

**Best Practices to Improve Apartment Building Waste Management  
Halifax, Nova Scotia**

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**Prepared by:**

**Drew DeCoste  
BES, BA, MREM Candidate 2020  
Halifax, Nova Scotia**

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## Executive Summary

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Around the world, municipal solid waste has become an ever-expanding issue. As societies' consumption habits continue to rise and throw-away culture continues to trend, the global problem with municipal solid waste does not seem to be slowing any time soon. Apartment buildings are major contributors to municipal waste generation and tend to divert less waste than the average single-unit dwelling. Lack of convenience, bin capacity, disposal monitoring and management have contributed to the issue. In addition, the overall apartment building population tends to be transient and diverse, making one-size-fits-all remedies inert.

On a global scale, Halifax, Nova Scotia is seen as a leader in solid waste management; however, they are not immune to the solid waste management issues that surround apartment buildings. Despite efforts to provide education and create programs to increase diversion rates, Halifax Regional Municipality (HRM) has not found a solution that is capable of addressing such a diverse and complex problem.

The overall objective of this project was to explore apartment building waste management in HRM and understand how best practices may be implemented to improve waste diversion.

To do so, this project took a mixed-method approach to achieving the project objectives. A literature review was conducted on municipal solid waste on a global, national and municipal scale, finishing with identifying the key barriers for apartment building waste management in HRM. Interviews were conducted with staff from all nine Nova Scotia Municipal Collection Regions to understand how each region perceives and manages issues surrounding apartment building waste management throughout the province. The responses to the interviews were put through a thematic analysis, pulling six main themes from the data collected. Two jurisdictional scans were conducted, one across Nova Scotia's Municipal Collection Regions, pulling basic information on information availability and continuity of waste management practices. A second scan was conducted in search of best practices within three larger cities that are peers to Halifax in terms of mandatory waste streams and solid waste management priorities. To understand tenant barriers, a survey was circulated for apartment residents in HRM to complete in search of demographics, opinions and personal experiences with apartment building waste management. The results of the survey provided insights into the top barriers for a small sample of apartment dwellers in HRM and qualitative responses provided context to the barriers. Additionally, a best practices scan was conducted to provide a list of industry best practices that are relevant to the improvement of the waste management system in HRM.

The results of this project have identified three key authoritative stakeholders that have the ability to improve waste diversion through implementing change and best practices. Tenants play a major role and their non-compliance is obvious when they do not source separate, however some authority figures who set the standard have been found to cut corners to save on money and time spent on waste management. Therefore, where HRM has focused much of its efforts on tenant education in the past, the recommendations have been focused around the three key authoritative stakeholders: waste haulers; apartment management/landlords; and the municipal government. Recommendations include short-term items such as having stakeholders brush up on their responsibilities according to municipal by-laws and updating municipal websites, up to long-term items such as restructuring the waste hauling system or creating a standardizing hauler license in HRM.

Municipal solid waste is a system that works well when key players pull their own weight. Haulers, tenants, superintendents, landlords, management companies, and governments are all responsible for upholding their standards set through legislation. These groups are all connected, therefore improving waste diversion rates and producing lasting change means implementing change in all aspects of the waste management system, not just one.

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## List of Terms

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|      |  |
|------|--|
| HRM  | Halifax Regional Municipality                    |
| MSW  | Municipal Solid Waste                            |
| ABWM | Apartment Building Waste Management              |
| GHG  | Greenhouse Gas Emissions                         |
| CCME | Canadian Council of Ministers of the Environment |
| CSC  | Community Stakeholder Committee                  |
| MCR  | Municipal Collection Regions                     |

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# 1. Objectives

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The management of municipal solid waste (MSW) has become an increasingly challenging task over recent decades; inappropriate waste disposal is a significant problem around the world and is an issue in desperate need of action (Fallade, 2015). Within this context, Halifax, Nova Scotia has earned global recognition for being a leader in waste management and diversion, and continues to view sustainable waste management as a priority and endeavours to increase overall waste diversion (Walker *et al.*, 2004). Despite such efforts, apartment buildings continue to generate a significant amount of MSW. These communities are dense and diverse and pose a challenge to any city's waste management goals as they typically divert significantly less than single-unit dwellings. They also pose numerous challenges in terms of education and enforcing municipal waste by-law compliance (Walker *et al.*, 2004).

This project aims to identify both the barriers to apartment building waste management (ABWM), and the best practices that can be deployed within the apartment-dwelling community. Much of this work will be underpinned by a more fulsome understanding of HRM's waste management history, initiatives and programs. Given the many socio-economic factors to be considered when deploying a successful waste management strategy, a mixed-methods involving both qualitative and quantitative data collection was necessary.

## 2. Methodology

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### 2.1 Informational Interviews

Informational interviews were conducted with Solid Waste Resources Education Officer, Chloe Kennedy and Diversion Planning Officer, Alonzo MacDonald to explore past, present and incoming waste programs that were introduced to address ongoing issues with multi-unit waste management. These interviews were conducted over the telephone and were unstructured. Notes taken were adapted to fit the scope of the project. See Table 2 for results.

### 2.2 Jurisdictional Scans

#### *2.2.1 Nova Scotia Jurisdictional Scan*

A provincial jurisdictional scan was conducted to explore waste management through Nova Scotia's nine (9) Municipal Collection Regions (MCR) (Table 3). Seven (7) characteristics were examined in order to understand the differences between the different waste management operational systems and related governing bodies. The main goal for this scan was to get a better understanding of the nine MCR's and their waste management systems across the province. Although this scan does not directly address ABWM, it provides a better understanding of the province's waste management system as a whole, which can lend a hand to understanding certain barriers and opportunities that may present themselves within the apartment building waste management sector.

The seven main search points for the scan were:

- number of municipalities under each MCR;
- whether the MCR has a designated website external to that of their municipality/municipalities;
- type of governance for each MCR;



- whether or not a ‘Waste Wizard’ was provided to users;
- whether or not a waste app was provided to users;
- whether or not a source separation guide was provided; and
- whether each municipality in the MCR followed the same waste rules for sources separation.

See Table 3 for results.

### ***2.2.2 Best Practices Jurisdictional Scan***

The best practices jurisdictional scan collected information on municipal waste management operational strategies, programs, and bylaws from three (3) major cities: Toronto, Canada; Calgary, Canada; and Amsterdam, Netherlands. These locations were chosen as they were comparable to HRM in terms of current waste management practices, waste streams and material bans (City of Toronto, 2012, Calgary, 2020c, XPAT, 2020). However, there were also sufficient differences between each locale to provide novel insights that could be applied to HRM. This scan is directly linked to ABWM.

The six main search points for the scan were:

- number of mandated waste streams at each locale;
- how many units define an apartment building;
- who provides material collection service for apartment buildings;
- what taxes and fees are associated with waste management;
- diversion goals and rates per location; and
- additional programs or initiatives that are unique or interesting in terms of apartment building waste management and regional waste management systems

See Table 4 for results.

Both jurisdictional scans provide valuable insights into how other municipal regions address barriers to waste management and may offer potential applicable methods to addressing similar barriers to ABWM in HRM.

## **2.3 Municipal Collection Region Interviews**

### ***2.3.1 Data Collection***

Ethics approval was received to conduct interviews with ten (10) solid waste resources staff from across Nova Scotia’s nine (9) MRC’s. The interviews were conducted primarily over the telephone with two exceptions; one was conducted over video call (Zoom), the second was completed in writing via email correspondence. The interviews were not recorded; however, the researcher took comprehensive notes on participant responses. Each interview consisted of the same 10 questions regarding the respondents personal and professional experiences, and the current enforcement of ABWM in their specific region. While each interview consisted of the same questions, open discussion was encouraged to understand better their particular perspectives. See Appendix B for a full list of interview questions.

### ***2.3.2 Qualitative Thematic Analysis***

A qualitative method was chosen to analyze the data from the interviews. Interview responses were anonymized and coded using an inductive thematic qualitative analysis to identify barriers, as well as experiences and perceptions of the industry. Several main themes were identified by coding key words and experiences from the interview responses. Of those, six (6) main themes were chosen to best describe the data: barriers to tenant compliance; barriers to regulation/enforcement; barriers to education; perceptions of management companies/landlords; helpful tools and strategies; and suggested improvements/ideas. These themes were identified through organizing and analyzing the qualitative data, pulling commonalities, comparisons and key terms/phrases from the interview responses and related discussions.

## **2.4 Tenant Survey**

### ***2.4.1 Data Collection***

A quantitative survey was chosen to gather data on tenant barriers to participation and compliance to ABWM. The survey was created with Opinio, using dichotomous, multiple choice, Likert scale and open-ended questions, and was granted ethics approval from Dalhousie University. Participants must have been at least 18 years of age and have lived in an apartment building in HRM, NS in the past five years. The survey went live on July 3, 2020 and closed on September 1, 2020. See Appendix C for a full list of survey questions..

The survey consisted of 19 questions that covered the following:

- consent to the terms of participation;
- identifying respondent demographic;
- respondents perceptions on various aspects of waste management strategies such as source separation, engagement barriers, knowledge on by-laws and challenges including apartment building management activities; and
- general solicitation for additional comments.

The survey was circulated through social media networks such as Instagram, Twitter and Facebook using personal accounts, as well as Instagram accounts from Stop Trashing It Network, Dalhousie Student Union, Halifaxnoise and their joint account, Halifaxnoiseathome. It was also circulated through faculty and community email lists at Dalhousie University and Saint Mary's University.

When the survey closed on September 1, 2020 there were 612 stored responses, of which 45 were incomplete, one did not indicate they agreed to the terms, such that the total of completed surveys were 566.

The data collected from this survey is not to be considered as a representative sample of the population and should not be normalized over all apartment buildings. Instead, the data are intended to elucidate further insights from past or present apartment dwellers within HRM regarding potential challenges or specific barriers negatively influencing diversion rates within the population. The results from this survey are used to provide descriptive statistics of these findings.

### ***2.4.2 Qualitative Thematic Analysis***

A basic thematic analysis was performed on the qualitative survey data collected through the final question, ‘Please feel free to provide any additional comments on apartment building waste management’, where 191 respondents left a comment. Themes were highlighted for the contents of each comment by coding key terms and phrases. Of the 191 responses, seven (7) main themes were chosen to best describe the data: insufficient bin capacity; belief that all waste will be landfilled anyway/mistrust with management; HRM waste system is too complicated; not a priority due to lack of affordable housing; poor quality in waste rooms/collection areas; request for electronic and battery waste disposal; and not enough enforcement from management companies.

### **3. Introduction**

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ABWM is a growing issue around the world (Fallde, 2015). In general, apartment buildings divert less waste than single-unit dwellings and with global consumption rates on the rise and a shrinking capacity for landfill expansion, addressing issues of disposal in apartment buildings has become a priority (Mustapha, 2013, Fallde, 2015).

Despite Nova Scotia being seen as a leader in municipal solid waste management on a national and international level, tensions surrounding ABWM have been running high in HRM for some time (Walker *et al.*, 2004, Walton, 2019). Many tenants are non-compliant in regards to mandatory source separation and apartment management companies have been lacking in providing appropriate bins and capacity for collection (Walton, 2019). Although HRM is equipped with their Solid Waste Resource Collection and Disposal by-law S-600 to promote and enforce waste diversion, non-compliance continues to be an issue within apartment buildings (Walton, 2019, Walker *et al.*, 2004). The multi-unit population is rising rapidly in HRM, breaking local records for apartment starts and vacancy rates are at an all-time low (Canada Mortgage and Housing Corporation, 2020, Halifax Partnership, 2018). These issues must be addressed before too many new apartments are ill equipped with waste management infrastructure and take to the current HRM standards of ABWM (Halifax Partnership, 2018).

This project has taken a mix-methods approach to explore key issues with apartment building waste management, present industry best practices and provide recommendations for HRM.

### **4. Background**

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#### **4.1 Municipal Solid Waste**

MSW is the end-of-life for a product discarded by the user. It consists of electrical waste, construction and demolition waste, food waste and sludge (Yang *et al.*, 2013). This waste has become a concern over the past few decades as heavy metals, leachate and landfill gas has become a threat to the environment and human health (Yang *et al.*, 2013, Zeng *et al.*, 2010). Each year, 1.47 billion tonnes of municipal waste is produced globally, and is projected to continue to increase until it will peak in 2100 (Zaman, 2016). Globally, municipal waste is typically deposited in dumps or landfills, and if not sorted, processed or disposed of properly, it can lead to a host of environmental and human health issues such as loss of land, leachate, landfill gas, sights, smells, rodents and greenhouse gas emissions (GHG) (Otten, 2001, Zeng *et al.*, 2010).

Despite about 84% of MSW being collected, only 15% is actually recycled (Zaman, 2016). This has the potential to improve through education and MSW programs such as recycling and composting initiatives (Ungureanu, 2018). Waste management is not a new concept. In fact, it can be dated back to the earliest periods of human civilization (Zaman, 2016). It began as a means to improve public health throughout the 19th century; however, has pivoted to focusing on environmental concerns (Greene & Tonjes, 2014). Today the primary objective of waste management and its related policies is to reduce harmful environmental impacts (Greene & Tonjes, 2014). This includes minimizing the impact of landfills through source separation, as well as through resource recovery (Zaman, 2016). Source separation and resource recovery aids in decreasing the amount of material being consumed by landfills, and helps to decrease the need to extract more virgin materials, and essentially eliminating all associated GHG throughout that extraction process (Mohareb *et al.*, 2004).

