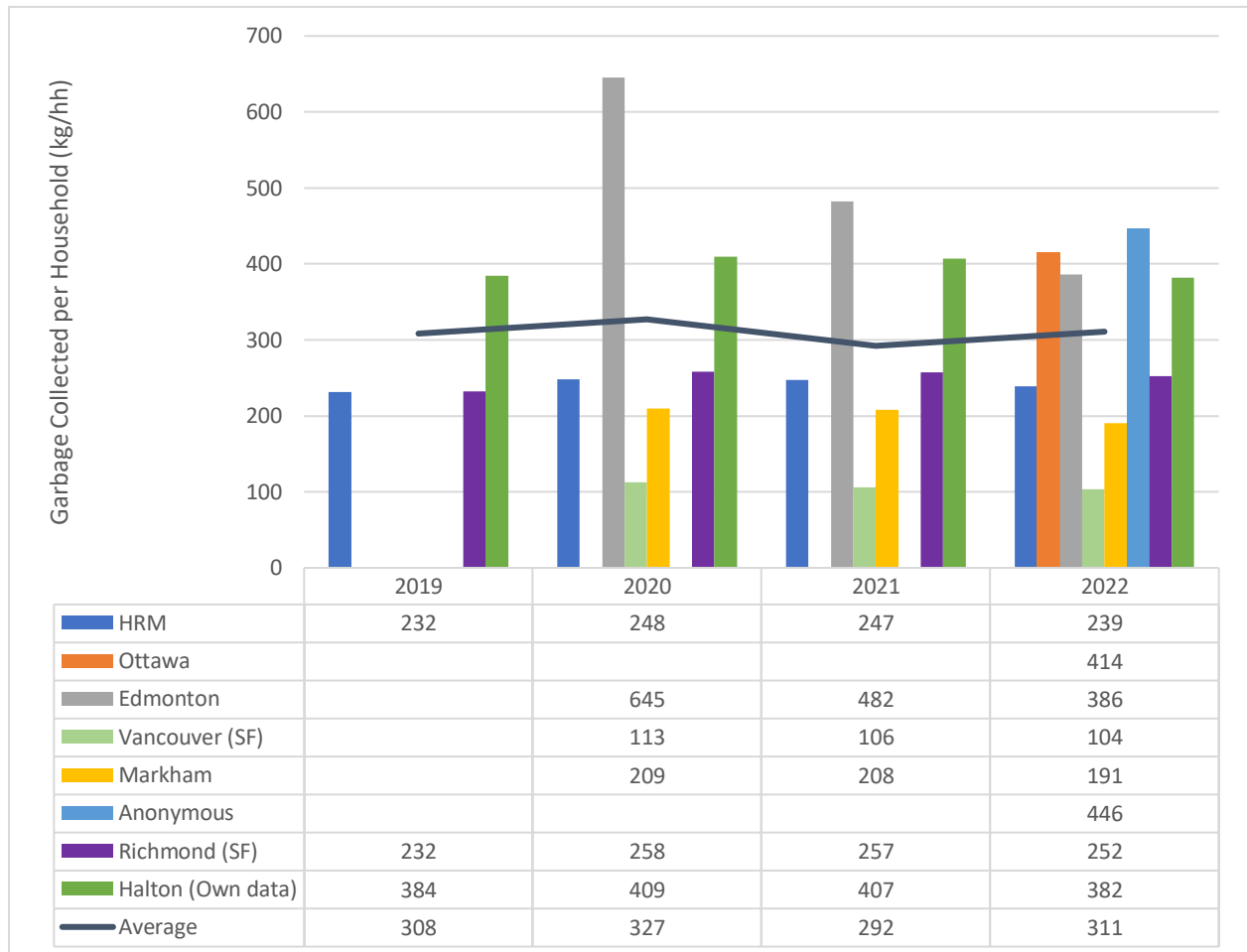
Note: Edmonton introduced city-wide organics collection in 2021. Ottawa weight includes some ICI data.

Figure 15: Residential Weight of Garbage Collected per Capita (kg/person)

⁷ RPRA Data Call <https://rpra.ca/programs/about-the-datacall/>

⁸ [2021 Datacall Report – rpra.ca](https://rpra.ca/programs/about-the-datacall/)

The weight of garbage collected per household was determined by dividing the weight of materials collected in a year by the number of households in the jurisdiction according to the 2021 census data, or the number of single-family households in the jurisdiction for Vancouver and Richmond as they only provided collection data for single-family households only. **Figure 16** shows the weight of garbage collected per household, measured in kilograms.



Note: Edmonton introduced city-wide organics collection in 2021. Ottawa weight includes some ICI data.

Figure 16: Residential Weight of Garbage Collected per Household (kg/hh)

The disposed weight per capita was determined by dividing the weight of materials disposed in a year by the population of the jurisdiction according to the 2021 census data. **Figure 17** shows the weight of garbage disposed per capita, measured in kilograms. Not all jurisdictions provided 2022 data, and not all were available on the RPRA Datacall as they have transitioned to IPR and have other reporting requirements. The jurisdictions for which 2022 data was unavailable include Ottawa, Simcoe County and Region of Niagara.

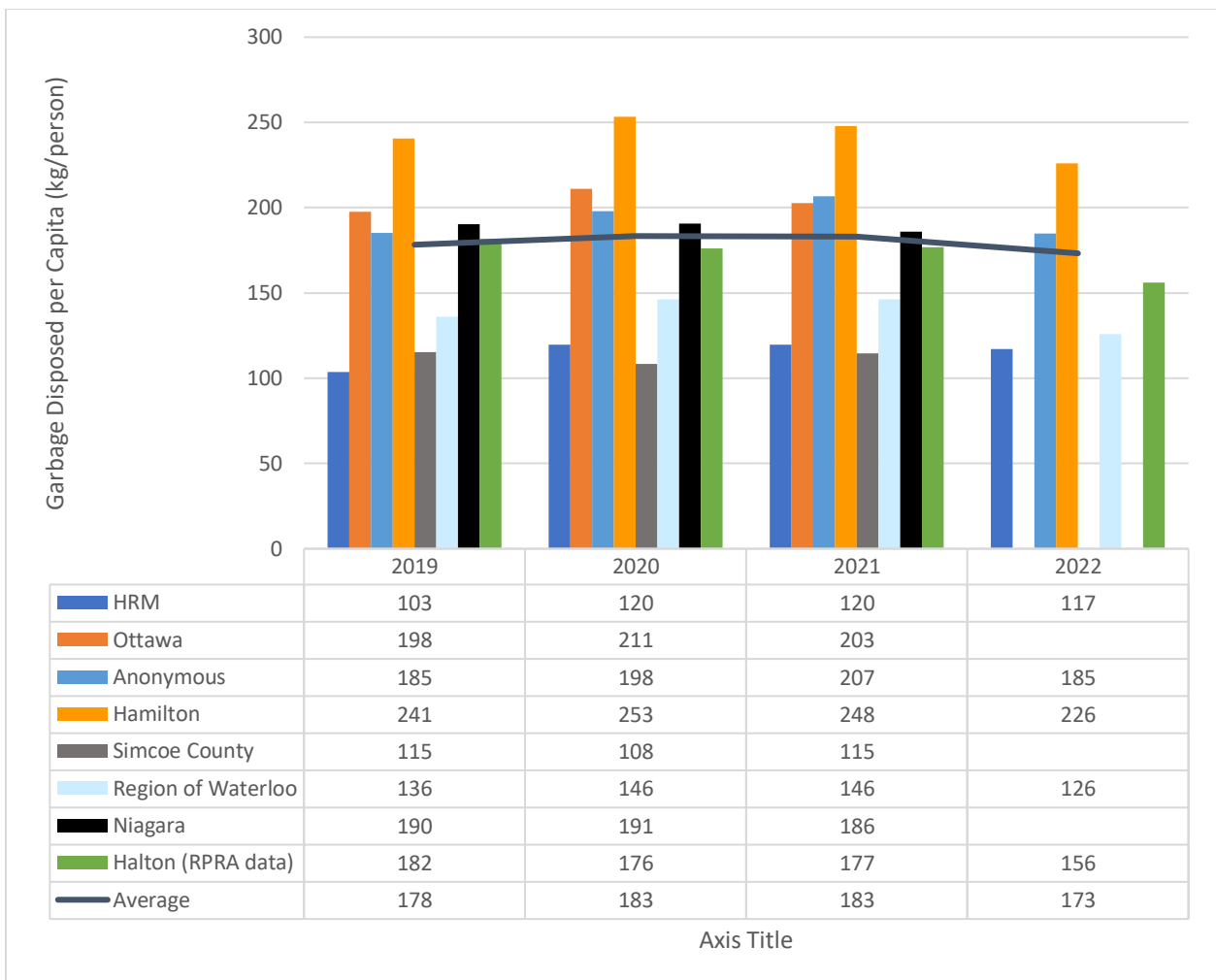


Figure 17: Residential Weight of Garbage Disposed per Capita (kg/person)

The disposed weight per household was determined by dividing the weight of materials disposed in a year by the number of households in the jurisdiction according to the 2021 census data, or the number of single-family households in the jurisdiction for Vancouver and Richmond as they only provided disposed data for single-family households. **Figure 18** shows the weight of garbage disposed per household, measured in kilograms.

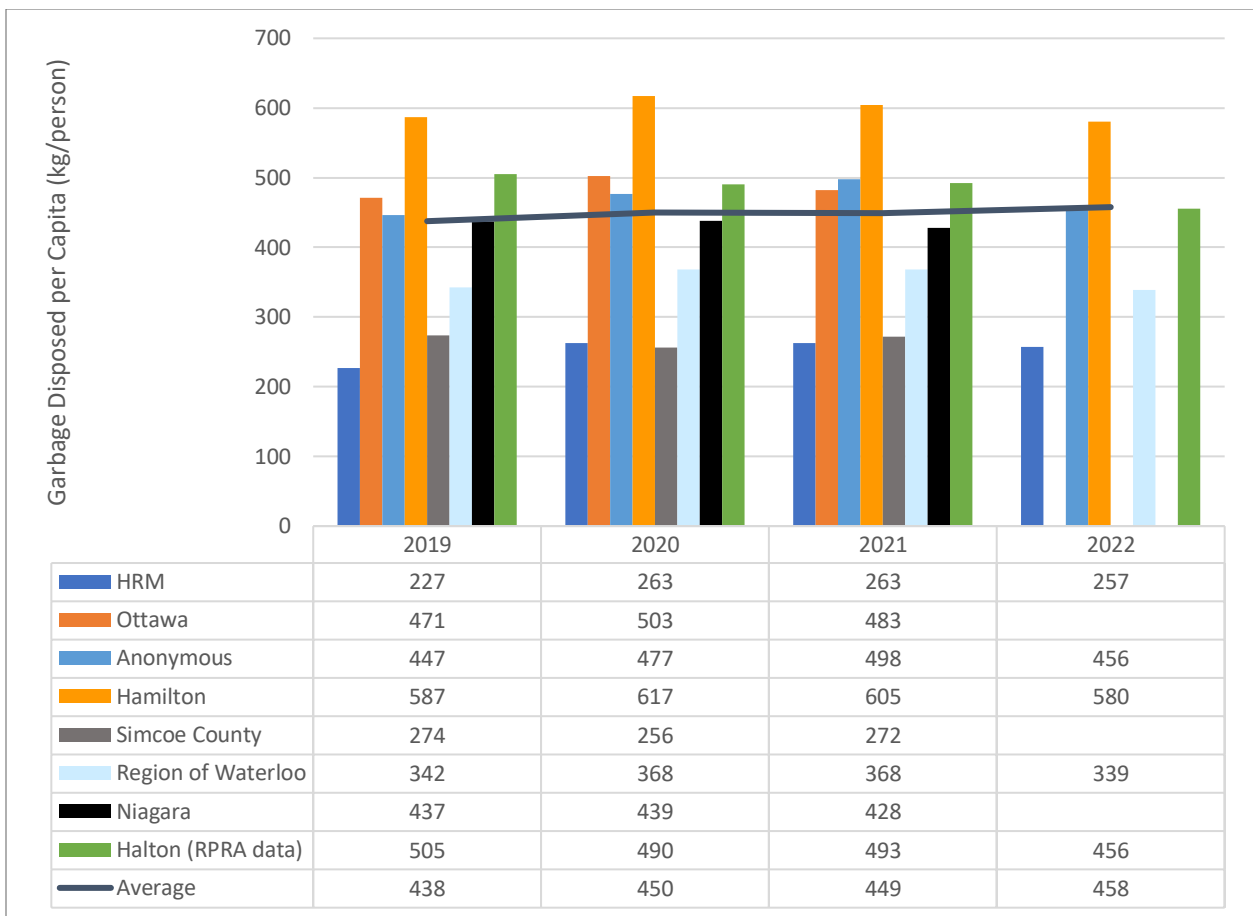


Figure 18: Residential Weight of Garbage Disposed per Household (kg/hh)

5.2.3

Residential Recyclables Weight

For the weight of recyclables from the residential sector, two types of data were used. First, jurisdictions provided their own data with respect to the weight of recyclables collected and second, a weight was determined from RPRA Datacall data that is recyclables collected and then marketed. Each set of data is presented in separate figures.

For the total weight of recyclables collected for many Ontario municipalities the “Total Reported and/or Calculated Marketed Tonnes” from the Blue Box (BB) Marketed tonnes RPRA Datacall report has been used.

The recyclable materials collected weight per capita was determined by dividing the weight of recyclable materials collected in a year by the population of the jurisdiction according to the 2021 census data.