Additionally, waste management and climate change go hand-in-hand. MSW accounts for 3.6% of the total annual world GHG (Zeng *et al.*, 2010). This stems from the extraction of raw materials, manufacturing, transportation, consumer use and waste management (Zeng *et al.*, 2010). If diverted materials were used primarily in production instead of extracting virgin materials, it can help to offset the GHG emissions (Zeng, *et al.*, 2010). Composting also results in long-term carbon storage; however, if organics were sent to landfills this would increase landfill gas (Zeng *et al.*, 2010)

Material recovery by means of recycling and composting is a viable way to offset the burdens of global consumption and conserve natural resources (Zaman, 2016, Ungureanu, 2018). Seeing waste as a resource instead of unusable can help to offset the pressures on landfills. (Zaman, 2016). Resources are limited globally and space for landfills are shrinking due to a rising population, rapid urbanization and industrialization, waste ought to be seen as a viable resource (Yang *et al.*, 2013). For every 1 tonne of MSW deposited, 71 tonnes of upstream and virgin materials is required (Zaman, 2016). Through waste management programs, resource recovery is possible and a viable way to minimize the impacts of the end of life of a product by diverting it from landfills, as well as minimizing the need for such extensive resource extraction before manufacturing.

## **4.2 Canadian Context**

In Canada, MSW is the responsibility of local governments (Sawell *et al.*, 1996). Although they are to adhere to certain overarching regulations, they tend to differ from province to province and within that, from municipality to municipality (Sawell *et al.*, 1996). Differences can range in number of waste streams, collections systems and societal importance placed on proper source separation (Otten, 2001).

In the 1980s, the Canadian Council of Ministers of the Environment (CCME) was established as a means to develop standards surrounding differing environmental issues, including waste management on a national scale (Sawell *et al.*, 1996). With rapidly shrinking suitable space for landfills and public pressure to conserve resources, waste management has been a priority in Canada for some time now (Sawell *et al.*, 1996). By 1988, CCME established standardized guidelines for MSW incineration practices and in 1990 they established a national objective of 50% waste diversion rate by the year 2000 (Sawell *et al.*, 1996). The goal was based on efforts in recycling, reduction in consumption, reuse and material recovery (Sawell

*et al.*, 1996). This meant implementing either 2, 3 or 4 stream systems across Canada, along with material bans for hazardous waste, among other materials (Otten, 2001).

After rising steadily for years, in 2009 Canada was cited as having the highest rates of MSW per capita in developed countries (Wordsworth, 2014). This was the result of rapid urbanization, as well as a rise in consumption stemming from an increase in revenue and GDP (Wordsworth, 2014). Because of this steady increase in solid waste generation, landfill gas has become one of Canada's top sources of emissions, rising 22% from 1990-2000 (Moharb *et al.*, 2008, Moharen *et al.*, 2004).

Waste incineration is now a relatively uncommon practice to eliminate MSW and efforts surrounding waste diversion in Canada are focused through increasing compliance with multi-stream systems and increasing public awareness of source reduction and diversion (Mohareb *et al.*, 2004).

## **5. Literature Review**

### **Waste Management in Halifax, Nova Scotia**

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#### **5.1 Nova Scotia Waste Management**

Under Section 39(1) of the Nova Scotia *Solid Waste-Resource Management Regulations* (1996) of Section 102 of the *Environment Act* (1994-1995), the Province of Nova Scotia divided into seven (7) MCR. As seen in Table 1, Region's A and B have been subdivided further, totaling nine (9) official MCR (Nova Scotia, 2017). Each MCR has been mandated to prepare a solid waste-resource management plan and were mandated to reach a minimum waste diversion rate of 50% by the year 2000 and are each individually responsible to uphold provincial and municipal regulations on solid waste management throughout each of their associated jurisdictions (*Table 1*) (*Solid Waste-Resource Management Regulations*, 1996). This includes implementing and enforcing municipal by-laws and provincial material bans.

Table 1:

| Region                    | Jurisdiction   |
|---------------------------|--|
| 1A: Cape Breton           | Inverness, Victoria, Richmond, Port Hawkesbury   |
| 1B: Cape Breton           | Cape Breton Regional Municipality  |
| 2A: Eastern               | Municipality of District of Guysborough, Municipality of the County of Antigonish, Municipality of the Town of Antigonish, Mulgrave and St. Mary's                                     |
| 2B: Eastern               | Pictou County  |
| 3: Northern               | Municipality of the County of Colchester, Municipality of East Hants, Municipality of County of Cumberland, Town of Amherst and the Town of Oxford. Including towns within the region. |
| 4: Halifax                | Halifax Regional Municipality  |
| 5: Valley                 | Town of Kentville, Municipality of the County of Kings, Town of Wolfville, Town of Berwick, Town of Middleton, Town of Annapolis Royal, Bridgetown, Hantsport                          |
| 6: South Shore/West Hants | County of Shelburne, Queens, Lunenburg, West Hants/Windsor   |
| 7: Western                | Town of Digby, County of Digby, Municipality of Clare, Municipality of Argyle, Town of Yarmouth, District of Yarmouth  |

*Note.* List of Nine Provincial Municipal Collection Regions, including their jurisdictions. This information has been collected through provincial sources as well as through interviews with staff from each MCR. See *Appendix A* for a full list of MCR's with related websites.

Since the early 1990's Nova Scotia has been in the process of implementing diversion strategies to combat the ever-increasing global consumption rates. In 1994-1995 the Resource Recovery Fund Board (RRFB) was created under Section 4(1) of the Nova Scotia *Solid Waste-Resource Management Regulations* (1996). The mandates for RRFB, now known as Divert NS, are as follows:

- (a) to develop and implement industry stewardship programs;*
- (b) to fund municipal or regional diversion programs;*
- (c) to develop and operate a deposit-refund system for beverage containers*
- (d) to develop education and awareness of source reduction, reuse, recycling and composting;*
- and*
- (e) to promote the development of value-added manufacturing in the Province.*

*(Solid Waste-Resource Management Regulations, 1996)*

Since the implementation of Divert NS, they have been a driving force for waste diversion in the province and have since created stewardship programs for beverage containers, used tires, electronic products, milk packaging, newspapers, yellow pages directories, medical needs, syringes or lancets, expired medication

and oil and glycol (Province of Nova Scotia, 2017). They have also facilitated the creation of 79 independently owned enviro-depots across the province of Nova Scotia (Divert NS, n.d).

Divert NS has also prioritized education initiatives for the public by actively changing the way Haligonians perceive waste. In a world grown accustomed to ‘throwaway culture’, reframing solid waste became one of the most valuable strategies HRM put into motion in terms of waste diversion. Waste became seen as a valuable resource instead of valueless residual from the city’s residents (Wagner, 2007). Reframing waste as a resource had its challenges, but was not overly difficult in the late 1980’s to early 1990’s as the overflowing and unsightly local landfill had been top story in the news (Wagner, 2007). In fact between 1989 and 1993, there were over 600 landfill-related new stories published in the local media outlets (Wagner, 2007). With the efforts of Divert NS, waste educators and the citizens of Nova Scotia, the province has the highest return rate for recyclable recovery in all of Canada at 83% (Divert NS, n.d).

## **5.2 International Recognition**

The province’s improvements to their waste management sector have not gone unnoticed. In fact, it was significantly better than the other Canadian provinces (Walker *et al.*, 2004). There became an overall sense of pride within the community by reaching their goals of 50% diversion by 2000 (Pesklevis, 2011). Because of the waste management programs and technologies in place, Nova Scotia has become a global leader in waste diversion. Representatives from Japan, Hong Kong, China, Vietnam, Russia, Ireland, Guyana, the US, Trinidad and other Caribbean countries have traveled to Nova Scotia to study how the province achieves their high rate of waste diversion (Walker *et al.*, 2004).

A study conducted in 2007 showed that despite the efforts to increase diversion, approximately 50% of all MSW in HRM was composed of recyclable materials, organics, paper, food and beverage containers (Wordsworth, 2014). However, through the implementation of numerous programs, the province has seen a tremendous reduction in waste. For example, the 2006-2007 clear bag program resulted in a 40% drop in waste and a 35-38% increase in organics and recycling (Nova Scotia Environment, 1995). However in recent years MSW rates have begun to climb as a result of economic growth in the province leading to a change in consumption (Pesklevis, 2011).

Currently, Nova Scotia has a goal of reaching zero waste by 2020, but as that deadline falls short, it becomes clear that something is not working despite the infrastructure, state of the art facility and education (Wordsworth, 2014).

## **5.3 HRM Municipal Solid Waste Management**

### ***5.3.1 Historic Look***

Although HRM may be recognized for their waste management practices today, the city has not always made waste management a priority (Walker *et al.*, 2004). In the early days of Halifax, waste was thrown in the street gutters only to be swept up into the sewer systems and deposited in Halifax Harbour (Pesklevis, 2011). One of the first community dumps was located in the Black community, Africville, and once it had reached its capacity the new dump was located in Bedford, followed by the Highway 101 Landfill (Pesklevis, 2011).

The Highway 101 Landfill had been in operation for 13 years with no synthetic liners; relying only on clay to contain leachate and control underground contamination (Wagner, 2007). This was common practice for landfills established in the 1970s (Otter Lake Community Monitoring, 2020). This was the final destination for almost all types of waste within the HRM and became a public and environmental health hazard (Wagner, 2007). The landfill was unsightly, had a strong scent and drew a large seagull population (Otter Lake Community Monitoring, 2020). By the mid-1990s the city was in need of a new landfill as the Highway 101 facility was reaching capacity (Wagner, 2007). Considering the state of existing landfill sites in the HRM area, NIMBY was certainly present in terms of choosing a new location. In 1994 the Community Stakeholder Committee (CSC) was created in order to determine how best to manage MSW through the implementation of new waste management strategies, including sourcing a location for the new community landfill (Wagner, 2007).

### ***5.3.2 Community Stakeholder Committee***

In 1994, Nova Scotia's provincial government held province-wide public consultations to gauge the population's thoughts on waste management. The consultation yielded results stating that the majority of the population found solid waste to be an important environmental, social and economic issue that was long overdue for action (Walker *et al.*, 2004).

A year later, in 1995, the *Solid Waste-Resource Management Strategy* was implemented through Section 92 of the Nova Scotia *Environment Act* (1995-1995) (Walker *et al.*, 2004). This strategy was created in an attempt to meet the national waste diversion target of 50% enacted in 1989; however, this goal was quite the lofty goal considering at the time Nova Scotia was recognized among the largest waste-producing provinces in Canada, recycling only 5% of their total municipal waste stream, landfilling the remaining 95% (Walker *et al.*, 2004, Pesklevic, 2011).

Through provincial goals to achieve better waste management practices and the need for a new landfill location, the Halifax CSC was authorized in 1995 (Walker *et al.*, 2004, Wagner, 2007). CSC was made up of 500 citizens who either lived, worked or leasured in Halifax, Dartmouth, Bedford and the County, as well as Vaughan Engineering and Laura Consulting to help facilitate the planning and implementation of the new waste management system (Otter Lake Community Monitoring, 2020). Over 50 meetings were held over a span of 13 months where CSC and other stakeholders discussed landfill locations, associated risks, material bans, waste streams, stewardship programs and facility technologies (Otter Lake Community Monitoring, 2020).

### ***5.3.3 Otter Lake Facility***

CSC, alongside public participation, chose a site 15 kilometers from downtown Halifax, which is now known as the Otter Lake Landfill (Pesklevic, 2011). This landfill is run by Mirror Nova Scotia which is led by a partnership with BFI, a multinational waste management company, and the local Municipal Group of Companies (Otter Lake Community Monitoring, 2020). The Otter Lake Landfill came into operation in 1999, equipped with state-of-the-art technologies in order to minimize the impact to the surrounding communities of Beechville, Lakeside and Timberlea (Otter Lake Community Monitoring, 2020).

Built into the design and purpose of the landfill, recyclables, organics and hazardous waste are extracted in order to minimize leachate, odours and landfill gas that were once an issue at the Highway 101 Landfill



(Pesklevis, 2011, Otter Lake Community Monitoring, 2020). This process occurs through the use of a Front-End Processing facility where waste is debagged and sorted, as well as a Waste Stabilization Facility where waste and organics are made inert before moving on to the landfill or to an organics processing facility (Wagner, 2007, Otter Lake Community Monitoring, 2020).

The facility processes around 300 to 400 truckloads of waste every day, equating about 150,000 tonnes of garbage per year (Pesklevis, 2011). Although the landfill is state-of-the-art and diverts a great deal of waste and organics, the cells are closing twice as soon as predicted (Pesklevis, 2011). HRM has put a great deal of time and effort into waste management, yet there is still much to be done.

#### **5.3.4 Municipal Waste Streams**

Operating under HRM Charter, By-law No. S-600, the *Solid Waste Resource Collection and Disposal By-Law*, is HRM's main tool for managing municipal solid waste (Halifax Regional Municipality, 1999, Walton, 2019). Much like any other by-law, it defines grey areas in meaning, guides the public's behaviour, outlines the reach of authority and permission to distribute fines for non-compliance.

As of 2020, there are five main waste streams that Haligonians are required to sort their waste into under By-law S-600 whether they live in a single unit dwelling or multi-storey apartment building (See Image 1 and Image 2 for HRM source separation guides) (Halifax Regional Municipality, 1999, Davidson *et al.*, 2011). The waste streams are as follows:

- green cart organics: food, soiled paper, crop residue, manure, cooking oil and grease, composite organics and leaf and yard waste;
- non-paper recycling: plastic, containers, metal and glass;
- paper: office paper, composite paper;
- corrugated cardboard (bundled); and
- garbage: end-of-life products, disposable cups, composite packaging, polystyrene (styrofoam), broken glass, soil plastic and foil.

Aside from these main five waste streams, there are additional provincial bans on materials that must be diverted. Citizens are to bring banned materials to a facility for special disposal, such as hazardous household special waste, paint, batteries, electronics, fluorescent bulbs, medication, syringes and textiles (Halifax, 2020, Davidson *et al.*, 2011). By requiring citizens to source separate their waste, the province is able to recover valuable or hazardous material from the waste stream instead allowing these to end up in a landfill which contributes to the provincial economy, creates jobs, and addresses environmental challenges (Nova Scotia Environment, 1995).

According to Section 21.1 of By-law S-600, anyone who is not compliant can face a minimum penalty of \$200.00 CAD, up to a maximum fine of \$5000.00 CAD (Halifax Regional Municipality, 1999). This applies for each day that an offence occurs, meaning this is not a one-time fine. Should the offender not pay their fine, court appearances and a prison sentence of up to 60 days is possible (Halifax Regional Municipality, 1999).

Image 1: HRM source separation guide

Image 2: HRM apartment source separation guide



(Halifax, 2020a)



(Halifax, 2020b)

*Note: Side-by-side images of Halifax Household Sorting Guide and Apartment Guide 'What Goes Where?' to showcase they are identical in what is required of residents, Winter 2020 (Available in 5 different languages)*

## 5.4 Waste Management in Apartment Buildings

In terms of MSW management, apartment buildings are important to highlight as they present their own host of issues. These multi-unit micro communities are dense, diverse and produce a lot of waste (Walker *et al.*, 2004). MSW management can be difficult and tedious when the reasons for non-compliance span multiple diverse households and are difficult to track.

In apartment buildings, it is the responsibility of the tenant to carry their waste from their unit and dispose of it in collection bins within a communal area (Theisen, 2002). The collection bins are shared between all residents and are disposed of by waste haulers, instead of each tenant bringing their waste to their curb themselves for curbside pickup (Theisen, 2002). Since collection bins are shared with the other residents of the building, source separation can become a cause of disagreement. Source separation takes time, space, practice and education and not everyone has the tools or desire to create a waste management system within their own unit. In fact, tenants of apartment buildings are less likely to recycle than single-unit dwellings overall (Fallde, 2015). This behaviour can affect how the rest of the building perceives the task of source separation. Because of their density, it seems nearly impossible to track who is sorting their waste and who is not. Seeing the non-compliance of some tenants can influence others into not sorting their waste as well (Fallde, 2015). Why should one renter sort their waste when the refusal of others to do so will contaminate the bins anyway? Additionally, the convenience of not having to source separate waste becomes a viable option when recycling and organic disposal bins sit next to the co-mingled waste with seemingly no individual repercussions (Theisen, 2002). However, the consequences of non-compliance extends beyond the ability to hold a renter responsible. As previously discussed, mismanaged waste has the potential to spur many issues including adverse effects to the environment and human health.

## 5.5 Apartment Buildings in Halifax Regional Municipality

### 5.5.1 What's the problem?

According to HRM's By-law S-600, apartment buildings are defined as commercial enterprises; meaning they are commercially taxed properties, consisting of six (6) legal units or more (Halifax Regional Municipality, 1999). And because apartment buildings are categorized as commercial enterprises, property

owners are responsible for securing their own contracts for waste collection as this municipal service is not included in commercial taxes as they are with residential (Halifax Regional Municipality, 1999).

### ***5.5.2 By-Law Non-Compliance***

Despite source separation being mandatory under section 12.3 of By-law S-600, it does require voluntary action from tenants (Walker *et al.*, 2004, Halifax Regional Municipality, 1999). Compliance of this by-law means tenants are in agreement that the cost of their time, space and effort are worth the collective social benefit; however, there are some residents who feel the cost is not worth it for them and therefore choose not to participate (Walker *et al.*, 2004). Without a system to monitor waste disposal or active management encouraging compliance, tenants can essentially choose whether to comply, without consequence (Walton, 2019, Windsor, 2015). Although HRM has made efforts to increase waste diversion, it has become accepted that apartment buildings are less compliant in terms of source separation than single-unit dwellings (Walker *et al.* 2004). That being said, there are residents who do not have the same opportunities to participate in source separation, such as senior citizens and people with disabilities, as well as apartment dwellers whose landlords have not provided opportunities for source separation, despite regulations and by-laws (Walker *et al.*, 2004).

The issue of non-compliance does not solely land on the tenants. Section 12 of By-law S-600 requires property owners to provide adequate space for source separation bins, sufficient educational signage and to keep recycling and organic bins within three meters of the garbage bin (Halifax Regional Municipality, 1999). Additionally, section 13 specifies that apartment management is required to keep the area around the bins clean and have bins collected at least every seven days (Halifax Regional Municipality, 1999). Unfortunately, this does not seem to be the standard being kept in HRM as residents have expressed widespread dissatisfaction with the city's ABWM practices. From a 2015 media article, apartment residents tell of a lack of organic collection bins, overflowing garbage, unkempt waste areas and little effort being given by management companies/landlords (Windsor, 2015). Despite the by-law, many superintendents do not even realize they are required to have all five waste stream bins present (Walton, 2019).

### ***5.5.3 The Impact of Low Vacancy Rates***

Over half the population living in HRM resides in multi-unit buildings (including condos) (Storring, 2016). The city's vacancy rate is extremely low at 1% as of 2019, falling 0.6% since 2018 and rent has increased by 3.8% in the past year (Canada Mortgage and Housing Corporation, 2020). A vacancy rate of 1% in HRM means that out of the ~49,000 apartment units in the city, only ~500 are for rent at a given time (MacNeill, 2020). Despite apartments being constructed at an increased rate, they are not being built fast enough to meet the demand (Canada Mortgage and Housing Corporation, 2020). The number of multi-unit building starts has grown from 276 in 2008 to 2,014 in 2017. In just under 10 years the city has significantly increased its density on the peninsula, which aligns with the mandate set out in the city's Centre Plan (Halifax Partnership, 2018). This trend is anticipated to continue as projects such as the Cogswell Interchange and Shannon Park re-developments are expected to include several apartment buildings and condos to increase urban density (Halifax Partnership, 2018).

When vacancy rates are high, tenants have the opportunity to be more selective with their choice in rental (Kunes, 2018). This forces apartment owners and management companies to become more creative in the amenities they offer and in the reliability of the services they provide, including maintenance and waste management (Kunes, 2018). On the other side of that same coin, when vacancy rates are low, renters do

not have the same amount of choice and cannot demand the same standard of practices and amenities as they could when the rates are high. Despite the potential fines for non-compliance, there does not seem to be a drive to enact change without guidance from compliance officers or waste educators (Walton, 2019).

## **Results and Analysis**

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### **6. Current State of Affairs - HRM Apartment Building Waste Management**

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Although ABWM remains an issue for HRM, the city has attempted to address this on multiple occasions through the implementation of differing programs (See Table 2). However, not every multi-unit program made its way into apartment buildings. The information presented in Table 2 is the result of informational interviews with Solid Waste Resources Education Officer, Chloe Kennedy and Diversion Planning Officer, Alonzo MacDonald. The purpose of the interviews were to explore past, present and incoming programs that HRM has used to address ABWM.

In HRM, condominium refuse is collected by the municipality as condo owners pay a residential tax that includes waste management, whereas apartment buildings pay commercial tax and require contracting out waste management to private waste haulers (Halifax Regional Municipality, 1999). Implementing programs within condos first allows the city the ability to monitor the successes more closely as they have more influence over condos at this time (Kennedy, 2020). It was hopeful that programs implemented for trial runs in condominiums would provide insight into how these programs would function in practice rather than on paper, and indicate whether they may be a good fit for apartment buildings as well (Kennedy, 2020).

Table 2:

| Program                               | Description  | Status  |
|---------------------------------------|--|---|
| Condominium Ambassador                | This program relied on the efforts of individuals/condo owners who were given the role of ‘Ambassador’. The Ambassador’s role was to check waste rooms for cleanliness and educate other residents on good waste management practices.<br>If successful, it would have been hopeful to see this implemented in apartment buildings.  | Inactive.<br>Unsuccessful due to lack of incentive for individuals considering the amount of work to be done. |
| Condominium Clear Bag Program         | Clear bag initiative in condominiums in an attempt to create a sense of ownership of one’s waste; encouraging proper sorting and transparency.   | Inactive. Mandatory use of clear bags is now a by-law.  |
| Beyond 3 R’s (Reduce, Reuse, Recycle) | Businesses and apartment buildings could be nominated to receive special recognition for the work they have done to increase waste diversion. This program encourages a more positive approach and celebrates effort rather than enforcing consequences to those that do not comply.   | On hold due to COVID-19   |
| Textile Collection Bins               | In partnership with charity organizations, textile donation bins would be placed at apartment buildings in order to facilitate convenient waste diversion of textiles.   | Inactive.   |
| NSCC & IPOANS                         | Nova Scotia Community College offers a Certified Apartment Manager Course in partnership with IPOANS. HRM waste educators perform guest lectures as a means to ensure waste management is deemed a priority from the beginning. Would like to increase SWR participation.  | Active. Currently online due to COVID-19.<br>SWR contacted when needed for presentation.                      |
| Master Composter Recycler             | 6-week program on HRM’s SWM system. Though this program does not specifically focus on apartment or condo waste management, the Master Composter Recycler program provides opportunity for participants to become ‘waste champions’ and may influence their communities.   | Active. Currently online due to COVID-19.   |
| Certification for Superintendents     | Superintendents are invited to participate in a one day (7 hour) professional development day where they will learn about HRM’s waste management strategies and how best to implement them and encourage tenant participation in HRM’s apartment building communities.   | On hold due to COVID-19.  |
| POSSE Software                        | This new software interface, POSSE will help streamline the permit and development process. With the implementation of POSSE it will now be required for all new development applications in HRM to run their waste room plans through Halifax Solid Waste Resources. This would allow for a standardization of waste room features such a drainage, door size, room size etc. in order to achieve the most convenient | On hold but scheduled for implementation  |

|  |  |  |
|--|--|--|
|  | and successful waste rooms for landlords, tenants and waste haulers. Building plans would not be approved without waste room approval. |  |
|--|--|--|

*Note:* List of the most recent programs created by HRM in an attempt to increase waste diversion in multi-unit residences. Information for this table was provided by HRM Solid Waste Resources Education Officer, Chloe Kennedy, 2020 and Diversion Planning Officer, Alonzo MacDonald, 2020.

## 7. Jurisdictional Scans

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### 7.1 Nova Scotia Jurisdictional Scan

A jurisdictional scan was completed for all nine Nova Scotia MCRs and helps to identify the key features of solid waste management in each MCR. This, in turn, provides a better understanding how and why some regions are more involved with ABWM and have differing kinds of authority. Although this scan did not explicitly pertain to ABWM, it provides insight about the broader provincial system where there may be gaps in information or opportunities for improvement.

Table 3:

| MCR | Number of jurisdictions | Designated MCR Website | MSW Governing Body Type | Municipal Waste Wizard         | Municipal or MCR Waste App     | Source Separation Guides | Source separation continuity |
|-----|-------------------------|------------------------|-------------------------|--------------------------------|--------------------------------|--------------------------|------------------------------|
| 1A  | 4                       | No                     | Municipal               | 0/4                            | 0/4                            | 4/4                      | Different                    |
| 1B  | 1                       | Municipal              | Municipal               | 0/1                            | 1/1                            | 1/1                      | n/a*                         |
| 2A  | 5                       | Yes                    | Committee               | MCR                            | MCR                            | 3/5                      | Different                    |
| 2B  | 1                       | Yes                    | Authority               | MCR                            | MCR                            | MCR                      | n/a*                         |
| 3   | 5                       | No (2/5)               | Municipal               | 2/2                            | 2/2                            | 1/2                      | Same                         |
|     |                         | Yes (3/5)              | Authority               | MCR                            | MCR                            | MCR                      | Same                         |
| 4   | 1                       | Municipal              | Municipal               | 1/1                            | 1/1                            | 1/1                      | n/a*                         |
| 5   | 8                       | Yes                    | Authority               | MCR                            | MCR                            | MCR                      | Same                         |
| 6   | 4                       | Yes                    | Committee               | MCR                            | MCR                            | 4/4                      | Same                         |
| 7   | 6                       | Yes                    | Authority               | External Party (Recycle Coach) | External Party (Recycle Coach) | MCR                      | Same                         |

*Note.* Jurisdictional scan of the provincial Municipal Collection Regions, describing basic features of their waste management systems. See *Appendix A* for a full list of MCR jurisdictions and related website links.