Figure 19 shows the weight of recyclable material collected per capita, measured in kilograms.

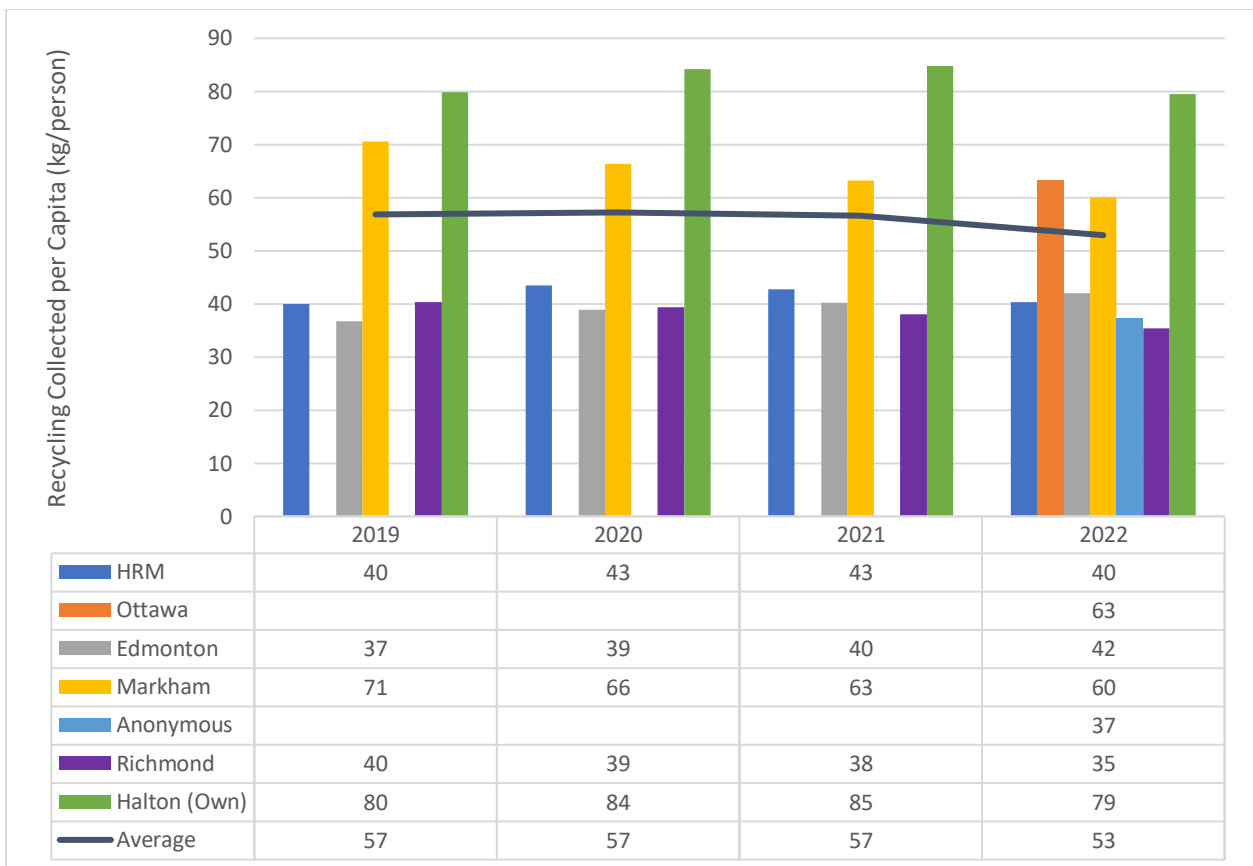


Figure 19: Residential Weight of Recyclables Collected per Capita (kg/person)

The recyclable materials collected weight per household was determined by dividing the weight of recyclable materials collected in a year by the number of households in the jurisdiction according to the 2021 census data. **Figure 20** shows the weight of recyclable material collected per household, measured in kilograms.

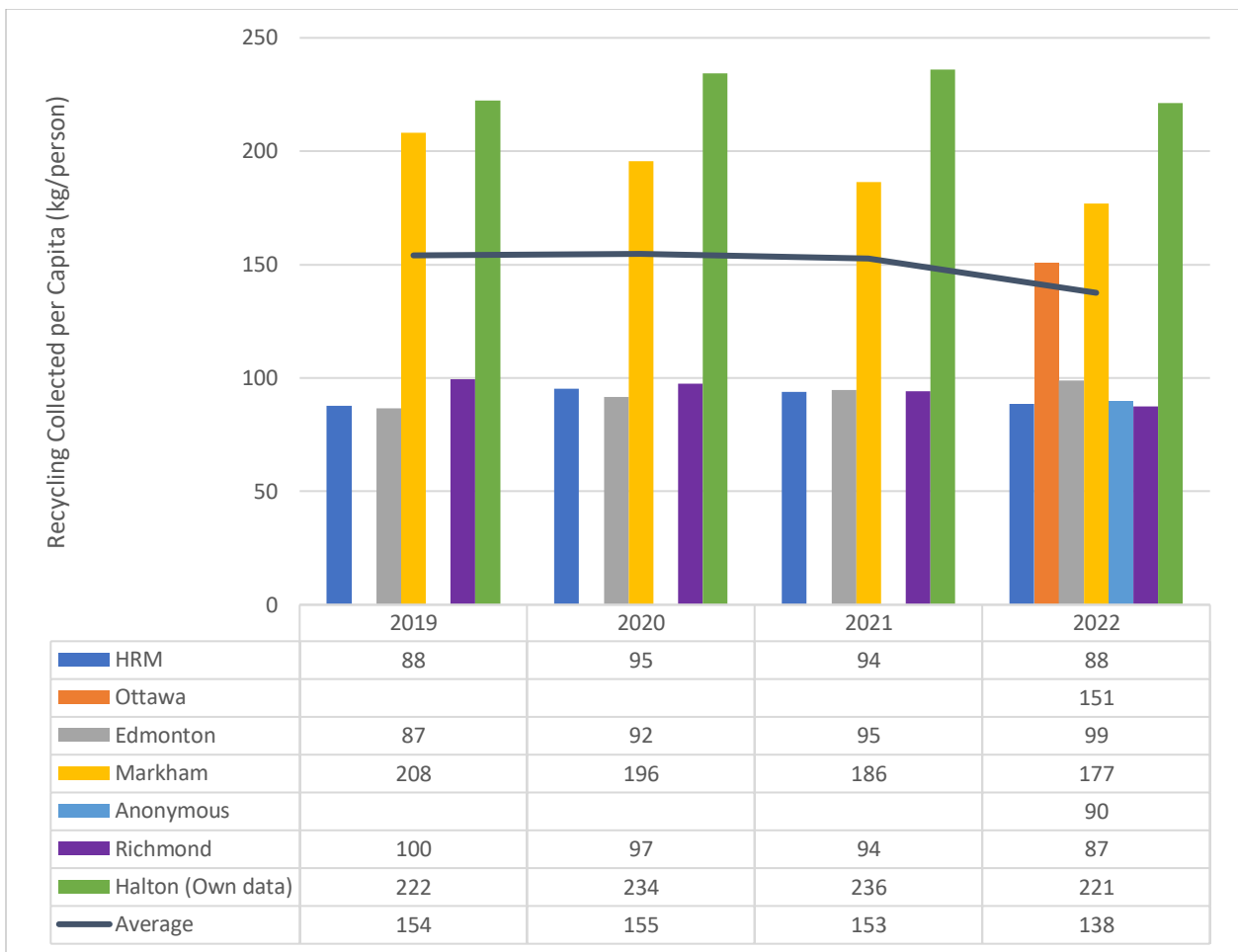


Figure 20: Residential Weight of Recyclables Collected per Household (kg/hh)

The weight of recyclable materials marketed per capita was determined by dividing the weight of recyclable materials marketed in a year by the population of the jurisdiction according to the 2021 census data. **Figure 21** shows the weight of recyclable material marketed per capita, measured in kilograms.

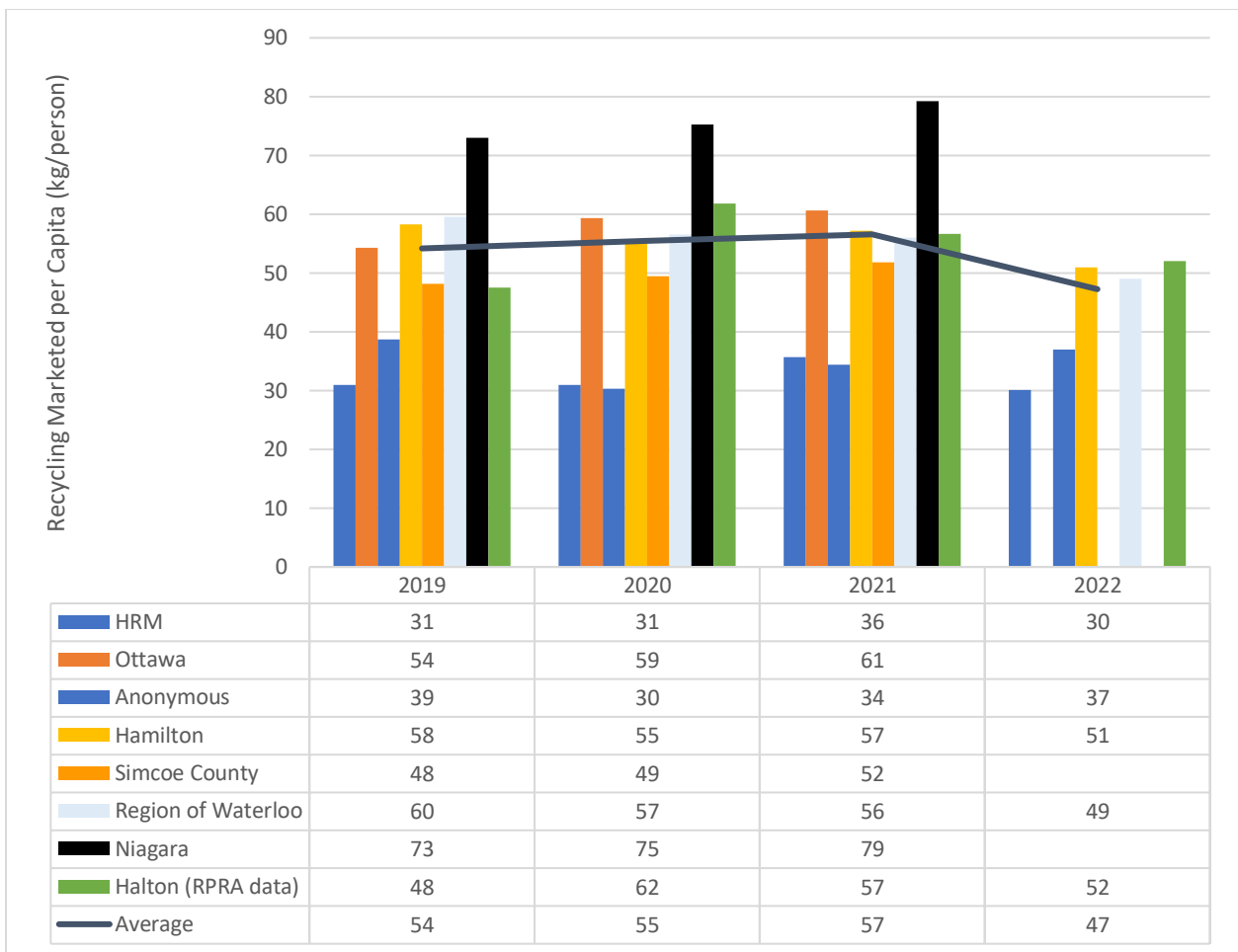


Figure 21: Residential Weight of Recyclables Marketed per Capita (kg/person)

The weight of recyclable materials marketed per household was determined by dividing the weight of recyclable materials marketed in a year by the number of households in the jurisdiction according to the 2021 census data. **Figure 22** shows the weight of recyclable material marketed per household, measured in kilograms.