\*Singular municipality within this Municipal Collection Region

## 7.2 Nova Scotia Jurisdictional Scan Key Findings

### 7.2.1 Governing Body Type

As seen in Table 2, there were three types of governing bodies identified in the scan; municipal, committee and authority. These three governing bodies allow for differing levels of political and enforcement power.

Committees are similar to authorities in that they are created by municipalities as a way to streamline information, however unlike authorities, they do not seem to have the power to create and enact policy (Halifax, 2020c). Authorities are contracted out by municipal governments to create a governing body that has the ability to enforce waste management regulations across their entire MCR jurisdiction (Valley Waste-Resource Management, 2018) For example, region 5's authority, Valley Waste-Resource Management, is made up of eight municipalities where they all follow the same waste management by-laws, including regulations and enforcement (Valley Waste Management, 2018). This helps them provide a consistent approach to governing all eight of region 5s jurisdictions instead of having to enforce eight

different sets of municipal rules (Valley Waste Management, 2018). From a committee perspective, region 2A and region 6 are able to provide a somewhat streamlined way to navigate information, although it can be noted in Table 3 that their regulations differ in terms of source separation guidelines unlike within authorities.

### ***7.2.2 Exchange of information***

Some regions had streamlined approaches to their waste management system, which allowed for easy access to their websites with content that was easily identifiable. Others had MCR website had names that may not be easily identified as the region's MSW governing body. In some cases, one has to know the exact verbiage and terms of what they are looking for in order to attain information on waste management such as 'source separation guides' and even 'municipal collection region'. In addition, even with the knowledge of MCR's, not every region had a website. Not knowing whether to look for an MCR website (possibly with a name that may not be identifiable), or to look through individual municipal websites was certainly a barrier to the exchange of information. If searching for answers is difficult, then perhaps the system needs an overhaul to allow the average person the opportunity to learn their role and responsibility and be able to quickly find the answers to their questions.

### **7.3 Best Practices Jurisdictional Scan**

The purpose of this best practices jurisdictional scan is to encapsulate the key facets of three prominent cities in terms of ABWM. Toronto, Canada, Calgary, Canada and Amsterdam, Netherlands were chosen for their current systems and diversion goals for the future. Unlike the Nova Scotian scan, Table 4 provides a visual representation of some key features of ABWM within each locale. For instance, in each city, material collection is the responsibility of the municipality; however, they differ in that Toronto allows the opportunity to opt out for private contracts, Calgary collects all waste excluding recycling, and Amsterdam collects recyclables and hazardous waste at community collection bins and drop sites. Each city takes a slightly different route in ABWM (City of Toronto, 2012, Calgary, 2020b, Goorhuis *et al.*, 2012). Following Table 4, best practices and additional programs are explored in more detail within each locale.



Table 4:

|                               | <b>Toronto</b>   | <b>Calgary</b>   | <b>Amsterdam</b>  |
|-------------------------------|--|--|---|
| <b>Mandated Waste Streams</b> | Garbage, recycling, organics and yard waste, additional special collection (City of Toronto, 2012).                | Garbage, recycling, organics and yard waste, additional special collection (Calgary, 2020c).                             | Garbage, recycling, organics and yard waste, additional special collection (Amsterdam, 2019).                             |
| <b>Definition</b>             | 8+ units (Toronto, 2020d)  | 3+ units, sharing an entrances, available for occupation for more than 30 days (Calgary, n.d.7)                          | 3+ units, sharing an entrances, available for occupation for more than 30 days (Amsterdam, 2019).                         |
| <b>Collection</b>             | Municipal collection, however there is the option to opt out and obtain private contracts (City of Toronto, 2012). | Municipal collection, however recycling is contracted. Option to opt for private contract for organics (Calgary, 2020b). | Municipal collection, however recycling is contracted. Option to opt for private contract for organics (Amsterdam, 2019). |
| <b>Taxes and fees</b>         | Property owners must pay into a blend of fees and taxes (Toronto, 2020f).  | Moving from waste tax to usage fees for education and transparency purposes (The City of Calgary, 2018).                 | Property owners must pay into a blend of fees and taxes (Amsterdam, 2019).  |
| <b>Diversion goal</b>         | Goal: 70%<br><br>Actual: single family, 65%<br>apartment, 28%<br>(Toronto, 2016, Toronto, 2017).                   | Goal: 70% (The City of Calgary, 2018).<br><br>Actual: N/A  | Goal: 70% (Amsterdam, 2019).<br><br>Actual: 65% (Social   |

*Note:* Best practices jurisdictional scan. Highlighting key features of Toronto, Calgary and Amsterdam apartment and regional waste management practices.

### **7.3.1 Toronto, Canada**

Toronto is one of Canada's largest cities where nearly half of the population lives in multi-unit residences such as apartments, condos and co-ops (Toronto, 2017). The large multi-residential population has encouraged the city to improve upon the system's efficiency and diversion.

Their municipal waste management system allows property owners to opt-in to City services, which provides free collection, waste bins for all streams and other educational material such as signage (Toronto, 2020a). Household bins are provided to buildings of 31 units or less and are required to be brought to the curbside for collection, and dumpsters are provided for buildings of 31 units or more and are to be collected via front-end hauler (City of Toronto, 2012). Should a property owner choose to opt-out of the City collection service, they are required to find a private contract hauler to provide the same service to the same standards and City and Provincial requirements. (Toronto, 2020a).

According to Section 354-3.4 of *Toronto Municipal Code*, all apartment owners and operators are required to have a comprehensive waste management plan for their building (City of Toronto, 2020). This mandate also includes storage and waste room requirements/standards, the compliance of diversion requirements

and the displaying of those requirements for tenants to see, as well as providing clear signage and stickers to ensure proper waste diversion (City of Toronto, 2020).

In terms of going above and beyond, the City of Toronto has created several programs of note to improve waste diversion in their apartment buildings. These include:

- sorting guides for tenants that are translated in 20 different languages (King, 2006);
- prioritizing education over enforcement and fines;
  - City officials would prefer to provide education and help building owners and managers before enforcing by-laws or distributing fines, encouraging better relationships with the property owner population (King, 2006).
- garbage chute closure programs;
  - Garbage chutes are convenient for tenants; however, they contribute to issues of non-compliance of source separation. Therefore the city has offered this program to help building owners who participate in municipal collection to close their chutes and transition to a new waste management routine for their tenants (Toronto, 2020b)
- free kitchen catchers and recycling bag;
  - For buildings that partake in municipal collection, they are eligible to receive free kitchen catchers and a recyclable collection bag to promote in-unit source separation (Toronto, 2020d).
- the 3R's Ambassador Program;
  - After attending a free three-hour training session, a 3Rs Ambassador will help their building by providing education through displays, posters or door-to-door outreach, as well as organizing exchange events. It is the city's goal to have an ambassador in each multi-residential building (Toronto, 2020c).
- extensive documents on building waste management for new developments and redevelopments; and
  - This document provides clear guidelines for developers to follow in terms of waste management protocol, storage rooms, collection requirements and other city codes and by-laws (City of Toronto, 2012)
- mayoral contest to improve waste diversion.
  - This contest provided multi-residences the opportunity to flex their waste management strategies and showcase what they do to improve the waste diversion of their building external to municipal and provincial requirements. The overall winner of the contest, Omni Forest Mansions, had gone above and beyond by providing collection for hazardous waste, organizing clothing and household item swaps, yard sales and running a workshop to repair broken items instead of throwing them away (Toronto, 2017).

### ***7.3.2 Calgary, Canada***

Calgary has a relatively newer waste management system compared to cities like Toronto and HRM. With the recent implementation of recycling and organic waste streams in 2016 and 2017 respectively, Calgary seemed like a notable second location for the jurisdictional scan to see how they handle ABWM (Calgary, 2020a).

Taking note of the primary recommendations from a comprehensive report in 2014, Calgary has mandated recycling through by-laws, increased the flexibility of how they manage their apartment sector as well as improve their communication and education (Calgary, 2020a, The City of Calgary, 2014).

Calgary differs from Toronto in terms of waste collection responsibility. Where Toronto provides collection service for every waste stream, Calgary does not. The City of Calgary does not provide recycling services and organic collection is optional through city services (Calgary, 2020b, Calgary, 2020c). These services must then be contracted out to a private hauling company; however, despite not being city-run, the haulers must continue to adhere to regulations on source separation. This allows apartment owners more flexibility for how, where and how often their recyclable and organics are collected (Calgary, 2020d). In terms of costs associated with collection, Calgary is also moving away from a tax based system to a fee based system for an increase in transparency and flexibility for the property owner and what their building and business require.

Calgary's notable initiatives includes:

- sorting guides for tenants translated in three different languages (Calgary, 2020g);
- flexibility;
  - Calgary has made it a priority to be flexible in terms of apartment building waste management from collection service providers and contracts to communication styles with individual building owners. This showcases that the city understands there is no one-size-fits-all solution for education, communication, collection, etc. (The City of Calgary, 2018).
- education mandates; and
  - It is mandated that building owners and operators provide education on source separation to tenants at least once a year, and every time a new tenant moves in (Calgary, 2020e).
  - It is also mandated that waste rooms must be equipped with proper signage on Calgary's by-laws on source separation (Calgary, 2020e).
  - Education, communication and engagement are also the main priorities and tools for the city's waste management initiatives for the future and 70% diversion goal by 2025 (The City of Calgary, 2018).
- prioritizing education over enforcement and fines.
  - City officials would prefer to work alongside owners and managers to ensure everyone is educated on their waste management system instead of attempting to solve an issue of non-compliance with a fine. (Calgary, 2020f).

### ***7.3.3 Amsterdam, Netherlands***

What is interesting about Amsterdam is their lack of readily available information on ABWM, despite the Netherlands touting a reputation for their environmental initiatives (Lapper, 2020). From the literature studied for this scan, there was almost no mention of apartment buildings (or multi-residential, multi-unit, multi-family, multi-storey, block complex etc.) being a particular problem in terms of waste management therefore this section focuses primarily on Amsterdams overall waste management system.

Waste management in Amsterdam works similar to that of Toronto and Calgary, with municipal alternating curbside pickup for garbage and organic waste. Where they differ is with their other waste streams (Goorhuis *et al.*, 2012). Recyclables such as paper, glass, cardboard and plastics, as well as electronic,

hazardous and bulky waste are still the responsibility of the municipality; however each jurisdiction is required to find alternative collection methods for these waste streams (Goorhuis *et al.*, 2012). Apartment buildings follow the same rules as the rest of the municipal region. Apartments typically have roll out bins or dumpsters in waste rooms or within close proximity outdoors for municipal collection, however, residents are required to adhere to the collection methods for the remaining waste streams within their jurisdiction (Lapper, 2020). In Amsterdam this often looks like community drop bins for recyclables, paper, and glass (Zhan *et al.*, 2020, Goorhuis *et al.*, 2012). These bins measure 0.6 cubic meters above ground but boast a five cubic meter capacity underground (Zhan *et al.*, 2020). These bins are available to the public, free of charge, to improve collection efficiency.

A few initiatives that have encouraged public participation include:

- Waste currency
  - A green initiative called WASTED allows citizens of Amsterdam to trade in their discarded waste for discounts at local shops to entice an increase in waste diversion (Schröter, 2020).
- Waste as a resource
  - One main way Amsterdam has been attempting to drive their diversion rate is through the education and understanding that waste is a valuable resource. The Netherlands are moving toward a full circular economy and they can no longer continue to accept and incinerate valuable resources (The Ministry of Infrastructure and the Environment *et al.*, 2016).
- Achievement Update App
  - RecyQ initiated a pilot program in Southeast Amsterdam to encourage an increase in waste diversion and awareness. Within this initiative, RecyQ has created an app called to track personal waste generation, showcase where they fall in the neighbourhood leaderboard and update citizens on their waste diversion performance (RecyQ, 2020).
- Policy
  - Strict policies from a national level lent a hand in the building success of waste management in the Netherlands. Air quality standards and material bans from a joint agreement with national, provincial and local governments helped to take waste management off the top of the political agenda (Ministry of Infrastructure and Water Management, n.d.).
- Additional waste collection
  - Some municipalities have expanded their underground collection bins to include items such as textiles and shoes for disposal, and bulky or electronic items can be brought to one of Amsterdam's 'bring-in' Civic Amenity sites for disposal (Bipro, 2014).

## 8. MCR Interviews: Qualitative Thematic Analysis

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Ten (10) Regional Waste Management Staff from diverse roles were interviewed from each designated MCR to identify the barriers their jurisdiction may face, understand their systems that work for them and get a better glimpse of how Nova Scotia differs across each region in terms of AMWB. It should be noted that although key themes were extrapolated from the data, each region differs in tenant demographics, apartment size, apartment definition, urban and rural settings, property owners etc. That being said, these are an amalgamation of respondent opinions and experiences with apartment building waste management

and their regional waste management systems. The main goal of the analysis was to determine main barriers and opportunities across the region. It is hopeful that this information will be useful to all MCR's.

The data and themes presented in the following tables are interpretations of amalgamated responses from interviewees. They are not direct quotes.

## **8.1 Identified Themes**

### ***8.1.1 Theme 1: Perceived Barriers to Tenant Compliance***

Table 5 showcases a list of perceived barriers to compliance identified by MCR Staff that tenants may face. In other words, why they feel tenants cannot or will not participate in source separation. This theme helps to identify the perceived barriers that MCRs may be working to address, and then compare these results to actual tenant identified barriers to understand if MCRs are paying attention to the most pressing areas.

Table 5:

| <b>Perceived Barriers to Tenant Compliance</b> |  |
|--|--|
| <b>Management</b>                              | Not taking ownership of waste management issues.   |
|  | Upkeep of a waste room can be an undesirable job for superintendents and is therefore left unattended and messy.                                 |
|  | Lack of landlord participation or encouragement. Not upholding a standard for tenants.   |
|  | May not seek proper bins from haulers that meet provincial guides for source separation, therefore barring tenants from source separation.       |
| <b>Haulers</b>                                 | Different waste haulers may have differing practices (mixed messages for management and for tenants).  |
|  | May not supply proper bins that meet provincial guides for source separation at a cheaper price.   |
|  | May collect unsorted waste to not lose a client contract by refusing a load.   |
| <b>Tenants</b>                                 | Typically a transient population making it difficult to keep up with education.  |
|  | Not enough space in unit to efficiently sort for all waste streams.  |
|  | Anonymity; feeling as though they will not be caught for not complying.  |
|  | Misconception that apartment residents are exempt from source separating.  |
|  | Diverse tenant demographics: rural, urban, language, short-term, long-term, temporary housing, student population, differing identities.         |
|  | There may be pushback from rural regions where change to waste management has been infrequent over the past few decades.                         |
| <b>Waste Rooms</b>                             | Uninviting waste room (dark, strong smell, unclean, infrequently monitored).   |
|  | Unsightly waste laying around.   |
|  | Lack of proper bins for source separation by provincial guidelines, or bins located further away in inconvenient places.                         |
| <b>Enforcement</b>                             | Differing by-laws per region. Based on regional by-laws, some regions are unable to enforce compliance until material reaches the transfer site. |

|  |  |
|--|--|
|  | Some regions may not have a compliance officer to implement any enforcement and therefore are less equipped to perform drop in visits. |
|--|--|

*Note:* Results of thematic analysis of MCR interviews. This table provides perceived barriers for tenants, they are not provided by tenants.

### **8.1.2 Theme 2: Barriers to Regulation/Enforcement**

Table 6 encompasses barriers that the MCR staff have identified as challenges to enforcing compliance and how they extend beyond lacking sufficient by-laws or compliance officers. According to Table 6, landlords, haulers and even the very definition of an apartment building could be prohibiting efficient enforcement.

Table 6:

| <b>Barriers to Regulation/Enforcement</b> |   |
|---|---|
| <b>By-laws</b>                            | There are many differing by-laws across the municipal collection regions, which can become convoluted for haulers, tenants and management companies to follow.  |
|   | Some by-laws enable proactive enforcement within apartment buildings where others may only enable reactive enforcement when materials arrive at the transfer station, which can be more difficult to trace and enforce compliance.  |
| <b>Enforcement</b>                        | Based on by-laws, compliance officers may or may not be allowed to stop in for waste audits or checks at apartment buildings.   |
|   | Some regions have insufficient or a complete lack of compliance officers which prohibits enforcement.   |
| <b>Haulers</b>                            | Lack of communication of non-compliance with regional waste staff to alert them to frequent offenders.  |
|   | May not supply proper bins that meet provincial guidelines for source separation (at a cheaper price).  |
|   | May make their own rules for collection, such as collecting organics in plastic bags or offering to sort waste for a fee, etc.  |
| <b>Landlord</b>                           | Difficult to reach and communicate with if the landlord is absent (out of region, province or even country) or owns/manages numerous buildings.   |
|   | May be difficult to work with.  |
| <b>Definition</b>                         | The definition of apartment building differs from region to region. They can range from 2, 3, 4 and 6 units or more, or may be defined as a building with 3 storeys or more. Depending on the municipality, the definition of apartment building could mean different things in terms of waste management (residential or commercial tax, collection service responsibility, or providing collection regardless of the tax rate). |

*Note:* Results of thematic analysis of MCR interviews.

**8.1.3 Theme 3: Barriers to Education**

According to the interview data, tenant and management education is a top priority for MCRs, however Table 7 has been created to showcase the identified barriers to closing gaps in education and to the exchange of information.

Table 7:

| <b>Barriers to Tenant Education</b>           |  |
|---|--|
| <b>Demographics</b>                           | Language barriers may affect education through English-only source separation guides, signage on bins or in waste rooms etc.                                     |
|   | Short-term, transient populations may not want to put in the effort of learning a new system only to leave.  |
|   | Rural identity may be a barrier to accepting new rules and education in terms of waste management. Change may be met with pushback.                              |
| <b>Management</b>                             | Lack of encouragement from management may lead tenants' to believe they are exempt from following provincial and municipal source separation rules.              |
|   | Not providing the correct number of bins may affect the tenants perception of what the source separation rules may be.   |
| <b>Haulers</b>                                | Providing fewer source separation bins to landlords may lead tenants to believe they are exempt from following provincial and municipal source separation rules. |
| <b>Municipal Solid Waste Management Staff</b> | Not knowing when to distribute new education information to new landlords if a building should come under new management.  |
|   | Needing to be asked for information kits in order to distribute them.  |
|   | The quick turnaround of apartment populations make it difficult to keep up with the need to educate new tenants or landlords.                                    |
|   | Waste management is such a large sector for a small staff to manage.   |

*Note:* Results of thematic analysis of MCR interviews.

**8.1.4 Theme 4 - Impressions and Perceptions of Landlords/Management Companies**

One main focus of the conversation was how mixed the apartment management/landlord population is in terms of willingness to comply, enthusiasm with ABWM and the population size that they manage. Table 8 represents the perceptions and impressions of landlords throughout Nova Scotia and how this may impact communication, education, enforcement and relationships with MCRs.



Table 8:

| <b>Impressions and Perceptions of Landlords and Management Companies</b> |  |
|--|--|
| <b>Barriers</b>  | May not be aware of what their legal responsibilities are surrounding waste management.  |
|  | Lack of enthusiasm or commitment to improving waste management and diversion.  |
|  | May want to save money by cutting corners (taking advantage of cheaper hauling contracts but trading off receiving proper source separation bins). |
|  | Absentee landlords can be difficult reach and communicate with.  |
|  | May think tenants will be non-compliant so why should they try/put in effort.  |
|  | May try to hide non-compliance through private hauler contracts.   |
| <b>Opportunities</b>   | Generally open to outreach with waste educators.   |
|  | Looking to save money in the long run (sorted material costs less to tip).   |
|  | Generally open to complying and communication to avoid fines.  |
|  | When landlords take waste management seriously their tenants may be more willing to follow.  |

*Note:* Results of thematic analysis of MCR interviews.

#### ***8.1.5 Theme 5: Helpful Tools and Strategies***

Throughout the differing Municipal Collection Regions, they all have their own tools that work well for their region. Table 9 encompasses each tool that has been used and deemed helpful to education, regulation and compliance across each MCR.

Table 9:

| <b>Helpful Tools and Strategies</b>           |   |
|---|---|
| <b>Haulers</b>                                | Having a good relationship between haulers and regional waste staff. This can help to identify frequent non-compliance and new building ownership or development.   |
|   | Differing tipping fees per material: less expensive for sorted material being diverted from landfill to encourage source separation, more expensive for waste heading to landfill. Double tipping fees for unsorted material. |
|   | Flagged loads for inspection and education opportunities.   |
|   | Licensing to specify that they are only to collect sorted material and refuse unsorted.   |
|   | Must provide an appropriate number of bins specified by provincial guidelines.  |
| <b>Municipal Solid Waste Management Staff</b> | Cold calls and recurring drop-ins to perform visual waste audits and remind management that waste is still a priority.  |
|   | Employing compliance officers.  |
|   | Employing waste educators.  |
|   | Providing 311 services for complaint and tenant calls.  |
|   | Using proactive instead of reactive outreach and communication.   |
| <b>Education Opportunities</b>                | Provision of kits and information sheets for both tenants and landlords.  |
|   | Using an education over fines/fees approach. Work with the landlord to meet a common goal.  |
|   | Signage and labels throughout waste rooms.  |
|   | Information sessions in apartment lobbies.  |
|   | Scheduled yearly ‘town hall’ for tenants to gather, get updates and ask questions.  |
| <b>Landlords</b>                              | Encouraging and active participation in waste management. Treat as a top priority.  |
|   | Include waste management in the lease agreements.   |

|                    |  |
|--------------------|--|
|                    | Effort made in overall waste room upkeep.  |
| <b>Waste Room</b>  | Inviting, well lit, clean and well kept.   |
|                    | Convenient, safe and frequently monitored.   |
|                    | 5 bin source separation.   |
|                    | Clear bin labels and signage throughout (translated if possible).  |
|                    | Frequent material collection.  |
| <b>Enforcement</b> | The employment of compliance officers.   |
|                    | Comprehensive by-laws that allow for enforcement at differing stages.  |
|                    | Broad provincial regulations and banned materials.   |
| <b>Tenants</b>     | Fair and firm guidelines may allow tenants to feel more inclined to comply.  |
|                    | Creating spaces for people to want to do the right thing (comply).   |
|                    | Frequent education including the use of freebies such as magnets and sorting guides.   |
| <b>Other</b>       | Summer students and internships help to take the load off waste resource staff. Perform audits, cold calls, check-ins, gather data, etc. |
|                    | Offer backyard composters at a ~60% cost reduction.  |
|                    | “What Goes Where apps’ to make source separation easier.   |

Note: Results of thematic analysis of MCR interviews.

**8.1.6 Theme 6: Suggested Improvements/Ideas**

Each interview participant was asked what they might change if they could. Not every respondent had an answer; however, Table 10 identifies a list of potential ideas for improving waste diversion or changes in enforcement that they would like to see enacted within their region or on a provincial level. This theme differs from Theme 5 as these ideas have not been implemented or deemed helpful as they were in Theme 5, they are simply suggestions and ideas from the MCRs.

Table 10:

| <b>Suggested Improvements/Ideas</b> |   |
|-------------------------------------|---|
| <b>Waste Room</b>                   | Improve waste rooms: create a space where tenants might want to care.   |
|                                     | Increase waste room monitoring.   |
|                                     | Lock waste room unless it is the buildings designated 'garbage day'.  |
|                                     | Seal off garbage chutes.  |
|                                     | Upgrade garbage chutes and waste room to accommodate source separation.   |
|                                     | Introduce initiative for bag tracking/tagging.  |
|                                     | Divide the dumpster into units for waste tracking purposes if building size permits.  |
| <b>Landlord</b>                     | Give more attention to landlords in terms of enforcement as they are the owners of buildings and thus should be held accountable for not encouraging source separation. |
|                                     | Create/implement a landlord association that helps to create an industry standard and means for a widespread exchange of information.                                   |
|                                     | Improve relationships with solid waste resource staff to improve overall communication of tenant turnaround and need for education.                                     |
| <b>Haulers</b>                      | Create a standardized guideline or licensing to ensure all haulers are following same rules and are not able to cut corners to offer better deals to landlords.         |
|                                     | Improve/change authority of haulers so they can enforce by-laws without fear of losing contract.  |
|                                     | Ultimately eliminate unfair competition.  |
|                                     | Improve communication with solid waste-resource staff to effectively inform them of frequent non-compliance, therefore enabling more efficient enforcement.             |
| <b>Enforcement</b>                  | Ensure all municipal collection regions have registered by-laws.  |
|                                     | Improve by-laws to better serve solid waste resource staff/compliance officers in terms of identifying and addressing unsorted material before it leaves the building.  |
|                                     | Improve relationships with landlords and haulers to ensure main stakeholders are all openly communicative of needs and standards being upheld.                          |

|              |  |
|--------------|--|
| <b>Other</b> | Waste audits.  |
|              | Create a sense of community responsibility.  |
|              | Create and upkeep donation rooms.  |
|              | Create opportunities to recycle other materials (textiles, paint, lightbulbs, etc.). |
|              | Continuous education for all stakeholders involved.                                  |

*Note:* Results of thematic analysis of MCR interviews.

## **8.2 Key Takeaways**

By looking at each of the themes presented, there is a great deal of overlap in terms of barriers and opportunities. Management companies, landlords, haulers, education, enforcement and by-laws, tenants, and waste rooms all play a large role in ABWM across the province. By focusing improvements in those areas, it may help to create digestible and tangible ways to improve apartment waste management systems across MCRs, well as individual apartment complexes in Nova Scotia. The following takeaways have been identified through the MCR interview data.