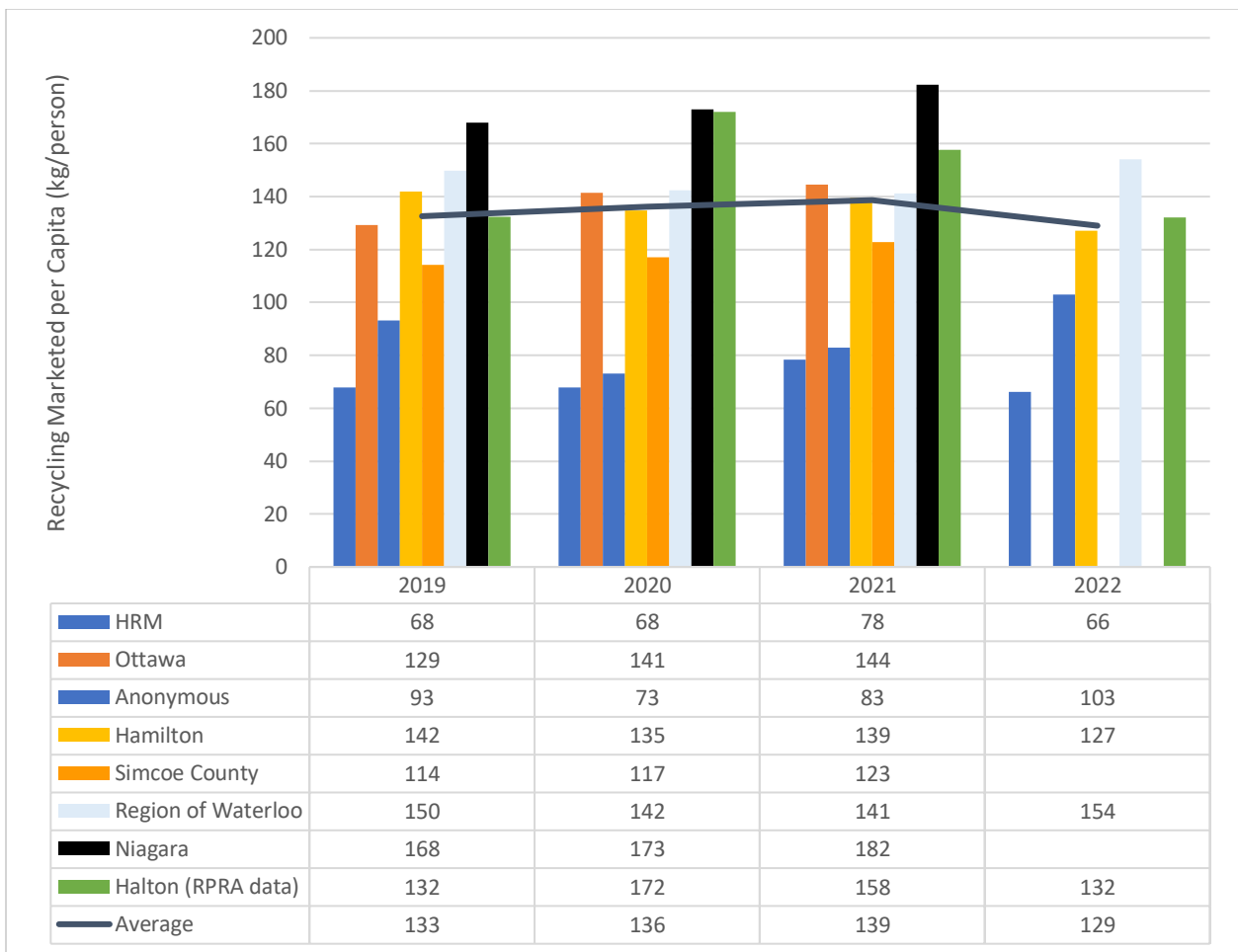


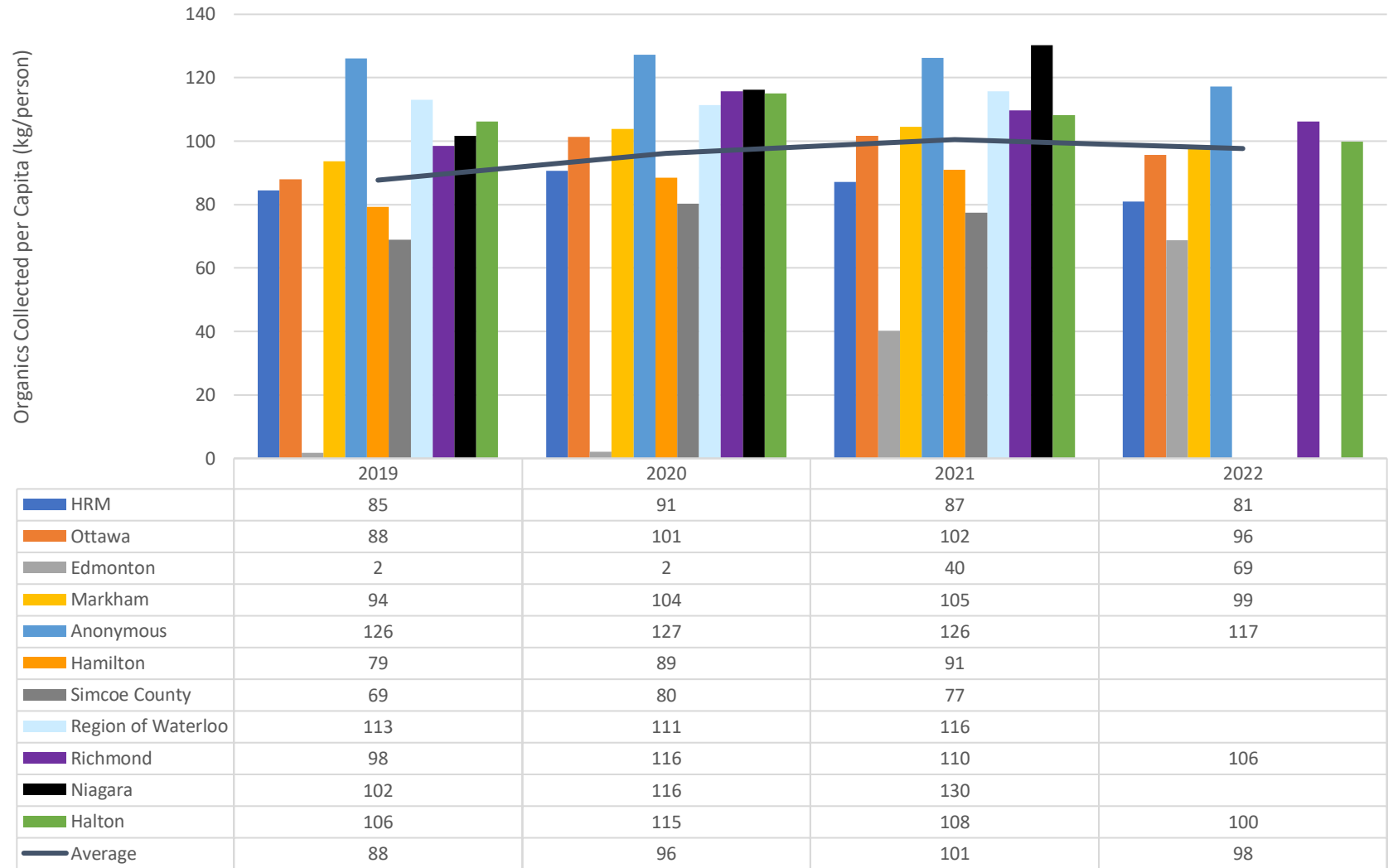
Figure 22: Residential Weight of Recyclables Marketed per Household (kg/hh)

5.2.4

Residential Organics Weight

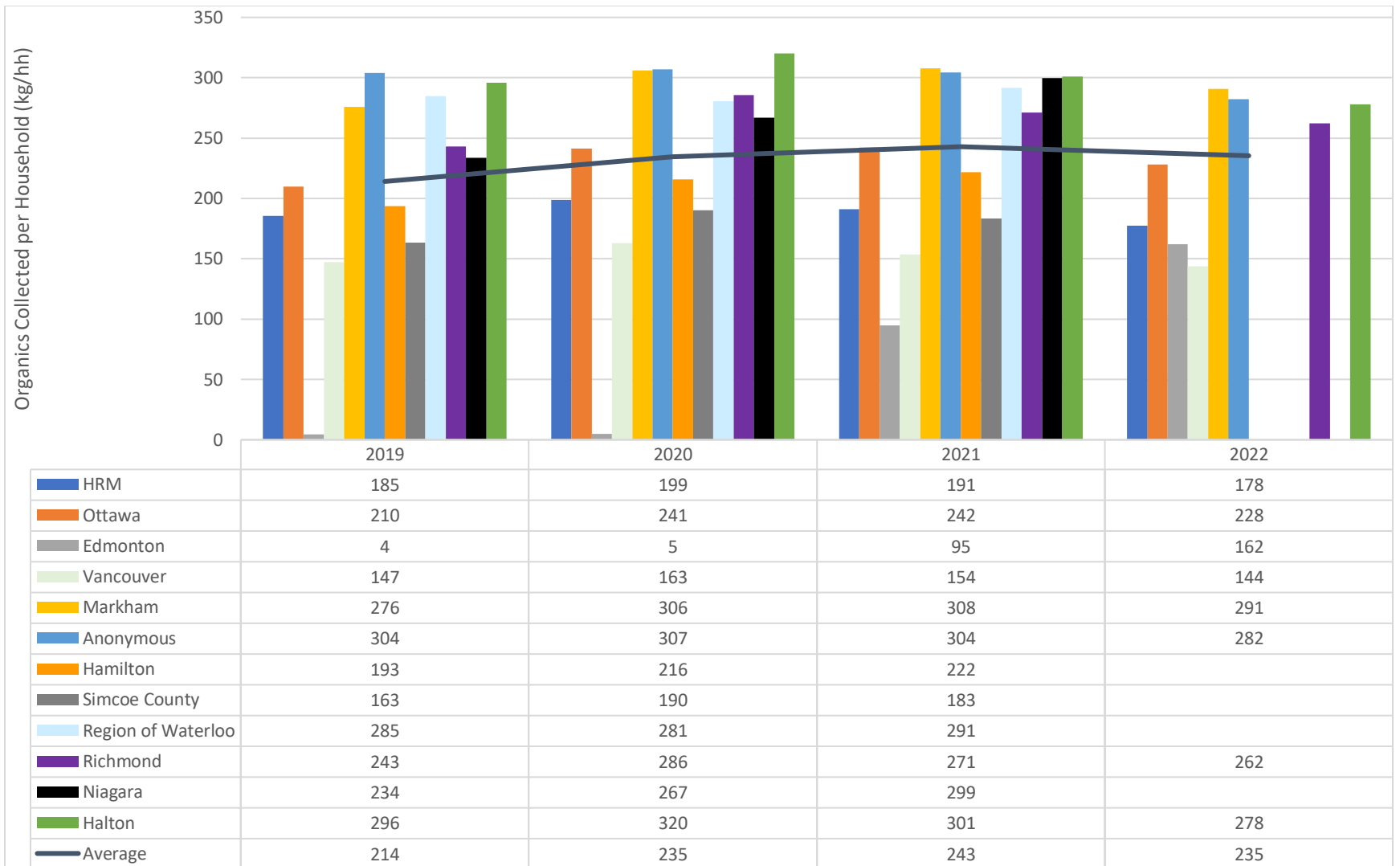
The total weight of organics collected in jurisdictions includes both leaf and yard waste and household organics. Most jurisdictions provide leaf and yard and household organics (kitchen waste) through the same collection system, i.e., same bin. Many also had additional leaf and yard waste collection services during peak times such as spring, fall and in early January for Christmas trees. For some Ontario jurisdictions, RPRA Datacall data has been used for the weight. Data was taken from the “Organics” RPRA Datacall Report, and the field used was “Total Organics” which include household organics collection curbside and at depot, and leaf and yard waste.

The weight of organic materials per capita, measured in kilograms, is shown in **Figure 23**. The weight of organic materials per household, measured in kilograms, is shown in **Figure 24**.



Note: Edmonton introduced city-wide organics collection in 2021.

Figure 23: Residential Weight of Organics Collected per Capita (kg/person)

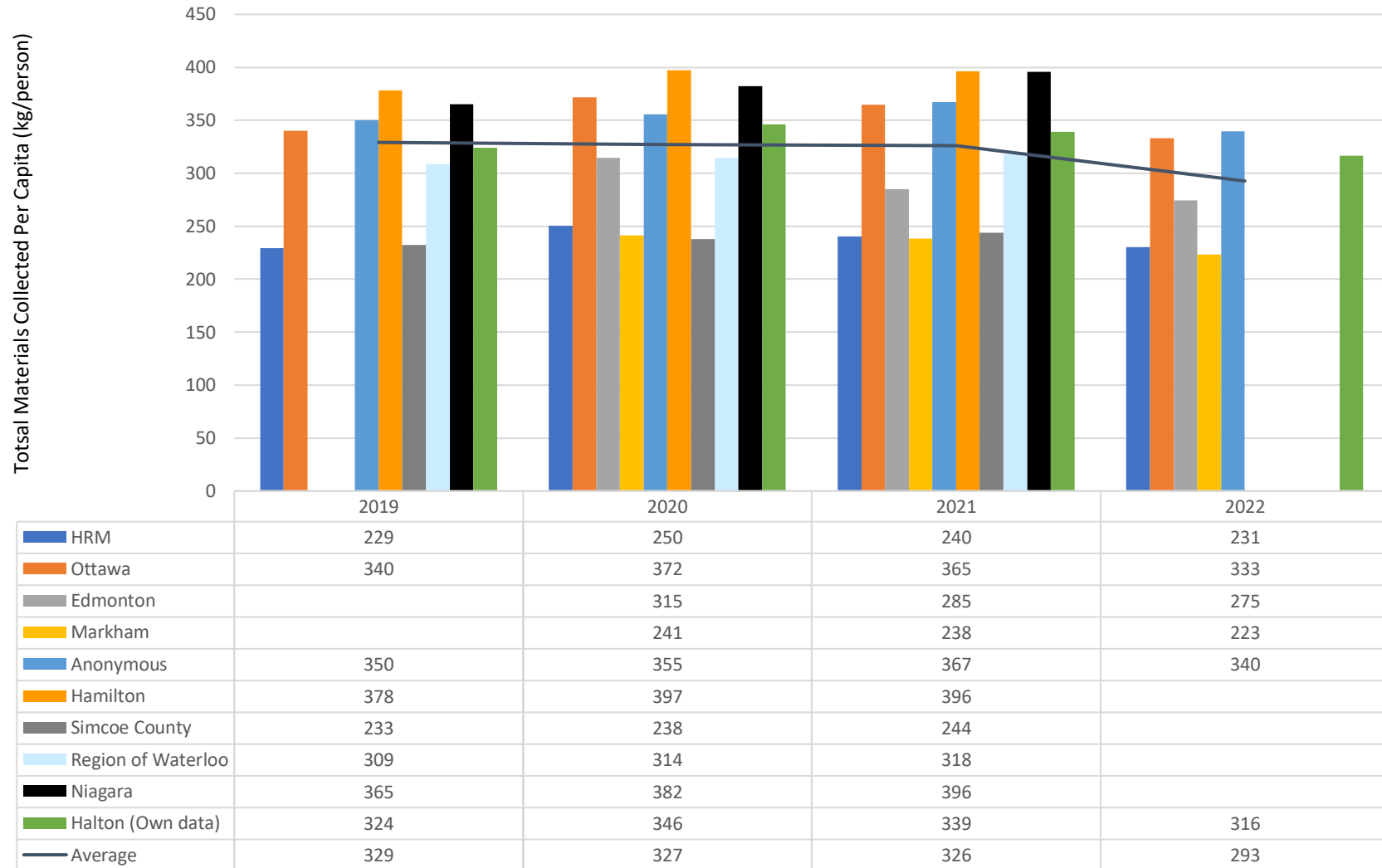


Notes: Edmonton introduced city-wide organics collection in 2021.

Figure 24: Residential Weight of Organics Collected per Household (kg/household)

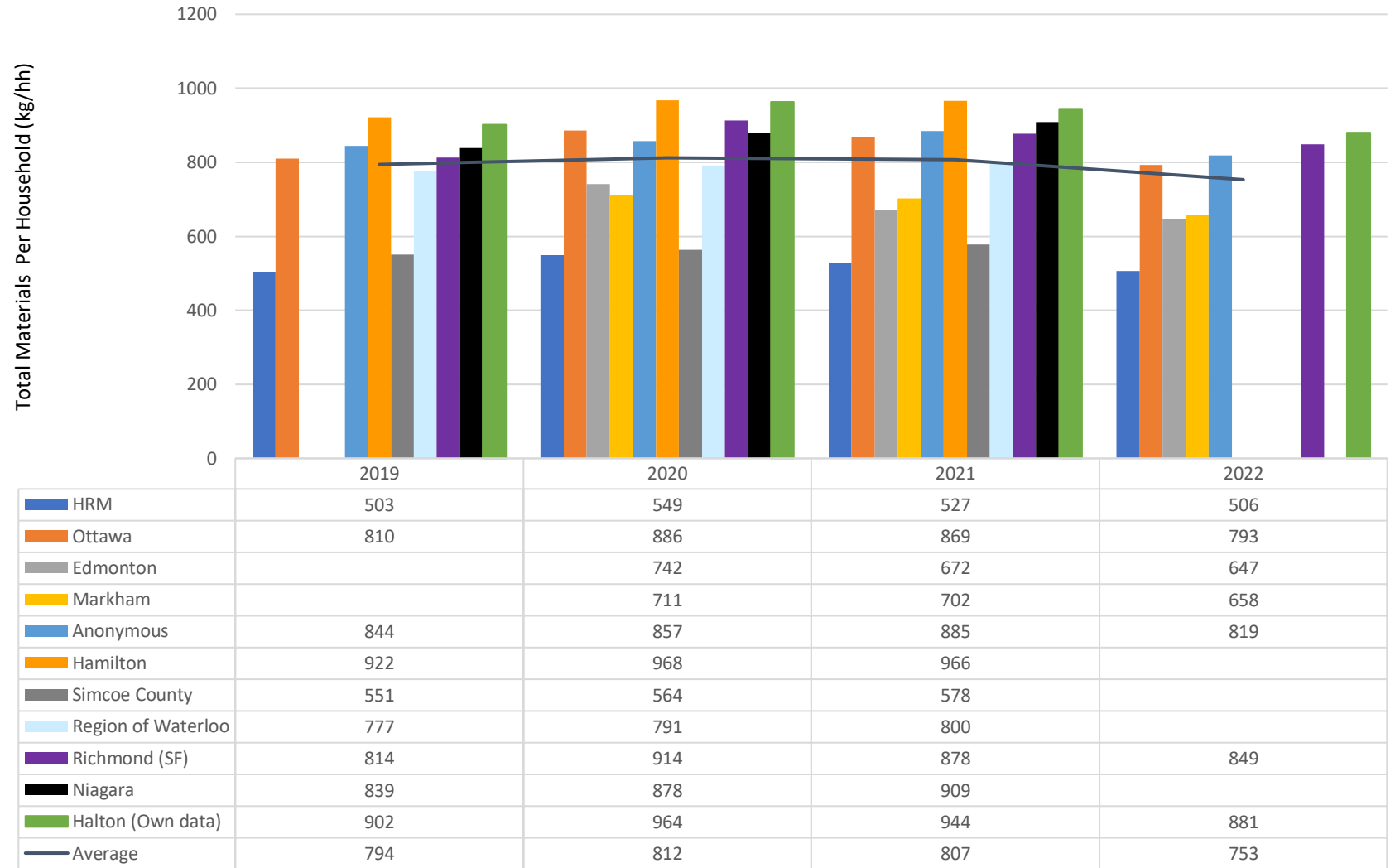
The weight of garbage, recyclables and organics collected have been combined for all jurisdictions that provided data for all waste streams. For Ontario jurisdictions where RPRA data was used (2019 to 2021 data from Ottawa, Anonymous, Guelph, Hamilton, Simcoe County, Region of Waterloo, Halton (RPRA data) and Niagara), disposed weight was used in lieu of garbage collected, and marketed tonnes were used in lieu of recyclables collected.

This total weight of materials collected per capita is shown in **Figure 25** and per household is shown in **Figure 26**. Richmond is not included in the per capita table and figure as only full data sets for single-family residences were provided.



Notes: Ottawa's 2022 weight includes some ICI material.

Figure 25: Total Residential Weight of Materials Collected per Capita (kg/person)



Notes: Ottawa's 2022 weight includes some ICI material.

Figure 26: Total Residential Weight of Materials Collected per Household (kg/hh)

Residential Diversion Rates

Based on the data provided, total diversion was calculated as the total weight of recyclables and organics (including leaf and yard) collected divided by the total weight materials collected and expressed as a percentage. This may not be how all jurisdictions calculate their diversion rates and may not be reflective of any publicly available diversion rates from these jurisdictions. For example, HRM calculates a diversion rate annually which include additional activities such as materials collected at Enviro Depots, grasscycling, backyard composting and household hazardous wastes. When calculating their diversion rates, HRM using the guiding principles from the MBN Canada Benchmarking that HRM previously participated in. HRM's diversion rates based on HRM's own calculations are shown in **Table 4**.

Table 4: HRM Calculated Diversion Rates

	FY 19/20	FY 20/21	FY 21/22	FY 22/23
Diversion Rate	60%	58%	57%	57%

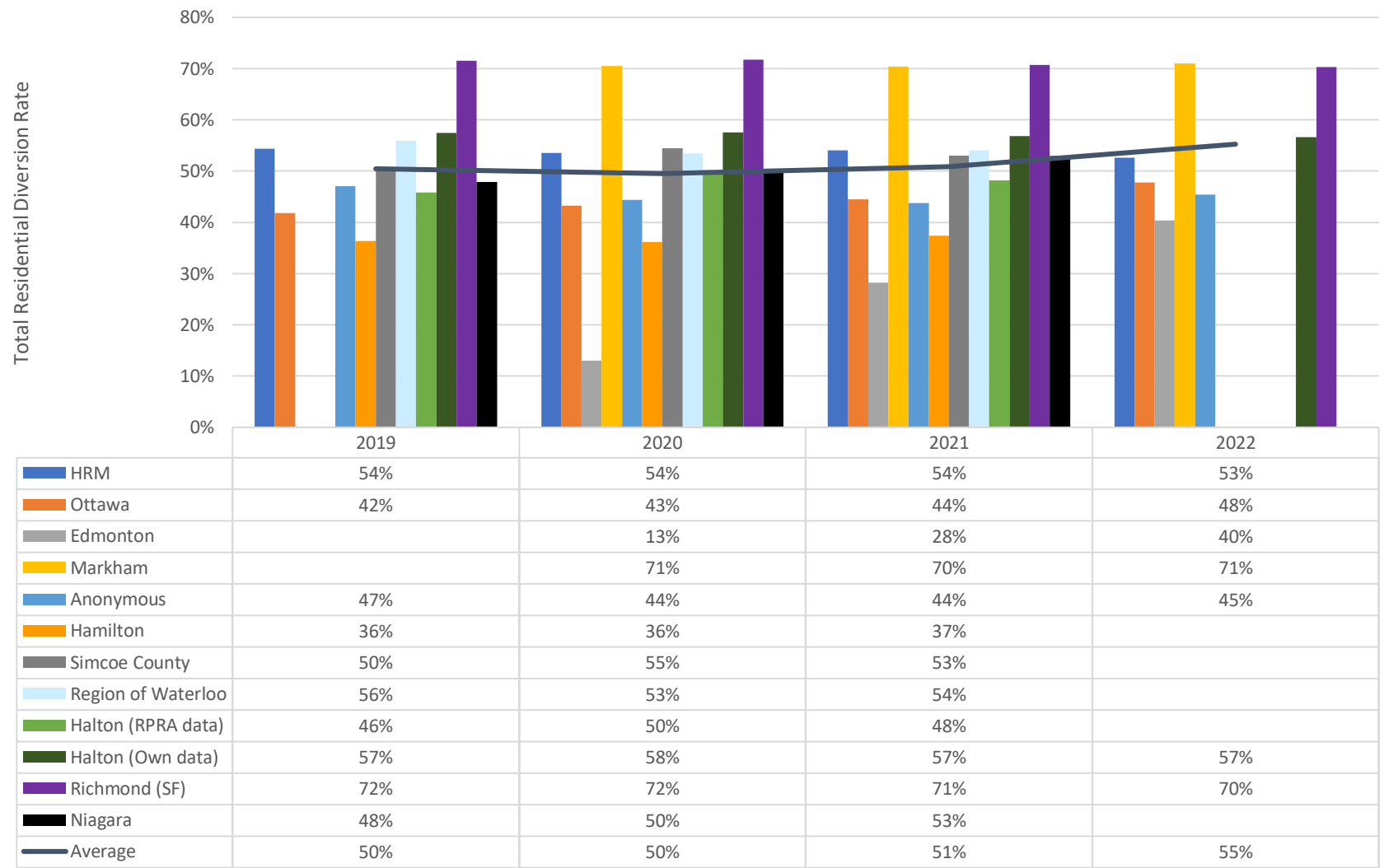
For Ontario jurisdictions where RPRA data was used (2019 to 2021 data from Ottawa, Anonymous, Guelph, Hamilton, Simcoe County, Region of Waterloo, Halton (RPRA data), and Niagara), disposed weight was used in lieu of garbage collected, and marketed tonnes were used in lieu of recyclables collected. This may lower these jurisdictions diversion rates as their marketed tonnes will be lower than collected recyclables.

For Richmond, their diversion rates are for single-family residences only. There is a higher diversion of materials from single-family than multi-residential buildings; therefore, diversion rates in Richmond will be higher than other jurisdictions that report both single-family and multi-residential data.

No diversion data is presented for Vancouver, as no data regarding recyclables collected was provided and therefore diversion rates could not be calculated.

The total diversion rates are shown in **Figure 27**. Diversion rates for recyclables are shown in **Figure 28**. Diversion rates for organics are shown in **Figure 29**.

Figure 27: Total Residential Diversion Rates (Recyclables and Organics)