### ***8.2.1 Tenants***

Tenant demographics appeared repeatedly within the identified themes. Apartment buildings are complex and diverse communities and because of that, there is not a one-size-fits-all solution on how to manage them. It is important to understand why tenants choose to participate in source separation or not. Although the interviews only provided a perception of tenant barriers, it should be noted that understanding each apartment community is detrimental to the participation of tenants in regards to source separation. For example, providing translated sorting guides when there are tenants who speak a different language residing in the building.

The convenience of a one-bag in-unit collection and one trip to the waste room can be appealing, especially when there is no way to trace where the unsorted material originated. The respondents deemed anonymity a top reason why and how tenants feel they should not have to separate their waste. Although, respondents also stated that tenants tend to be more apt to follow the rules if they are firm and fair within their building, despite the anonymity that comes with multi-unit living. Including waste management and source separation within the lease creates an automatic standard and sets a precedent and priority of compliance in the building. It shows new tenants that there are enforceable rules for every tenant and may increase the likelihood of continuous compliance.

### ***8.2.2 Management Companies and Landlords***

Management companies and landlords provide a necessary service. Running an apartment building takes effort and requires the coordination of many moving parts. Although the MCR interview impressions of management companies and landlords may seem critical, it does show how solid waste-resources see their role within the waste management system. Management companies and landlords play a massive role in

waste diversion. Landlord efforts have the ability to create ripple effects by demanding better from their haulers, encouraging source separation and communicating with waste educators when their building has seen a great deal of turnaround or when they notice tenants are becoming non-compliant with their waste separation.

Management companies and landlords also have the ability to state waste as a priority within their lease agreements. When waste management responsibilities are stated as a standard, it helps to create a sense of obligation to comply from the beginning. The main recurring point brought up in the interviews was that when management companies and landlords take waste management seriously, there is more likelihood that tenants will follow. When rules are firm and fair throughout the building, tenants may be more likely to comply.

### ***8.2.3 Haulers***

From the outside looking in, haulers may only appear as the transporters of discarded material; however, they in fact have the capacity to play a much larger role in ABWM. According to solid waste-resource staff, they may not understand the capacity with which they can provide insights and enforcement. It was suggested that creating new/updated systems and guidelines as suggested by solid waste-resources may contribute to the standardization of the hauling sector. According to the MCR interviews, it may help to remove unfair competition (such as cutting corners in capacity and cost to secure more private contracts) by providing haulers with leverage to enforce regulations if they are no longer concerned about losing their contract to a less compliant hauler.

In some MCRs, improving relationships with haulers has been shown to improve the ability to track unsorted waste and frequent offenders. This has allowed educators and compliance officers the opportunity to work with management companies and landlords to improve their practices and provide education. Haulers may also contact solid waste-resource managers to alert them if a new client contacts them looking for bins. This may help keep educators in the loop in terms of when buildings are changing hands or being developed and thus can provide prompt education when needed.

### ***8.2.4 Education***

Education was one of the top necessary resources cited by solid waste-resource staff. Information kits and information sessions have been proven to yield results with the MCRs, but with the typically transient and diverse communities in apartment buildings, upkeep can become cumbersome. This is where apartment management companies, landlords, and hauler relationships and communication become key in education. When alerted to a large tenant turnaround, buildings changing hands or frequent offenders of non-compliance, this may help to take the guesswork out of some education upkeep. In one region, a management company contacts solid waste educators to come out for an annual 'town hall' where their tenants are invited to participate in a 30-45 minute session, ask questions and receive free educational handouts and sorting guides. This has proven to be extremely helpful for this company as they openly show that education, relationships and waste management are a main priority within their building.

In terms of helpful educational tools, the Divert NS sorting guides and list of tenant and landlord responsibilities were cited as being an extremely helpful tool to have for education.

### ***8.2.5 Enforcement and By-laws***

By-laws and enforcement capacity may be one of the top variables noted within this analysis. Each region has their own by-laws that vary in certain degrees. Some regions have the capacity to enforce regulations at the offending apartment building, where others have no enforcement capacity until the collected material reaches the transfer station. Another region has no registered enforceable by-law whatsoever which leaves them with no ability to enforce regulations. The variations on by-laws and enforcement are curious considering each region is to follow provincial regulations set out in the *Environment Act* (1994-1995), yet they all have their own varying degrees of doing so. The regions with more comprehensive and hands on by-laws stated they find their ability to enforce is sufficient where the rest stated the gaps in their system make it difficult to track, enforce or distribute fines for non-compliance. A standardization of by-laws may want to be considered. When rules are fair across the board, it may allow for large management companies to remain more diligent with their systems instead of having to adapt from region to region.

### ***8.2.6 Waste Rooms***

Waste rooms are the management company/landlords ongoing way to set a standard for waste management. Interview respondents cited well-kept and inviting waste rooms as a top priority for landlords. When a waste room is dingy and smells, the standard for upkeep may feel low. When waste rooms are well lit, monitored and provide signage as reminders for source separation, it can be seen as the management upholding their end of the bargain. When waste rooms are inviting, they provide a space for tenants to want to do better and participate in something bigger.

## **9. Tenant Survey**

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The objective of the survey was to explore tenant barriers to source separation, and the results provide a look at respondents' experiences with ABWM in HRM, but they are not to be taken as normative. The survey results represent a small sample of apartment dwellers in HRM and solely represent their experiences and opinions. Throughout the results of the quantitative data there will be inclusions of themes from the qualitative data resulting from the final questions on the survey prompting respondents for additional comments.

### **9.1 Descriptive Statistics**

#### ***9.1.1 Demographics***

As for survey demographics, respondents were asked to indicate their age range, gender identities, as well as their highest level of education obtained. The age-range of 25-34 was the highest indicated at 55.5%, followed the age-range of 18-24 at 33.4%. As for gender identification, overwhelmingly 82% of respondents indicated they were female identifying. And lastly, the highest level of education obtained by the respondents was an undergraduate degree at 46.8%. This may indicate the bias of the survey circulation methods where they were predominantly circulated via social media and university email lists.

#### ***9.1.2 Source Separation Habits***

Respondents were asked to indicate whether they recycled and/or composted on a regular basis while living in their apartment building. Comparing the responses from Figure 1 and Figure 2, it can easily be seen that more respondents choose to recycle (92.38%) than they do compost (66.8%).

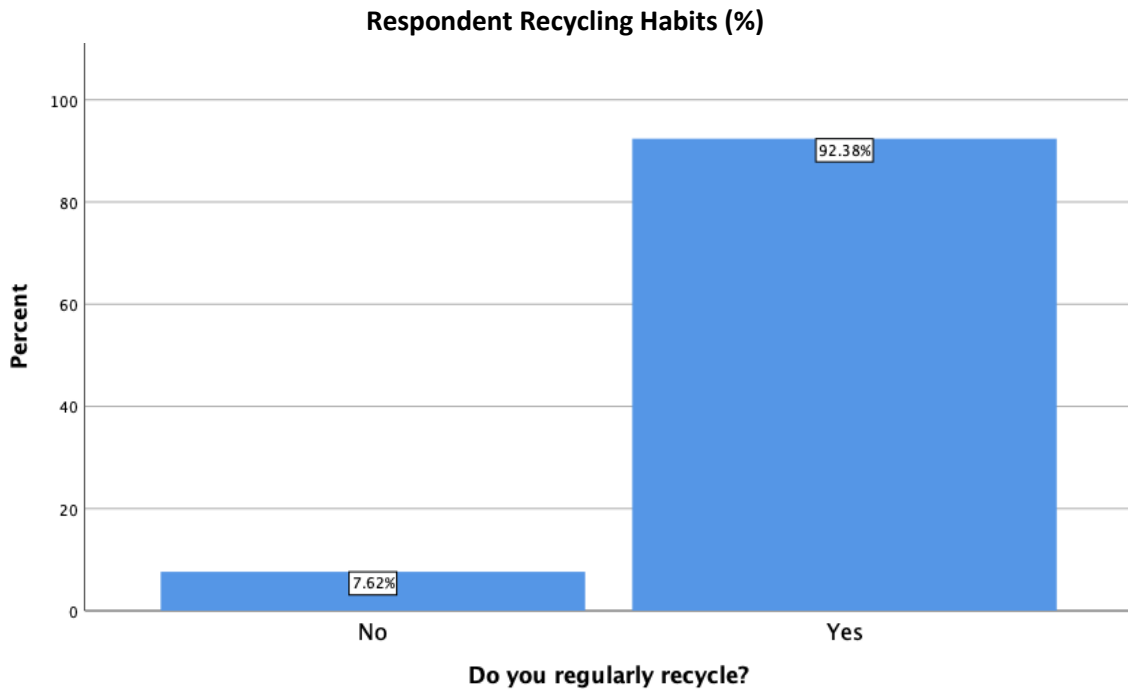


Figure 1: Bar chart of survey results indicating whether respondents regularly recycle (%)

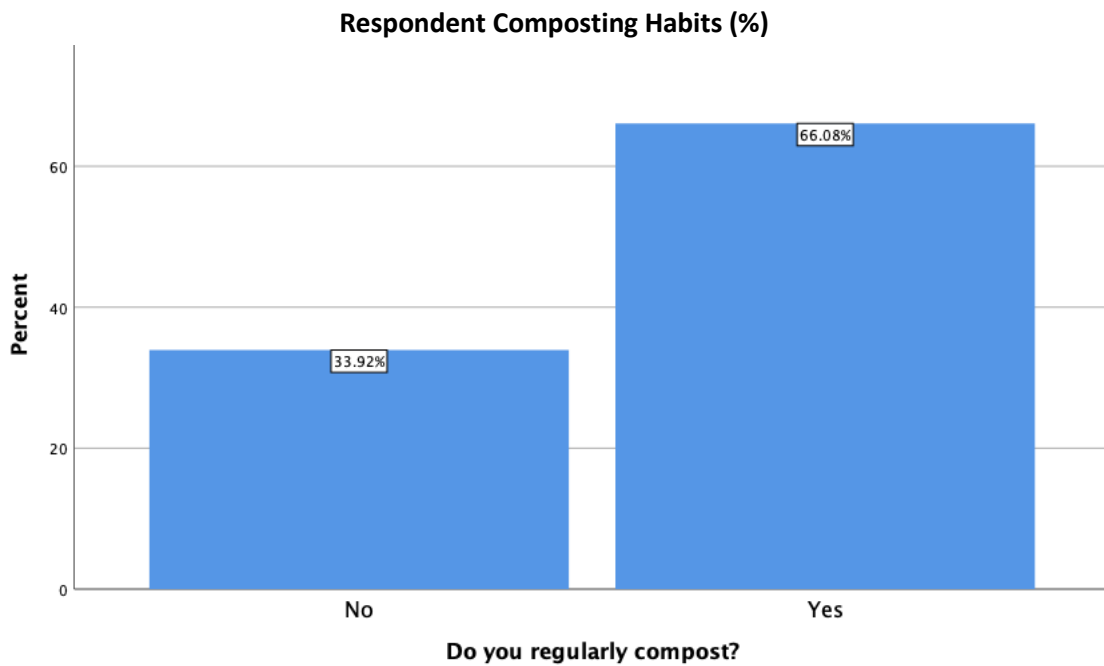


Figure 2: Bar chart of survey results indicating whether respondents regularly compost (%)

If the respondents indicated ‘no’ to either recycling or composting, they were then prompted to indicate why not. As indicated in Figure 3, the top barrier at 28.99% was that tenants lacked sufficient space to



recycle within their own unit to perform necessary source separation for containers, plastics, paper and cardboard.

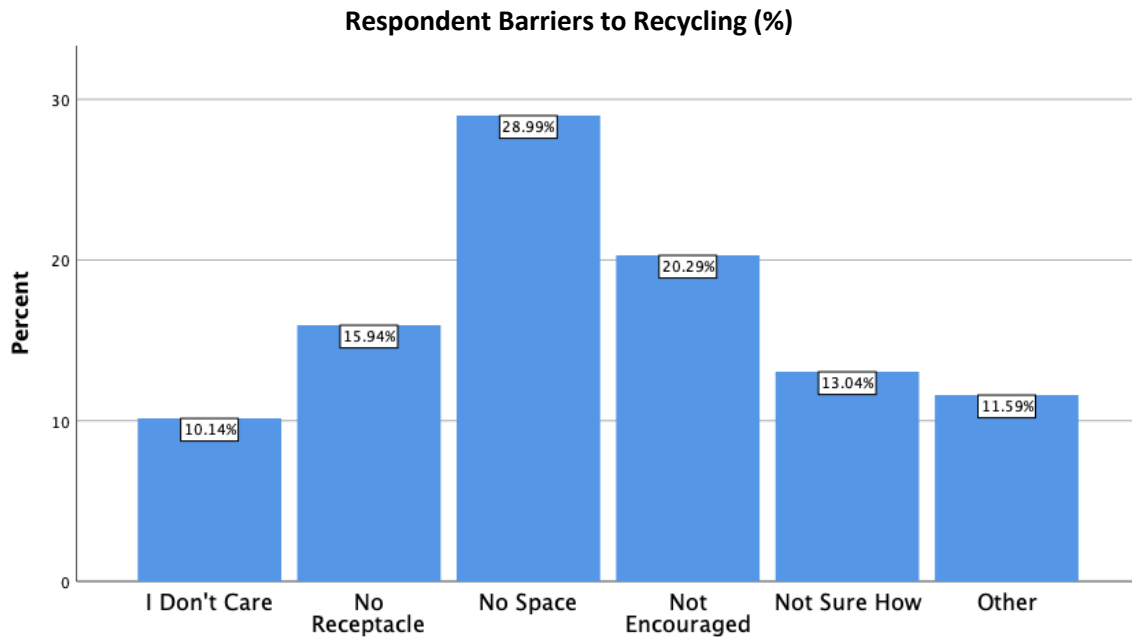


Figure 3: Bar chart of survey results indicating main barriers to recycling (%)

The ‘Other’ column (11.59%) in Figure 3 prompted respondents to add their own additional barriers for recycling using free text responses. The main thematic responses for this category were; the bins provided by the apartment company were not the correct capacity for the building size; they did not have sufficient space within their unit to sort all waste streams; and they suspected that their apartment management company was having all waste brought to the landfill without sorting and therefore they did not want to waste their efforts.

*“I have no space in my current apartment. I barely have space for my belongings.”*

-Survey Respondent, 2020

Similarly to the question on recycling, participants were given the opportunity to indicate why they do not actively participate in composting, seen in Figure 4.

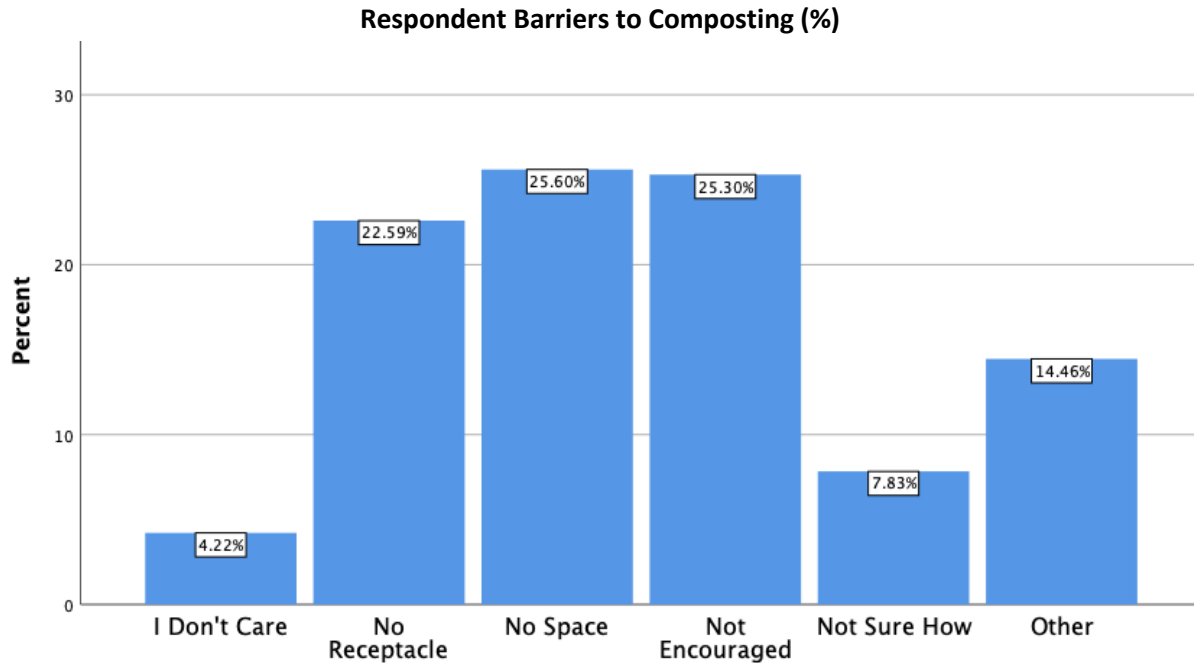


Figure 4: Bar chart of survey results indicating main barriers to composting (%)

According to Figure 4, the top three reasons survey respondents did not compost on the regular were ‘No Space’, ‘Not Encouraged’ and ‘No Receptacle’, at 25.6%, 25.3% and 22.59%, respectively. The ‘Other’ column (14.46%) in Figure 4 allowed respondents to indicate additional reasons using free text responses. The main themes of those responses were: inconvenience of emptying unit compost (walking up and down flights of stairs or long elevator rides); bins are often either overflowing, smell, attract rodents or located in a ‘sketchy’ location outside the building; and the bins often contain plastic bags which tenants believe results in entire bin going to garbage and therefore do not want to waste their own efforts.

*“Composting is difficult as landlords provide one bin for multiple units, the bin is never clean [...]. Pests are also a problem.”*

-Survey Respondent, 2020

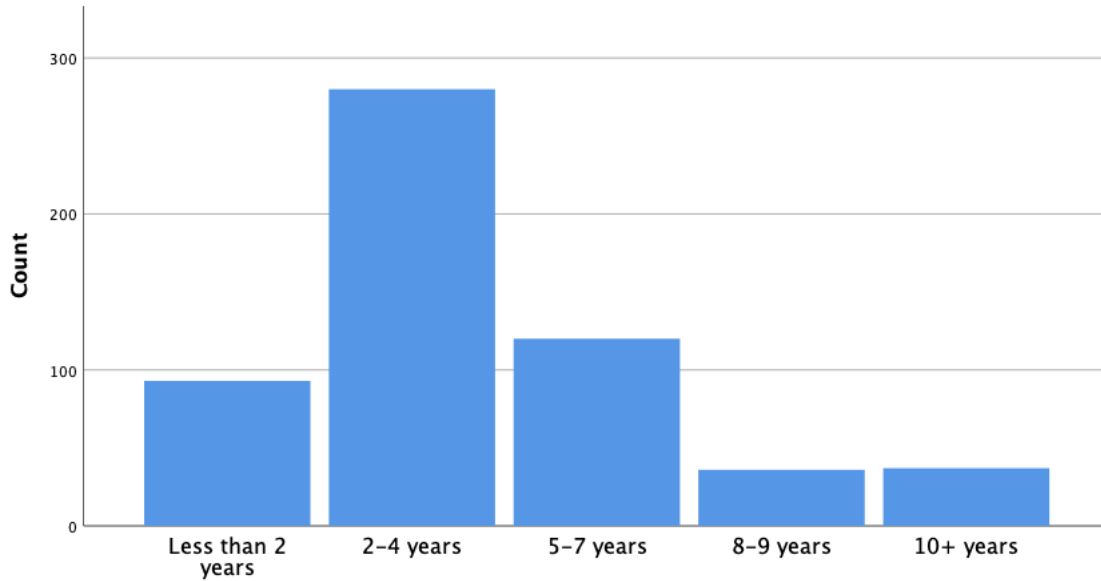
*“While I still compost one major discouragement is the cleanliness of the compost bin maintained by the property manager.”*

-Survey Respondents, 2020

### 9.1.3 Additional

Interestingly, the majority of respondents indicated that they have lived in apartments in HRM for a relatively short period of time in comparison to lengthier time ranges. Figure 5 shows that 65.9% of respondents have lived in apartments in HRM for four years or less. This may showcase the transient nature of the apartment building population in HRM, which has also been indicated as a barrier to ABWM throughout literature (Walker *et al.*, 2004).

### Length of Time Respondents Have Lived in Apartment Buildings in Halifax, NS



*Figure 5: Bar chart indicating the length of time survey respondents have lived in an apartment building in Halifax, NS in the past 5 years.*

Although the population sample only represents a small percentage of tenants in HRM, Figure 6 has highlighted a possible impact of waste management education on the choices people make. The survey respondents indicated more so that since they learned about waste management growing up, they are more likely to think of good waste management practices as a priority when apartment hunting. Once again, this data is biased and should not be taken as normative; however, it has highlighted that educating parents and young children may help to encourage waste diversion in the long term.

### Do Respondents Who Learned About Waste Management Growing Up Prioritize it When Apartment Hunting?

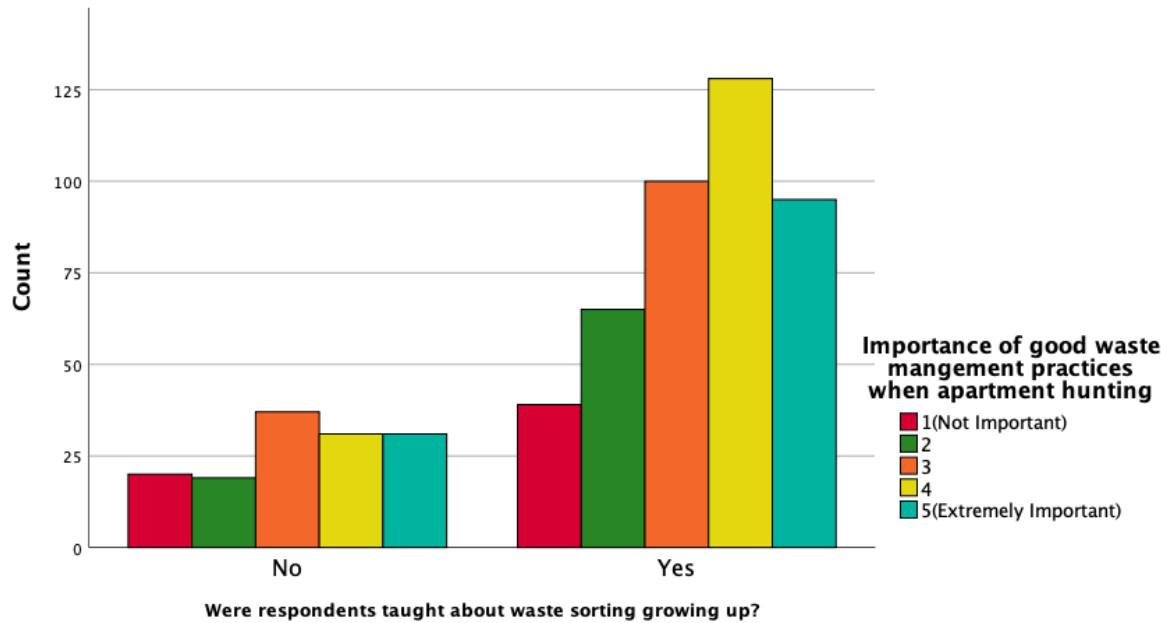


Figure 6: Bar chart indicating a comparison between respondents who learned about waste management growing up to their indicated level of importance for good waste management practices when apartment hunting.

## 9.2 Qualitative Data Analysis

The final question of the survey prompted respondents to leave additional comments they had about their experiences with ABWM through the use of free text. Out of the 191 responses, there were seven (7) main themes identified. They are as follows:

1. many buildings are lacking sufficient bin capacity or collection frequency in all waste streams;
2. common belief that all sorted waste will end up in the landfill, despite efforts to source separate;
  - a. Mistrust with management companies (not forthcoming when questioned about waste management practices, waste haulers and where the waste ends up);
  - b. Mistrust with private waste haulers (collect all waste streams into one truck);
  - c. Lack of participation from all tenants, which spoils efforts for those who comply;
3. HRM WM system is complicated and difficult to learn;
  - a. Need more education for tenants, landlords and waste haulers;
4. apartment building waste management is not a priority due to the lack of housing in the city;
5. collection bin area: waste rooms or outdoor bins;
  - a. Not well lit;
  - b. Bins not conveniently located (some inside, some outside);
  - c. Not well maintained (waste laying around, strong smell, unwashed organic bins);
  - d. Lack of clear signage on source separation and by-laws;
6. strong request for an electronic and battery waste disposal area (either in the waste room or conveniently located community collection site); and
7. not enough enforcement or encouragement from apartment management companies.

Overwhelmingly the top comment was that tenants continuously see plastic bags in the compost bin.

*“The Facilities exist, but they often aren’t used properly by many people in the building. There will frequently be plastic in the compost bin, and recycling will be missorted, so it all probably gets thrown out. There also aren’t enough bins for the amount of recycling the building does. There’s almost always overflow onto the ground which won’t get picked up.”*

-Survey Respondent, 2020

### **9.3 Key Takeaways**

There are some clear gaps in communication between haulers, tenants, apartment managers/landlords and governing bodies which seems to have caused a lack of trust. A few main takeaways from the survey is that there are many tenants who want to participate in source separating, despite those that do not. The desire to be compliant is there, so it seems apartment residents are in need of better support systems to ensure they are not wasting their efforts, their time or their in-unit space. As previously stated, apartment buildings are unique and diverse micro-communities, therefore the solution to these barriers will not be one size-fits-all. When addressing the system, it will be helpful to reflect on the tenant indicated barriers and the overarching themes that have been indicated.