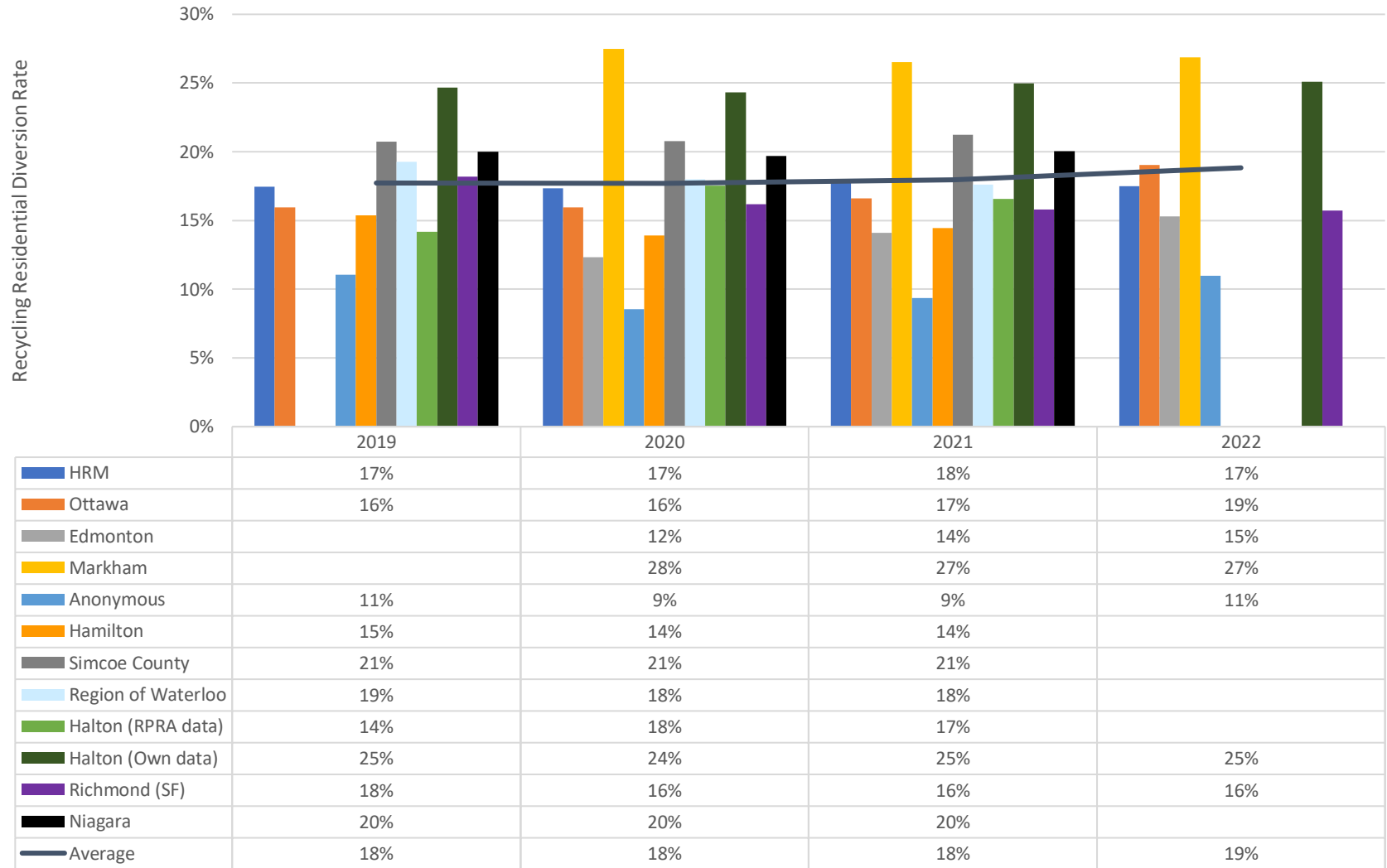


Figure 28: Residential Recyclables Diversion Rates

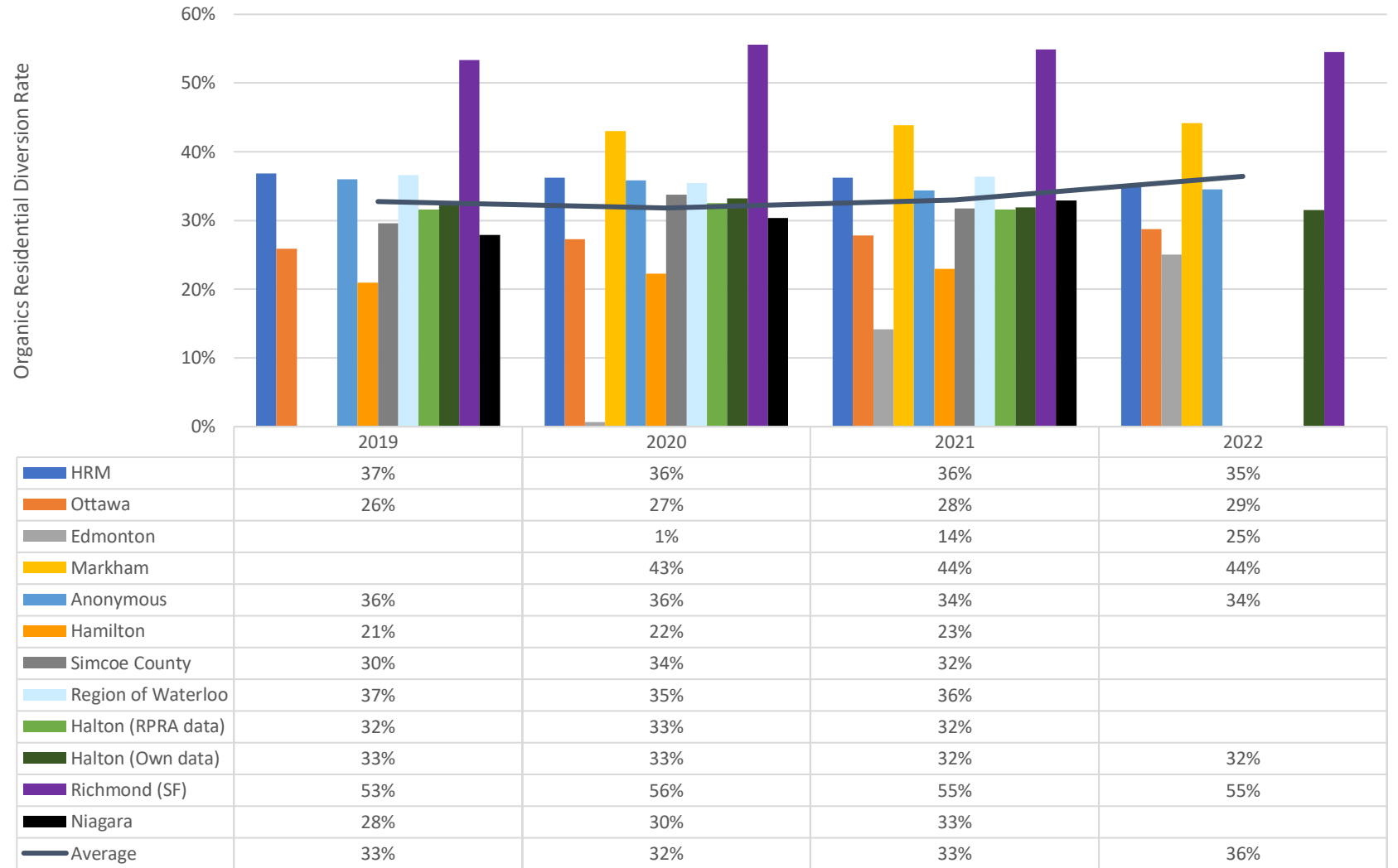


Figure 29: Residential Organics Diversion Rates

No ICI collected data was available or provided by the jurisdictions; therefore, no ICI diversion rates were calculated.

5.2.7 Operating Cost per Tonne of Residential Collection and Diversion

Across all jurisdictions, the information available with respect to costs was limited. Two of the three jurisdictions that provided cost information requested that the cost data remain anonymous. For HRM, a combined operating cost per tonne for residential collection was determined based on the total contracted collection costs and the total tonnes collected across all waste streams, as shown in **Table 5**. Estimated residential costs for curbside and depot garbage collection, recycling and organics are included in **Table 6** to **Table 8**, respectively. The portion of collection costs attributed to each stream is based on contract bid documents and actual expenditures. The full cost of weekly summer organics has been included with organics (**Table 8**). Costs do not include capital expenditures, such as the purchase of new green carts.

Table 5: HRM's Operating Cost per Tonne of Residential Curbside Collection (\$/tonne)

	2019	2020	2021	2022
Total Collection Costs	\$16,993,647	\$15,944,121	\$15,522,155	\$16,421,912
Total Weight Collected (tonnes of garbage, recyclable and organics)	100,805	110,122	105,730	101,389
Collection Costs per Tonne (garbage, recyclable and organics)	\$169	\$145	\$147	\$162

For HRM, the operating costs per tonne of garbage was determined by deriving the portion of collection costs from garbage and adding it to the rural depot costs where only garbage is collected as shown in **Table 6**. To determine the portion of collection costs allocated to garbage, the portion of total weight that is garbage was multiplied by the total contracted collection costs for collection. Some limitations of this approach are that depot costs will also include some ICI costs.

Table 6: HRM's Operating Costs per Tonne of Residential Curbside and Depot Garbage Collection (\$/tonne)

	2019	2020	2021	2022
Rural Refuse Depot Haulage	\$261,643	\$241,474	\$275,859	\$313,437
Collection Costs	\$4,917,019	\$4,583,762	\$4,538,244	\$4,811,717
Total Collection Costs	\$5,178,662	\$4,825,236	\$4,814,103	\$5,125,154
Total Weight of Garbage Collected	46,035	51,125	48,561	48,051
Collection Costs per Tonne	\$112	\$94	\$99	\$107

Two other jurisdictions provided their collections costs per tonne for garbage and their costs were \$120 per tonne and \$200 per tonne.

With respect to operating costs per tonne for recyclables, a combination of data provided by jurisdictions and RPRA Datacall data was applied. With regards to the cost per tonne of recyclables reported by jurisdictions, it is unclear if those are per tonne collected, or marketed tonnes. To determine the costs of collection per tonne based on RPRA Datacall data two data points were used:

- “Total Reported and/or Calculated Marketed Tonnes” from the BB Marketed Tonnes reports; and
- “Residential Collection Costs” from the BB Costs and Revenue report.

Collection costs per tonne for recyclables across jurisdictions are shown in **Figure 30**. To maintain the requested anonymity of the jurisdictions the information in this table and figure have been anonymized and presented as jurisdiction one through nine on the horizontal axis of **Figure 30**.

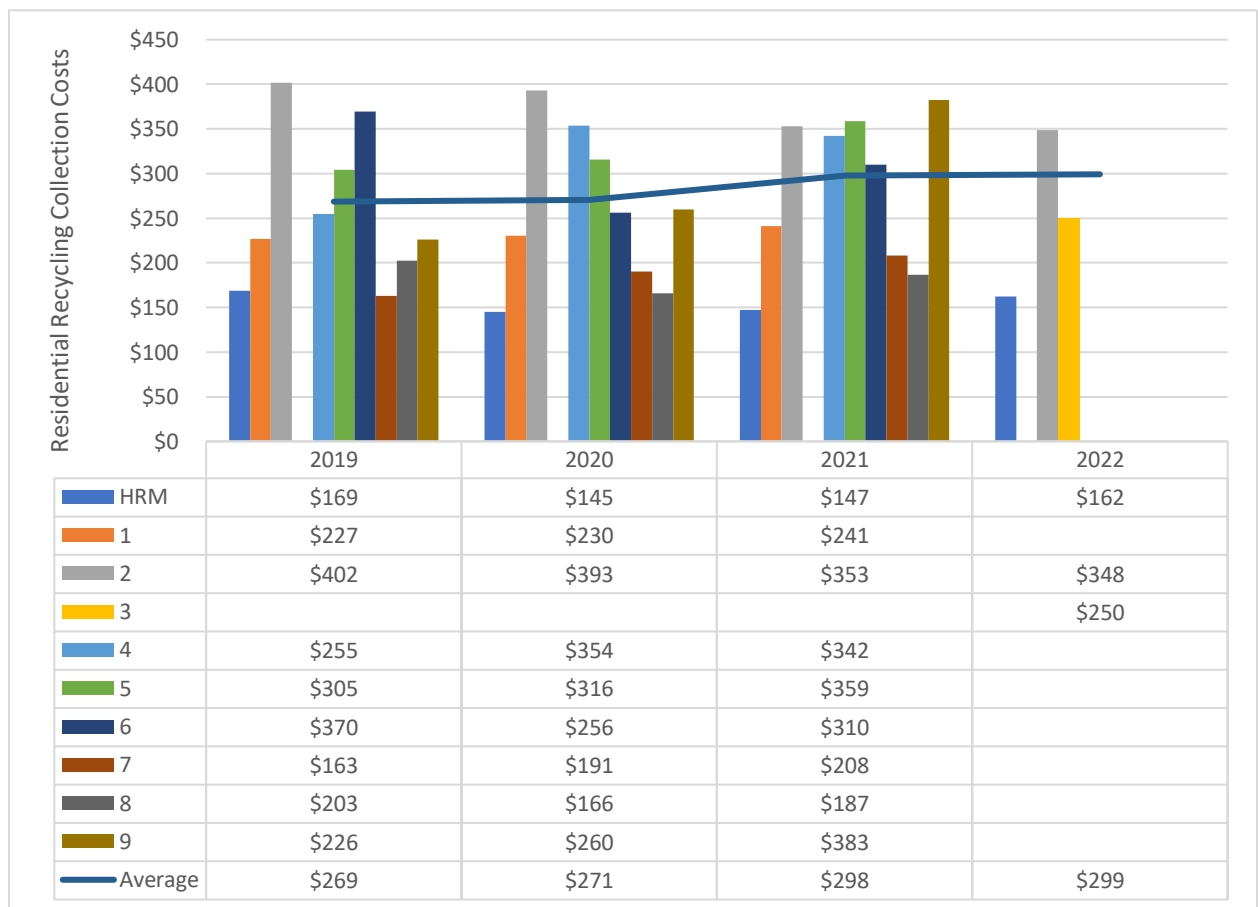


Figure 30: Costs of Collection of Residential Recyclables per Tonne (\$/tonne)

No jurisdictions provided their diversion costs; therefore, only RPRA Datacall data was available. To determine the costs of diversion per tonne based on RPRA Datacall data two data points were used:

- “Total Reported and/or Calculated Marketed Tonnes” from the BB Marketed Tonnes reports; and
- “Residential Gross Costs Including Interest on Municipal Capital and Administration” from the BB Costs and Revenue report.

For HRM, the operating costs per tonne of recyclables was determined by deriving the portion of collection costs from recyclables and adding it to the portion of the MRF costs associated with residential materials as shown in **Table 7**. To determine the portion of collection costs allocated to recyclables, the portion of total weight that is recyclables was multiplied by the total contracted collection costs for collection. To determine the portion of MRF costs associated with residential materials, the total MRF costs were divided by the portion of materials processed at the MRF from residential sources. A limitation of this approach is that revenue has not been factored into this cost. This cost for diversion is different than the Ontario costs as it is based on tonnes collected and not marketed; this will result in a lower cost per tonne for HRM.

Table 7: HRM's Total Residential Diversion Costs for Recyclables (\$/tonne)

	2019	2020	2021	2022
MRF Costs (Residential)	\$2,479,545	\$2,541,864	\$2,449,011	\$2,268,043
Collection Costs	\$6,027,313	\$5,618,805	\$5,563,008	\$5,898,234
Total Diversion Costs	\$6,369,409	\$6,006,368	\$8,012,020	\$8,166,277
Total Weight of Recyclables Collected	17,598	19,118	18,827	17,739
Diversion Costs per Tonne	\$362	\$314	\$426	\$460

The operating costs of diversion per tonne of recyclables marketed are shown in **Figure 31**.

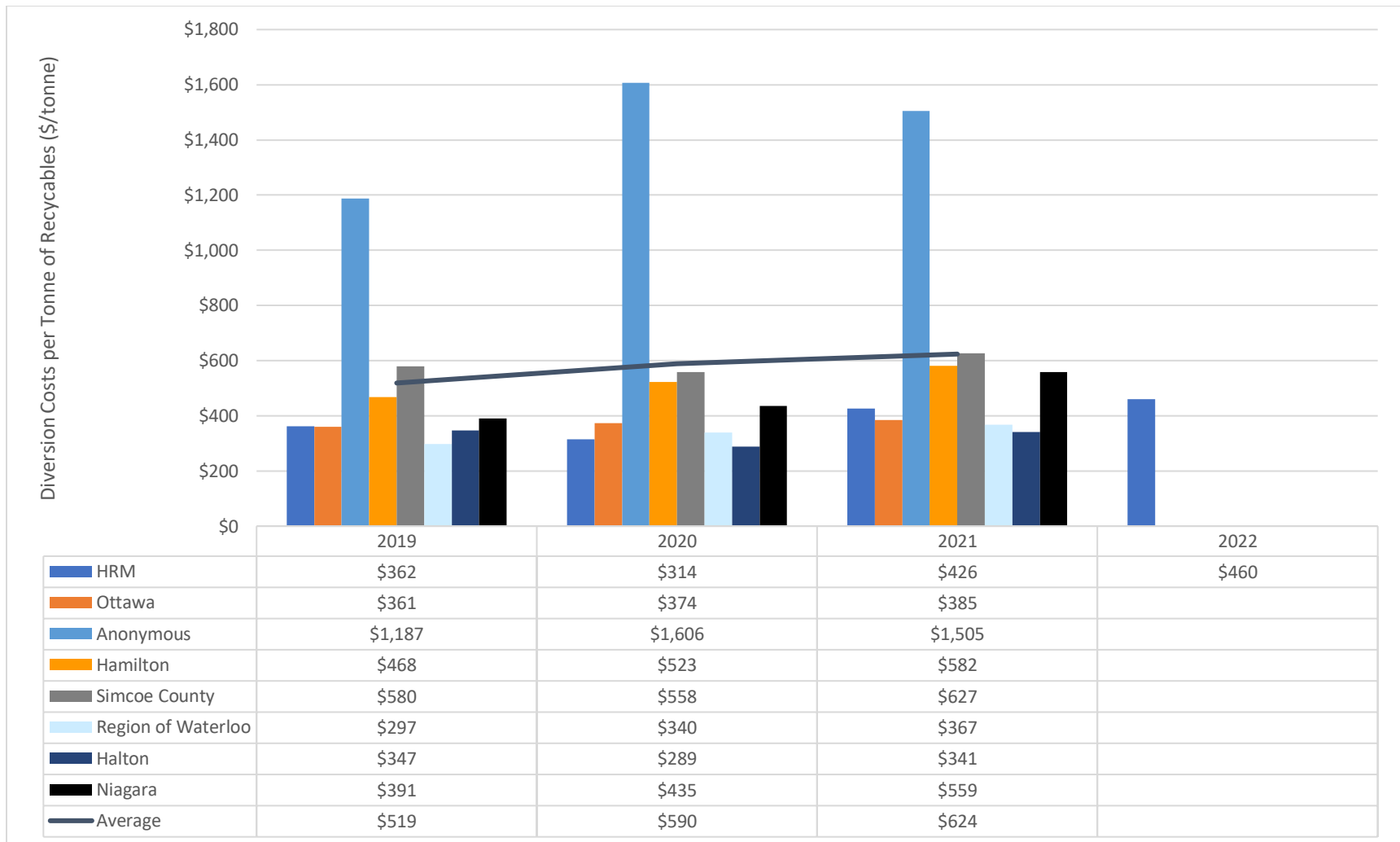


Figure 31: Residential Diversion Costs per Tonne of Recyclables (\$/tonne)

For HRM, the operating costs per tonne of to divert organics was determined by deriving the portion of collection costs from organics and adding it to the portion of costs from the two compost facilities in Halifax associated with residential materials as shown in **Table 8**. To determine the portion of collection costs allocated to organics, the portion of total weight that is organics was multiplied by the total contracted collection costs for collection. To determine the portion of compost facility costs associated with residential materials, the total compost facility costs were divided by the portion of materials processed at the compost facility from residential sources.

Table 8: HRM's Residential Costs per Tonne of Organics Diversion (\$/tonne)

	2019	2020	2021	2022
Compost Facility Costs	\$6,002,868	\$6,612,443	\$8,332,872	\$8,212,518
Collection Costs	\$6,201,187	\$5,741,555	\$5,420,903	\$5,711,962
Cart Delivery/Repairs - Operating	\$151,872	\$164,279	\$159,952	\$142,206
Total Diversion Costs	\$12,355,927	\$12,518,277	\$13,913,727	\$14,066,686
Total Weight of Organics Collected	37,172	39,879	38,342	35,600
Diversion Costs per Tonne	\$332	\$314	\$363	\$395

No comparable costs were provided by other jurisdictions for organics diversion, as no processing costs for organics were provided. The only costs related to the organics that were provided were collection costs by two jurisdictions, and their costs were \$107 per tonne and \$200 per tonne.

5.3 Key Themes and Findings

To assess HRM's performance against the jurisdictions reviewed through this benchmarking, HRM's metrics were compared to the average of all jurisdictions. In **Table 9** HRM's performance compared to the average for each metric is summarized.

Table 9: HRM's Performance Compared to the Average for Each Metric

Metric	HRM's Performance
Residential Garbage Collected Weight per Capita	In all years HRM is below the average and is among the lowest for this metric. On average over the four years HRM is 25% below the average.
Residential Garbage Collected Weight per Household	In all years HRM is below the average, although within the low to mid range on this metric. On average over the four years HRM is 22% below the average.
Residential Garbage Disposed Weight per Capita	In all years HRM is below the average and is among the lowest for this metric. On average over the three years HRM is 37% below the average.
Residential Garbage Disposed Weight per Household	In all years HRM is below the average and is among the lowest for this metric. On average over the three years HRM is 43% below the average.

Metric	HRM's Performance
Residential Recyclable Collected Weight per Capita	In all years HRM is below the average and is among the lowest for this metric. On average over the four years HRM is 26% below the average.
Residential Recyclable Collected Weight per Household	In all years HRM is below the average and is among the lowest for this metric. On average over the four years HRM is 39% below the average.
Residential Recyclable Marketed Weight per Capita	In all years HRM is below the average and is among the lowest for this metric. On average over the three years HRM is 41% below the average.
Residential Recyclable Marketed Weight per Household	In all years HRM is below the average and is the lowest for this metric. On average over the three years HRM is 47% below the average.
Residential Organics Weight Collected per Capita	In all years HRM is below the average, although within the mid-range for this metric. On average over the four years HRM is 10% below the average.
Residential Organics Weight Collected per Household	In all years HRM is below the average, although within the low to mid-range for this metric. On average over the four years HRM is 19% below the average.
Total Residential Materials Weight per Capita	In all years HRM is below the average and is among the lowest for this metric. On average over the four years HRM is 25% below the average.
Total Residential Materials Weight per Household	In all years HRM is below the average and is the lowest for this metric. On average over the four years HRM is 34% below the average.
Total Residential Diversion Rate	In all years HRM is above the average, and in the mid-range for this metric. On average over the four years HRM is 4% above the average.
Recyclables Diversion Rate	In all years HRM is at or near the average. HRM is in the mid-range for this metric. On average over the four years HRM is 2% below the average.
Organics Diversion Rate	In all years HRM is above the average, except 2021 when HRM is below the average. HRM is in the mid-range for this metric and very close to the average. On average over the four years HRM is 8% above the average.
Costs of Collection of Residential Recyclable per Tonne	In all years, the calculated collection cost for all waste streams for HRM is less than the average, and lower than all other jurisdictions costs for recyclables. On average over the four years HRM is 45% below the average.
Residential Diversion Costs per Tonne of Recyclables	In all years HRM is below the average, although within the low to mid-range for this metric. On average over the three years for which there are data HRM is 36% below the average.

When considering the metrics of total residential materials weight per capita and household HRM is amongst the lowest. Similarly, with respect to all three waste streams, HRM is well below the average in terms of weight of materials collected, disposed, and marketed per capita and household. This result is more pronounced in the garbage and recyclable waste streams than in the organics stream where HRM is closer to average. Overall, the low total weight of material suggests that residents in HRM are taking positive steps to refuse, reduce and reuse, at the upper levels of the waste hierarchy.

In particular, lower residential disposed weight points to strong diversion results. HRM had amongst the lowest residential garbage collected and disposed weights across all jurisdictions reviewed.

HRM's total diversion rates are above average, and this is driven by slightly above average diversion of organics, while recyclables diversion is slightly below the average. HRM is near the average of diversion rates with respect to both recyclables and organics collected per capita and per household. This is an important metric for both recyclables and organics as the overall weights of those materials in HRM was quite low compared to other jurisdictions. Recognizing that overall waste generation is below average, recycling and organics diversion rates show that HRM is on par with other jurisdictions. Further analysis of landfill waste audits would be required to fully evaluate where improvements could be made to recycling and organics diversion.

Given the limited information available with respect to costs, it appears that HRM is within the same range or lower with respect to costs as the other jurisdictions reviewed. However, more detailed analysis would require a review of detailed costs per waste stream and more data from other municipal jurisdictions.

Appendix A

Waste Generation Projections

Table A 1: Waste Generation Projections - Low Scenario

Year	Population	Residential Tonnes			Commercial Tonnes				Total Tonnes (Residential and Commercial)			
		Garbage	Recyclables	Organics	Garbage	Recyclables	Organics	C&D	Garbage	Recyclables	Organics	C&D
FY 22/23	466,272	48,051	17,739	35,600	110,778	6,025	15,609	33,583	158,829	23,764	51,209	33,583
FY 23/24	472,647	48,221	17,802	36,015	111,619	6,205	15,728	34,383	159,840	24,007	51,742	34,383
FY 24/25	479,159	48,396	17,866	36,438	112,478	6,391	15,849	35,205	160,874	24,258	52,287	35,205
FY 25/26	485,384	48,535	17,918	36,837	113,255	6,578	15,958	36,019	161,790	24,495	52,796	36,019
FY 26/27	491,295	48,635	17,954	37,211	113,947	6,764	16,056	36,822	162,581	24,719	53,267	36,822
FY 27/28	496,864	48,694	17,976	37,558	114,547	6,950	16,140	37,612	163,241	24,927	53,698	37,612
FY 28/29	502,064	48,712	17,983	37,875	115,051	7,136	16,211	38,386	163,763	25,118	54,087	38,386
FY 29/30	506,882	48,687	17,974	38,162	115,458	7,319	16,269	39,141	164,146	25,293	54,431	39,141
FY 30/31	511,323	48,623	17,950	38,419	115,771	7,502	16,313	39,879	164,394	25,452	54,732	39,879
FY 31/32	515,489	48,529	17,915	38,655	116,014	7,684	16,347	40,606	164,543	25,599	55,002	40,606
FY 32/33	519,372	48,405	17,870	38,868	116,187	7,865	16,371	41,321	164,592	25,735	55,240	41,321
FY 33/34	522,971	48,253	17,814	39,059	116,290	8,047	16,386	42,024	164,543	25,860	55,445	42,024
FY 34/35	526,304	48,075	17,748	39,230	116,329	8,227	16,392	42,714	164,404	25,975	55,621	42,714
FY 35/36	529,381	47,873	17,673	39,380	116,307	8,408	16,388	43,394	164,180	26,081	55,768	43,394
FY 36/37	532,206	47,647	17,590	39,511	116,226	8,588	16,377	44,061	163,873	26,178	55,888	44,061
FY 37/38	534,804	47,401	17,499	39,624	116,093	8,768	16,358	44,719	163,493	26,267	55,983	44,719
FY 38/29	537,100	47,128	17,398	39,715	115,891	8,947	16,330	45,360	163,020	26,345	56,045	45,360
FY 39/40	539,195	46,839	17,292	39,790	115,645	9,125	16,295	45,993	162,484	26,417	56,085	45,993
FY 40/41	541,099	46,534	17,179	39,851	115,357	9,304	16,255	46,617	161,892	26,483	56,105	46,617
FY 41/42	542,827	46,216	17,062	39,898	115,031	9,483	16,209	47,233	161,247	26,545	56,107	47,233
FY 42/43	544,306	45,879	16,937	39,927	114,653	9,661	16,155	47,836	160,531	26,598	56,082	47,836
FY 43/44	545,639	45,531	16,809	39,945	114,244	9,840	16,098	48,432	159,775	26,648	56,042	48,432
FY 44/45	546,817	45,173	16,677	39,951	113,804	10,019	16,036	49,022	158,977	26,695	55,986	49,022
FY 45/46	547,820	44,803	16,540	39,944	113,328	10,198	15,969	49,603	158,132	26,738	55,913	49,603
FY 46/47	548,657	44,423	16,400	39,925	112,821	10,377	15,897	50,176	157,244	26,776	55,822	50,176
FY 47/48	549,334	44,033	16,256	39,894	112,282	10,556	15,821	50,740	156,315	26,811	55,716	50,740
FY 48/49	549,875	43,636	16,109	39,854	111,718	10,735	15,742	51,298	155,354	26,844	55,596	51,298
FY 49/50	550,281	43,231	15,960	39,803	111,130	10,915	15,659	51,849	154,361	26,875	55,462	51,849

Table A 2: Waste Generation Projections - Moderate Scenario

Year	Population	Residential Tonnes			Commercial Tonnes				Total Tonnes (Residential and Commercial)			
		Garbage	Recyclables	Organics	Garbage	Recyclables	Organics	C&D	Garbage	Recyclables	Organics	C&D
FY 22/23	471,008	48,051	17,739	35,600	110,778	6,025	15,609	33,583	158,829	23,764	51,209	33,583
FY 23/24	482,059	48,687	17,974	36,362	112,697	6,265	15,880	34,715	161,383	24,238	52,242	34,715
FY 24/25	493,354	49,329	18,211	37,140	114,645	6,514	16,154	35,883	163,974	24,725	53,294	35,883
FY 25/26	504,526	49,942	18,437	37,905	116,538	6,768	16,421	37,063	166,480	25,205	54,326	37,063
FY 26/27	515,547	50,522	18,651	38,656	118,369	7,027	16,679	38,251	168,891	25,678	55,335	38,251
FY 27/28	526,386	51,069	18,853	39,389	120,133	7,289	16,927	39,446	171,201	26,142	56,317	39,446
FY 28/29	537,015	51,579	19,041	40,104	121,823	7,556	17,166	40,645	173,402	26,597	57,270	40,645
FY 29/30	547,416	52,052	19,216	40,799	123,438	7,825	17,393	41,846	175,490	27,041	58,192	41,846
FY 30/31	557,591	52,489	19,377	41,475	124,977	8,098	17,610	43,050	177,467	27,476	59,085	43,050
FY 31/32	567,628	52,900	19,529	42,137	126,464	8,376	17,820	44,264	179,364	27,905	59,956	44,264
FY 32/33	577,511	53,283	19,670	42,785	127,894	8,658	18,021	45,485	181,176	28,328	60,806	45,485
FY 33/34	587,318	53,646	19,804	43,424	129,285	8,946	18,217	46,720	182,931	28,750	61,641	46,720
FY 34/35	596,977	53,983	19,929	44,050	130,623	9,238	18,406	47,963	184,605	29,167	62,456	47,963
FY 35/36	606,490	54,294	20,044	44,662	131,908	9,536	18,587	49,214	186,203	29,580	63,249	49,214
FY 36/37	615,854	54,581	20,150	45,261	133,141	9,838	18,760	50,474	187,722	29,988	64,022	50,474
FY 37/38	625,087	54,846	20,247	45,848	134,326	10,145	18,927	51,743	189,172	30,393	64,775	51,743
FY 38/29	634,191	55,088	20,337	46,423	135,465	10,458	19,088	53,022	190,553	30,795	65,511	53,022
FY 39/40	643,097	55,303	20,416	46,980	136,543	10,774	19,240	54,304	191,846	31,190	66,220	54,304
FY 40/41	651,893	55,499	20,489	47,528	137,580	11,096	19,386	55,597	193,079	31,585	66,914	55,597
FY 41/42	660,590	55,677	20,554	48,066	138,579	11,424	19,527	56,902	194,256	31,979	67,592	56,902
FY 42/43	669,113	55,831	20,611	48,588	139,525	11,757	19,660	58,213	195,356	32,368	68,248	58,213
FY 43/44	677,561	55,971	20,663	49,103	140,439	12,096	19,789	59,537	196,410	32,759	68,892	59,537
FY 44/45	685,929	56,095	20,709	49,610	141,320	12,441	19,913	60,875	197,416	33,150	69,523	60,875
FY 45/46	694,192	56,203	20,749	50,108	142,165	12,792	20,032	62,225	198,368	33,541	70,140	62,225
FY 46/47	702,360	56,296	20,783	50,596	142,974	13,150	20,146	63,586	199,270	33,933	70,742	63,586
FY 47/48	710,437	56,374	20,812	51,075	143,751	13,514	20,255	64,961	200,125	34,326	71,331	64,961
FY 48/49	718,449	56,440	20,836	51,548	144,500	13,885	20,361	66,350	200,939	34,721	71,909	66,350
FY 49/50	726,395	56,493	20,856	52,014	145,221	14,263	20,463	67,755	201,715	35,119	72,476	67,755
FY 50/51	734,275	56,535	20,871	52,473	145,916	14,649	20,560	69,175	202,451	35,520	73,033	69,175

Table A 3: Waste Generation Projections - High Scenario

Year	Population	Residential Tonnes			Commercial Tonnes				Total Tonnes (Residential and Commercial)			
		Garbage	Recyclables	Organics	Garbage	Recyclables	Organics	C&D	Garbage	Recyclables	Organics	C&D
FY 22/23	474,949	48,051	17,739	35,600	110,778	6,025	15,609	33,583	158,829	23,764	51,209	33,583
FY 23/24	490,352	49,113	18,131	36,681	113,684	6,320	16,019	35,019	162,798	24,451	52,700	35,019
FY 24/25	506,154	50,189	18,528	37,787	116,644	6,628	16,436	36,509	166,833	25,156	54,223	36,509
FY 25/26	522,194	51,262	18,924	38,907	119,618	6,947	16,855	38,042	170,880	25,872	55,762	38,042
FY 26/27	538,452	52,329	19,318	40,038	122,602	7,278	17,275	39,619	174,931	26,596	57,313	39,619
FY 27/28	554,908	53,389	19,710	41,179	125,591	7,621	17,697	41,238	178,980	27,330	58,876	41,238
FY 28/29	571,541	54,439	20,097	42,329	128,580	7,975	18,118	42,899	183,019	28,072	60,446	42,899
FY 29/30	588,342	55,479	20,481	43,486	131,565	8,340	18,538	44,602	187,045	28,822	62,024	44,602
FY 30/31	605,318	56,509	20,862	44,651	134,549	8,718	18,959	46,348	191,059	29,580	63,610	46,348
FY 31/32	622,503	57,533	21,239	45,827	137,539	9,109	19,380	48,140	195,071	30,349	65,207	48,140
FY 32/33	639,882	58,547	21,614	47,012	140,530	9,513	19,802	49,979	199,078	31,127	66,814	49,979
FY 33/34	657,449	59,553	21,985	48,206	143,522	9,931	20,223	51,864	203,075	31,916	68,429	51,864
FY 34/35	675,209	60,550	22,353	49,409	146,515	10,362	20,645	53,798	207,065	32,716	70,054	53,798
FY 35/36	693,080	61,531	22,716	50,615	149,490	10,807	21,064	55,774	211,021	33,522	71,680	55,774
FY 36/37	711,133	62,503	23,074	51,830	152,464	11,266	21,483	57,799	214,967	34,340	73,313	57,799
FY 37/38	729,303	63,459	23,427	53,048	155,421	11,738	21,900	59,869	218,880	35,166	74,948	59,869
FY 38/29	747,582	64,399	23,774	54,269	158,361	12,225	22,314	61,983	222,759	35,999	76,583	61,983
FY 39/40	765,980	65,324	24,116	55,493	161,284	12,726	22,726	64,144	226,608	36,842	78,219	64,144
FY 40/41	784,497	66,234	24,452	56,721	164,192	13,243	23,136	66,351	230,426	37,694	79,857	66,351
FY 41/42	803,143	67,130	24,782	57,953	167,086	13,774	23,544	68,607	234,216	38,557	81,497	68,607
FY 42/43	821,920	68,012	25,108	59,189	169,967	14,322	23,949	70,914	237,979	39,430	83,139	70,914
FY 43/44	840,762	68,876	25,427	60,425	172,820	14,885	24,351	73,265	241,696	40,312	84,777	73,265
FY 44/45	859,827	69,733	25,743	61,672	175,678	15,466	24,754	75,675	245,411	41,209	86,426	75,675
FY 45/46	879,034	70,578	26,055	62,923	178,525	16,064	25,155	78,139	249,103	42,120	88,079	78,139
FY 46/47	898,399	71,412	26,363	64,181	181,363	16,681	25,555	80,659	252,775	43,044	89,736	80,659
FY 47/48	917,927	72,234	26,667	65,445	184,193	17,316	25,954	83,237	256,428	43,983	91,399	83,237
FY 48/49	937,649	73,048	26,967	66,717	187,022	17,971	26,353	85,875	260,070	44,938	93,070	85,875
FY 49/50	957,569	73,854	27,265	67,998	189,849	18,647	26,751	88,577	263,704	45,911	94,749	88,577
FY 50/51	977,693	74,652	27,559	69,288	192,676	19,343	27,149	91,343	267,328	46,902	96,438	91,343

Table A 4: Waste Generation Projections - NSTM Scenario

Year	Population	Residential Tonnes			Commercial Tonnes				Total Tonnes (Residential and Commercial)			
		Garbage	Recyclables	Organics	Garbage	Recyclables	Organics	C&D	Garbage	Recyclables	Organics	C&D
FY 22/23	481,356	46,035	17,598	37,172	93,289	6,029	17,176	30,156	139,324	23,627	54,348	30,156
FY 23/24	502,719	47,597	18,195	38,744	96,845	6,397	17,830	31,809	144,442	24,592	56,575	31,809
FY 24/25	524,343	49,148	18,788	40,330	100,404	6,779	18,486	33,509	149,552	25,567	58,816	33,509
FY 25/26	546,215	50,686	19,376	41,928	103,965	7,175	19,141	35,256	154,651	26,551	61,069	35,256
FY 26/27	568,305	52,209	19,958	43,536	107,520	7,584	19,796	37,049	159,729	27,542	63,332	37,049
FY 27/28	590,580	53,713	20,533	45,152	111,064	8,008	20,449	38,886	164,777	28,541	65,601	38,886
FY 28/29	613,008	55,195	21,100	46,773	114,590	8,445	21,098	40,766	169,785	29,544	67,871	40,766
FY 29/30	635,564	56,654	21,657	48,397	118,094	8,896	21,743	42,689	174,748	30,553	70,140	42,689
FY 30/31	658,243	58,088	22,206	50,024	121,574	9,360	22,384	44,654	179,663	31,566	72,408	44,654
FY 31/32	681,007	59,496	22,744	51,651	125,024	9,839	23,019	46,661	184,520	32,583	74,669	46,661
FY 32/33	703,829	60,875	23,271	53,275	128,438	10,331	23,647	48,707	189,314	33,603	76,922	48,707
FY 33/34	726,690	62,224	23,787	54,895	131,815	10,838	24,269	50,792	194,039	34,624	79,164	50,792
FY 34/35	749,590	63,543	24,291	56,512	135,153	11,358	24,884	52,916	198,696	35,649	81,395	52,916
FY 35/36	772,520	64,832	24,784	58,124	138,451	11,893	25,491	55,080	203,283	36,676	83,615	55,080
FY 36/37	795,468	66,090	25,265	59,731	141,709	12,442	26,091	57,284	207,799	37,707	85,822	57,284
FY 37/38	818,445	67,319	25,734	61,333	144,927	13,006	26,683	59,528	212,246	38,741	88,017	59,528
FY 38/29	841,445	68,519	26,193	62,931	148,106	13,586	27,268	61,812	216,625	39,779	90,199	61,812
FY 39/40	864,478	69,691	26,641	64,524	151,247	14,181	27,847	64,139	220,937	40,822	92,371	64,139
FY 40/41	887,546	70,835	27,078	66,114	154,351	14,792	28,418	66,509	225,186	41,871	94,532	66,509
FY 41/42	910,661	71,953	27,506	67,700	157,421	15,420	28,983	68,924	229,374	42,926	96,683	68,924
FY 42/43	933,828	73,045	27,923	69,283	160,457	16,066	29,542	71,384	233,502	43,989	98,826	71,384
FY 43/44	957,063	74,114	28,332	70,865	163,463	16,729	30,096	73,892	237,577	45,061	100,961	73,892
FY 44/45	980,368	75,160	28,732	72,445	166,438	17,410	30,644	76,448	241,598	46,142	103,089	76,448
FY 45/46	1,003,735	76,182	29,122	74,024	169,383	18,111	31,186	79,053	245,565	47,233	105,210	79,053
FY 46/47	1,027,177	77,181	29,504	75,601	172,299	18,830	31,723	81,708	249,480	48,334	107,324	81,708
FY 47/48	1,050,700	78,159	29,878	77,178	175,187	19,569	32,254	84,415	253,347	49,448	109,432	84,415
FY 48/49	1,074,329	79,118	30,245	78,756	178,052	20,330	32,782	87,177	257,170	50,574	111,537	87,177
FY 49/50	1,098,066	80,057	30,604	80,335	180,894	21,111	33,305	89,994	260,952	51,715	113,640	89,994
FY 50/51	1,121,913	80,978	30,956	81,915	183,714	21,915	33,824	92,868	264,692	52,871	115,739	92,868

Appendix B

Jurisdictional Scan Template

Topic	Summary of Key Questions
General Information	• Brief overview of waste management services provided and facilities available including: ○ Any changes in services between 2019 and 2022 ○ Upcoming changes ○ Collection through contract and/or by municipal forces • Jurisdiction Population • Population served (residential [e.g., single family and multi-residential] and ICI sector [e.g., schools, municipal facilities, Business Improvement Areas, businesses]) • Bylaws that govern waste collection, programs and services, including what sectors can be served • Impacts to population served (e.g., seasonal residents) • Differences, if any, between residential and/or ICI collection
Garbage	• Collection service levels provided (frequency of collection, style of collection [e.g., bags, carts]) • Limit on set out and/or fees for setting out any/additional garbage • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Disposal rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of disposal, per tonne, per sector, 2019 to 2022 • Can residents drop off garbage at transfer stations, depots, landfill etc.
Recycling	• Collection service levels provided (accepted materials, frequency of collection, streams [e.g., 1, 2 or 3], style of collection [e.g., bags, carts], if recycling is co-collected) • Limit on set out and/or fees for setting out any/additional recycling • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Diversion rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of diversion, per tonne, per sector, 2019 to 2022 • Can residents drop off recycling at transfer stations, depots, landfill etc.
Organics (food waste)	• Collection service levels provided (accepted materials, frequency of collection, style of collection [e.g., carts], if compostable bags are permitted as liners) • Limit on set out and/or fees for setting out any/additional organics • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Diversion rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of diversion, per tonne, per sector, 2019 to 2022 • Can residents drop off food waste at transfer stations, depots, landfill etc.

Topic	Summary of Key Questions
Organics (leaf and yard waste)	• Collection service levels provided (accepted materials, frequency of collection, style of collection [e.g., carts, paper bags, repurposed container]) • Limit on set out and/or fees for setting out any/additional LYW • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Diversion rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of diversion, per tonne, per sector, 2019 to 2022 • Can residents drop off LYW at transfer stations, depots, landfill etc.
Bulky Waste (if separate from Garbage)	• Collection service levels provided (frequency of collection, # of items permitted, scheduling pick-up – if applicable) • Limit on set out and/or fees for setting out any bulky waste • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Disposal rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of disposal, per tonne, per sector, 2019 to 2022 • Can residents drop off bulky waste at transfer stations, depots, landfill etc.
Additional Curbside Streams e.g., C&D, Textiles, Batteries	• Collection service levels provided • Limit on set out and/or fees for setting out any streams • General description of collection vehicles and fleet • Quantities (tonnes) collected per sector, 2019 to 2022 • Disposal rate per capita, per sector, 2019 to 2022 • Approximate cost of collection per tonne, per sector, 2019 to 2022 • Approximate cost of disposal, per tonne, per sector, 2019 to 2022
Follow-up	• If Dillon can follow-up with additional questions
Confidentiality	• If any of the information provided is confidential and can be shared with HRM, but may not be provided in a report

Appendix C

Overview of Selected Jurisdictions' Waste Management Programs

This appendix provides an overview of the solid waste management systems in the jurisdictions reviewed. **Table C1** provides an overview of the terminology used with respect to different collection types used for waste streams.

Table C1: Collection Type Terminology

Collection Type	Description	Example Image
Bags	Bags are used for all waste streams, and jurisdiction may have requirements as to the colour or type for different waste streams.	
Containers	Some jurisdictions allow residents to set out their waste using their own containers and may have size limits and other requirements for those containers.	
Boxes	Boxes are typically used for recycling and do not have lids or wheels.	
Carts	Carts are used for all waste streams and are typically wheeled with lids and can be serviced by automate waste collection vehicles.	

Table C2: Jurisdictional Review of Waste Management Programs

Jurisdiction	Overview of Waste Management Program
Ottawa, Ontario	Ottawa provides collection services for residential and some ICI garbage, recyclables, and organics. Residential collection is provided through curbside collection to single-family households and containerized collection to multi-residential buildings. ICI collection is provided through a Yellow Bag Program in line with the curbside program and through containerized collection. Curbside collection: Customers include single family, low rise multi-residential, some multi-residential, places of worship, city facilities, and some commercial businesses that participate in the Yellow Bag program. • Garbage is collected bi-weekly in bags and garbage containers through manual collection up to a limit of six items; • Recyclables are collected in two streams, with each stream collected bi-weekly on an alternating basis in boxes; • Organics is collected weekly in carts provided by Ottawa and include leaf and yard waste year-round; and, • Leaf and yard waste is collected separately during 10 weeks in the Spring and Fall peak seasons. Yellow Bag Program: Customers include commercial businesses that generate less than 16 bags of garbage every two weeks. For multiple businesses in one building all must participate and have a combined total limit of 16 bags. • Frequency of collection is the same as the curbside program; and, • When each stream is collected, users of the Yellow Bag Program can set out up to 16 bags of garbage, three green bins and 15 containers of recyclables. Containerized collection: Customers include multi-residential and city facilities. • Garbage, organics, and recyclables are divided into two streams and are collected between one to five times per week. Collection is completed using front-end bins or 360L carts and are collected with front-end loading trucks.

Jurisdiction	Overview of Waste Management Program
Edmonton, Alberta	Edmonton provides curbside and communal collection of residential waste in the following streams: garbage, organics, recyclables, and yard waste. In 2019 the City started winding down it's commercial collection services and no longer services the ICI sector, except for City owned sites. Single-family collection: • Garbage is collected bi-weekly in carts of varying sizes; • Recyclables are collected weekly in single-stream blue bags; • Organics is collected weekly from spring to fall and bi-weekly in the winter in 120L carts. Leaf and yard waste is accepted; and, • Leaf and yard waste is seasonal, with two collections in the spring and two collections in the fall. Multi-residential (communal) collection: • Garbage and recyclables are collected weekly in bins; and • Organics are not currently collected but is set to begin in Fall 2023. ICI collection: Edmonton does not collect materials from the ICI sector, except for City owned facilities.
Vancouver, British Columbia	Vancouver provides collection services for residential garbage and organics. Recyclables are collected by a contracted waste hauler (GFL) on behalf of Recycle BC. Residential collection (single-family and multi-residential): Vancouver collects from all single-family homes and some multi-residential buildings if they have the space for sufficient waste totes on the building's property, and capacity to only receive bi-weekly garbage collection. • Garbage is collected bi-weekly from carts of varying sizes. Extra garbage can be placed curbside for collection, but it must have a bag tag attached (\$2 per tag); • Recyclables are collected weekly in three streams (paper, containers, and glass) in carts and bags of varying sizes. Recyclables are collected by a contracted Recycle BC collector and is not the responsibility of the City; • Organics is collected weekly in carts of varying size. Leaf and yard waste is accepted; and, • Leaf and yard waste is collected through four additional weeks of collection in the fall and a weekend for tree collection following winter holidays. ICI collection: Vancouver does not collect materials from the ICI sector at all.

Jurisdiction	Overview of Waste Management Program
Markham, Ontario	Markham provides collection services to single-family, multi-residential and some commercial locations and Business Improvement Associations (BIAs). Single-family collection: • Garbage is collected bi-weekly in clear bags, with up to four privacy bags inside the clear bags. No limit on number of bags set out for collection; • Recyclables are collected weekly in a single-stream in a blue box; • Organics is collected weekly in 50L or 100L carts, with excess allowed to be placed in clear bags next to the bins; and, • Leaf and yard waste is collected bi-weekly April-November in paper bags or rigid open top containers. Christmas tree pick-up is also provided during the first two weeks of January. Multi-residential collection: • Garbage, recyclables, and organics are collected weekly in bins; and, • Organics are not currently collected but is set to begin in fall 2023. ICI collection: ICI properties that Markham has extended services to are required to follow residential policies for curbside collection. Other: In 2017 Markham banned textiles waste at the curbside. There are 160 public access locations and 63 multi-residential properties for textile drop-off.
Anonymous	The anonymous jurisdiction provides collection services to single-family, and some multi-residential and ICI customers. Single-family: • Garbage is collected bi-weekly using carts of varying size; • Recyclables are collected bi-weekly in a single-stream using carts of varying sizes; • Organics is collected weekly in 80L carts; and, • Leaf and yard waste is collected on a bi-weekly basis from spring to fall. Waste must be placed in a paper yard waste bag or appropriate container. Multi-residential collection: To receive collection, multi-residential buildings must adhere to the by-law requiring sorting into three streams and using jurisdiction provided carts or bins. • Collection from all three streams provided as needed, up to two to three times per week. ICI collection: • Downtown businesses receive collection services six days per week (Mon-Sat) for garbage, recyclables, and organics; and, • Eligible ICI properties outside of the downtown, such as places of worship and non-profit community centers, must set their waste out for collection in the same manner as single-family curbside collection.

Jurisdiction	Overview of Waste Management Program
Hamilton, Ontario	Hamilton provides collection services to single-family and some multi-residential and ICI locations⁹. Residential collection (single-family and multi-residential): • Garbage is collected weekly in bags and containers. Single-family households are limited to one bag per week, excess bags must be tagged, and bag tag costs are provided free of charge; • Recyclables are collected weekly in dual-stream system in blue boxes and carts; • Organics is collected weekly in carts, leaf and yard waste is not accepted; and, • Leaf and yard waste is collected separately March to December, and Christmas trees are collected two weeks in January. ICI collection: • ICI collection is provided in the same manner as residential, except in the downtown area where garbage pick-up is provided up to six days per week.
Simcoe County, Ontario	Simcoe County provides collection services to residential and some ICI customers¹⁰. Residential collection (single-family and multi-residential): • Garbage is collected bi-weekly in carts. Garbage that does not fit in carts must be tagged, and bag tags costs \$3 per tag; • Recyclables are collected bi-weekly in a single-stream in carts of varying sizes; • Organics are collected weekly in carts, leaf and yard waste is not accepted; and, • Leaf and yard waste is collected bi-weekly, seasonally from spring to fall, and Christmas tree collection is provided. ICI collection: • ICI properties that require services that are proportional to single-family collection are provided service. Other: • Collection services for batteries, clothing/textiles and electronics is also provided.

⁹ Questionnaire not completed; information taken from [Garbage & Recycling](#) website.

¹⁰ Questionnaire not completed; information taken from [Waste Collection Information](#) website.

Jurisdiction	Overview of Waste Management Program
Region of Waterloo, Ontario	Waterloo provides collection services to all single-family residences and provides only recycling collection to multi-residential buildings¹¹. Single-family collection: • Garbage is collected bi-weekly in bags or containers. Single family homes can put out up to three garbage bags/cans per collection and small apartments can set out up to 10 garbage bags/cans. Four times a year there are double garbage days where double the amount of garbage can be set out. Otherwise, garbage set out over the limit must be tagged, and tags costs \$2 each; • Recycling is collected weekly in a dual-stream system in blue boxes; • Organics are collected weekly in carts, leaf and yard waste is not accepted; and, • Leaf and yard waste is collected bi-weekly, seasonally from March to November, and Christmas tree collection is provided. Multi-residential collection: • Recycling is collected weekly in a dual-stream system in carts. ICI collection: • ICI properties that require services that are proportional to single-family collection are provided service. Schools are also provided recycling service in the same manner as multi-residential buildings.

¹¹ Questionnaire not completed; information taken from [Waste Management](#) website.

Jurisdiction	Overview of Waste Management Program
Halton, Ontario	The Region of Halton provides collection services for garbage, recycling, and organics for customers within four local municipalities: City of Burlington, the Town of Halton Hills, Milton, and Oakville. All collection services are contracted out to private service providers. Single-family collection: • Garbage is collected bi-weekly in bags and containers. Households may set out up to three bags or cans with a maximum of 125L/25kg each. Diaper and medical bag programs are available; • Bulky items can be set out bi-weekly with garbage, up to three items per collection; • Recyclables are collected weekly in a single-stream. Recyclables can be set out in a blue box (85L or less) or clear bags, and cardboard may be bundled; • Organics is collection weekly in carts of varying sizes. There is no limit, but maximum weight for each cart/bag set out is 23kg; and, • Leaf and yard waste is collected bi-weekly from April to December. Waste must be placed in a paper yard waste bag or appropriate container and weigh no more than 23kg. ICI collection: • Customers are publicly funded schools, some municipal facilities, BIAs and some commercial; • Garbage collection is provided in carts up to 360L and both BIAs and commercial are provided with two carts. Collection is provided twice a week for BIAs and once per week for other ICI; • Recyclables collection is provided in carts up to 360L, two carts are provided to BIAs and one to all other commercial. Collection is provided twice a week for BIAs and once per week for other ICI; and, • Organics and leaf and yard collection is not provided to commercial customers due to lack of processing capacity.
Richmond, British Columbia	Richmond provides collection services to all single-family and some multi-residential buildings. No information was provided regarding the level of service for the multi-residential collection program. Single-family collection: • Garbage is collected bi-weekly in carts of varying sizes; some townhomes receive weekly collection. Garbage bags can be purchased for excess waste tag (\$5 per tag) and garbage vouchers are provided for up to \$25 towards a drop-off at Vancouver Landfill; • Recyclables are collected in three streams (paper, containers, and glass), weekly in carts and bags of varying sizes; and, • Organics is collected weekly in carts of varying sizes. Leaf and yard waste is accepted. ICI collection: • There was a pilot program to collect from commercial properties that could be serviced the same as residential properties; however, this program likely will not be implemented long-term. There is no data available with regards to this pilot.

Jurisdiction	Overview of Waste Management Program
Niagara	Niagara provides collection services to single-family and multi-residential buildings¹². Single-family collection: • Garbage is collected bi-weekly in bags or containers. Single family homes may put out up to two garbage bags/cans per collection. Excess garbage set out over the limit must be tagged. Tags cost \$2.85 each; • Recyclables are collected weekly in a dual-stream system in boxes; • Organics are collected weekly in carts. Leaf and yard waste is accepted; and, • Leaf and yard waste is collected weekly year around. Multi-residential collection: • Garbage is collected bi-weekly in bags or containers. Limit of two bags per unit to a maximum of 24 bags; • Recyclables are collected weekly in a dual-stream system in carts; and, • Organics are collected weekly in carts, leaf and yard waste is accepted. ICI collection: • Niagara does not collect materials from the ICI sector.

¹² Questionnaire not completed; information taken from [Garbage, Recycling and Organics](#) website.