*“Apartment managers who do not help residents understand the proper use of the recycling compost services and do not respond when the bins provided are being misused, make it impossible for anyone in the building to properly recycle or compost, as the improperly sorted contents of the bins end up in the landfill. While recycling and composting are important to me, when picking an apartment, I have no way of knowing whether those services are actually being provided or if the manager is simply providing multi colored garbage bins to visually appease us. Furthermore, even just finding an affordable apartment in HRM is no small feat, and once you’ve found one and moved in and it isn’t atrocious, you aren’t likely going to move again when you suspect the recycling is not going anywhere. Young people care about recycling and we’re raised in the generation where recycling and composting were important, yet we are also the most likely to be living in apartments and with vulnerable income situations, and so we have the least control over whether recycling and composting is even an option for us.”*

- Survey Respondent, 2020

## **10. Best Practices**

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Best practices can be defined as a set of guidelines, initiatives, procedures, programs or regulations that are deemed by industry as the most correct or efficient (Kenton, 2019). Seeking out best practices in any industry can help regions understand options, see if they are meeting the current mark for best practices and provide a route to change. In terms of ABWM this best practices scan has been divided into three main sections: municipal governments/governing bodies, management companies/landlords and waste haulers; each representing a key authority stakeholder within the apartment industry.

## 10.1 Municipal Government

- Create a database of all apartment buildings in the region. This should include descriptive information and characteristics such as waste collection responsibility, participation in source separation, building features that may be challenging for MSW site visits, contact information for managing staff and building owner (Oxford County, 2012).
- Require all new developments to adhere to design standards that meet the regions program delivery needs. Some municipalities require new builds to include a three-chute system to tackle issues of convenience (York Region, 2012, Weinstein & Sizemore, 2016, The Sheltair Group, 2007).
- Hire dedicated staff to support the apartment building sector can allow for a more focused and proactive approach instead of having MSW staff extend themselves to tackle such a complex industry (York Region, 2012).
- Education and outreach for property management and tenants (York Region, 2012)
- Ensure all websites are up-to-date with the latest information on the local recycling/waste management system (Weinstein & Sizemore, 2016).
- Comprehensive by-laws that promote the participation of all parties involved such as tenants, landlords, haulers and government. These practices include; mandatory recycling (source separation) for all apartment buildings, annual education requirements for tenants, source separation clause in lease agreements, standards for collection, service termination for failing to provide sufficient collection bins for source separation and disposal limits (York Region, 2012).
- Material bans can encourage an increase in diversion by being able to provide enforcement in terms of non-compliance. Many regions have banned recyclables; however, places like Nova Scotia have gone further to ban over 13 materials from the landfill to encourage waste diversion (The Sheltair Group, 2007).
- Implement clear bag programs as a means to allow for better enforcement of material bans by performing visual waste audits (Ross, 2008).

## 10.2 Apartment Management/Landlord/Property Owner

- Signage is an important feature in any waste management system and should be consistent and clear, including the use of simple icons, photos and colour schemes (blue = recycling, green = organics, black = garbage etc). It is also ideal to match the signage to the bin colour (RDOS, n.d.).
- Ask residents to sign a commitment to recycling and display a sign or sticker on participants' doors as a means to encourage a new social norm. This tactic was used as a pilot initiative in Metro Vancouver alongside other initiatives that proved to increase recycling rates within the building (York Region, 2012).

- Include compliance to waste management within lease agreements (York Region, 2012).
- Provide tenants with waste management education, including the role of apartment buildings within the municipal system at least once per year (York Region, 2012, Oxford County, 2012).
- In high-rise buildings, establish a waste collection site on each floor to ensure refuse is easily transported to the waste room for collection (Weinstein & Sizemore, 2016).
- Provide incentive or rewards for the implementation of successful programs such as using building community compliance for recycling to allow for savings on building services (Weinstein & Sizemore, 2016).
- Mandating apartment building owners to provide a comprehensive waste management plan with initiatives to encourage an increase in diversion (The Sheltair Group, 2007).

### 10.3 Waste Haulers

- Municipally contract haulers to collect waste from apartment buildings instead of requiring buildings to secure private contracts in order to provide accurate data and equal collection service across the region (Pilot in Boston) (Weinstein & Sizemore, 2016).
- Offer recyclable and yard waste at a lower tipping cost than waste or unsorted material meant for landfill (Weinstein & Sizemore, 2016).
- Meet the 4 C's of multi-residential recycling: *Convenience, Clarity, Colour and Capacity*. Waste rooms and collection bins should be accessible for all tenants. All collection bins should be easily identifiable based on colour coding to match the waste stream, as well as clear image-based signage (WM, n.d., RDOS, n.d). Additionally, all bins should reflect the appropriate capacity necessary for the number of tenants/units. Best practices on capacity include providing a 360 litre cart for every seven units, or one cubic meter for every 15 units in bulk bins (Oxford County, 2012). Recycling capacity should reflect 50% of the total service volume (WM, n.d.).
- Include fees and rewards within contracts for apartment buildings based on diversion rates. These fees and rewards can give the hauler more control in terms of enforcement and grounds to suspend or terminate contracts if a building remains consistently non-compliant (The Sheltair Group, 2007).

## 11. Discussion

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Although research on this topic tends to focus on tenant compliance, looking further into this industry has certainly expanded the project scope of responsibility to include management companies/landlords, waste haulers as well as municipal and authoritative governing bodies. Though each their own separate entity, the results of the project have found that they are all connected in ways that impact the entire system. Therefore, as much as the following sections are divided into key stakeholders, they are interconnected and discuss the implications of other stakeholders throughout.

### 11.1 Tenants

When the proof of non-compliance is visible in collection bins, it can be easy to walk away thinking tenants are the ones at fault for low diversion rates in HRM. However, although source separation is mandated in HRM through By-law S-600, the responsibility should not, and ultimately does not, not fall solely on the tenants (Halifax Regional Municipality, 1999). The tenant survey has provided insight into barriers apartment dwellers face in HRM, and they have identified a desire to be compliant. Aside from a lack of in-unit space, the two other top barriers to source separation identified by survey respondents were issues with management companies not providing receptacles for source separation, and that apartment building management companies do not encourage tenants to divert their waste. Although this may be true to some cases in HRM, literature seems to suggest that anonymity be the driving force for non-compliance (Walton, 2019, Theisen, 2002, Fallde, 2015). Whatever the reason, best practices suggest that when management companies include waste management compliance within the lease agreement, and provide education, regular upkeep of the waste collection area and create standards, tenants are more likely to divert their waste in order to uphold a community standard, despite continuous anonymity (York Region, 2012, Oxford County, 2012, WM, n.d.).

### 11.2 Management Companies/Landlords

According to the thematic analysis of the MCR interviews and tenant survey data, tenant compliance is as much an issue with management as it is an issue with anonymity. However, by looking at HRM's current rental market, it can be seen that management companies need to provide very little and they will still find tenants to fill the units in buildings (Canada Mortgage and Housing Corporation, 2020). In a rental market with a vacancy rate of 1%, renters are forced to take what they can in terms of housing, and are often met with fewer perks (Kunes, 2018). With the media attention and information from the MCR interviews and tenant surveys, it appears that many management companies/landlords have not been upholding their end of the by-laws, as suspected.

Yet through the tenant survey, it has been made apparent that many tenants are not even aware of the by-laws surrounding ABWM, leaving them unable to demand improved practices. In the free-text survey responses, many discussed a dissatisfaction that their building did not provide receptacles for source separation, some even stating they wished it was required by HRM, which it is (Halifax Regional Municipality, 1999). This helps to highlight the need for a change in waste education. As HRM has been educating tenants on their own responsibilities for waste management, an increase in education on the responsibilities of the management company/landlord could be used appropriately in this case (Kennedy, 2020).



### **11.3 Waste Haulers**

According to the MCR interview data, waste haulers have the opportunity to play a more significant role in ABWM than they appear to. They provide apartment buildings with collection bins and decide whether the material in a collection bin is appropriately sorted or not, and by-law have the ability to reject any unsorted waste (Halifax Regional Municipality, 1999). However, according to the MCR interviews, many contracted haulers have created a competitive market for themselves, by cutting corners to save money and secure contracts. In that market, as stated in the MCR interviews, the ability to reject waste is not as viable when another hauler promises to collect no matter what (The Shelair Group, 2007). This is where the benefit of a standardized system as seen in best practices, whether municipally run, or created through a license may be beneficial to both apartment management companies and waste haulers (Weinstein & Sizemore, 2016). As seen in the three major cities explored in the best practices jurisdictional scan, Toronto, Calgary, and Amsterdam all provided a standardized municipal collection for waste, which may be something to consider in HRM moving forward (City of Toronto, 2012, Calgary, 2020b, Goorhuis *et al.*, 2012).

Additionally, outside of a systematic change, the MCR interviews stated that improving relationships can improve efficiency of the ABWM system. By providing ongoing communication, haulers are able to inform solid waste-resources of frequent offenders, passing the responsibility onto the region and allowing the hauler to remain out of a position of enforcement, eliminating the fear of losing their contracts (The Shelair Group, 2007).

### **11.4 Municipal Government**

Education plays a large role in the municipal sector for ABWM; therefore HRM should continue to expand on that initiative (Kennedy, 2020). With the responses from the tenant and MCR data, it is clear that tenants are unaware of the responsibilities of the other stakeholders involved in waste management. By looking at past, present and incoming programs (Table 2), as well as the tenant survey data, it is suggested that more focus be put on educating the public on by-laws and making responsibilities clear so tenants and management companies may hold each other to a standard. And with the apartment building population rising rapidly in HRM, more staff need to be allocated to dealing with ABWM, as suggested in best practices (York Region, 2012). Education mandates, as seen in Calgary, require management to provide education to tenants at least once a year (The City of Calgary, 2018). This may be included in a mandate to have building owners provide a waste management plan, which include requiring a program to circulate and provide education on waste management for tenants, as seen in best practices (The Sheltair Group, 2007).

HRM is implementing the new POSSE software program (as seen in Table 2), which will require all new developments to have their waste rooms approved by HRM solid waste-resources (MacDonald, 2020). This is seen as best practices, and should hope to address waste management in the rapidly expanding apartment building sector in HRM (York Region, 2012, Weinstein & Sizemore, 2016, The Sheltair Group, 2007).

### **11.5 Why Does This All Matter?**

With the combined learnings of this report, it should be understood that the issues surrounding apartment building are not as complex as they seem. With that being said, rewiring the ABWM system to address the topics explored through this report may not be the easiest route to take for every stakeholder involved. Some best practices may be time consuming or costly to implement, others may be difficult to enforce. Implementing programs that may require more effort may be the most effective in terms of achieving actual

change. Yet it should be understood that according to the literature, implementing one program may not yield great results, however creating a comprehensive system with many moving parts that address all aspects of waste management such as regulations, mandates, material bans, enforcement, agreements and education, may be likely to be more successful (Oxford County, 2012).

From a program implemented in Oxford County, Ontario between May 2012 and June 2012, it was estimated that recycling rates increased by 44% after implementing a host of best practices initiatives for apartment buildings (Oxford County, 2012). Significant change to ABWM is possible through the implementation of best practices.

As HRM’s apartment building population currently sits at just over 50%, addressing the issues of ABWM in HRM is of utmost importance as the number of units continues to rise (Storring, 2016, Canada Mortgage and Housing Corporation, 2020). HRM must improve the overall functionality of the ABWM system by implementing best practices within each of the stakeholder systems, otherwise the present issues identified in this report may continue to trend if left untreated.

## 12. Recommendations & Conclusions

### 12.1 Recommendations

Taking into account the key findings of this project and the list of best practices, a list of recommendations has been created for Halifax, Nova Scotia. Recommendations have been broken down into authority stakeholder groups; waste haulers, management companies/landlords, and municipal governments. Each of which has been given multiple recommendations that have been broken down into short (Table 11), medium (Table 12) and long-term (Table 13) time frames.

- (S) Short-term = up to 1 year;
  - Short-term recommendations are items that will require stakeholders to refresh themselves on by-laws and implement easier programs to improve the system, compliance and diversion rates. These include education and creating resident standards.
- (M) Medium-term = 1-2 years; and
  - Medium term recommendations include restructuring internal systems
- (L) Long-term = 2-5 years, or more.
  - Long-term recommendations are predominantly items that will require change in legislation or systematic overhauls which will require more time to

It is acknowledged that addressing the issues surrounding apartment building waste management are far from a one-size-fits-all and these recommendations are meant to guide the industry into creating overall improved standards for all stakeholders.

Table 11:

| Short-term Recommendations |                 |             |
|----------------------------|-----------------|-------------|
| Stakeholder Group          | Recommendations | Description |
|                            |                 |             |

|                 |  |  |
|-----------------|--|--|
| Municipal Gov.  | Update By-law S600 to include bin capacity   | Update by-law S-600 to include requiring appropriate bin capacity for all apartment buildings and waste haulers  |
|                 | Update all Municipal and Provincial Websites, <i>and/or</i> ;  | All provincial and municipal websites need to be updated to communicate updated information.   |
|                 | Create a centralized website for all Municipal Collection Regions  | A centralized website with waste management systems from each Municipal Collection Regions may help to provide more accessible information for the public and can allow for  |
|                 | Positive Reinforcement System  | Providing updates on municipal diversion milestones can be an effective motivator for tenants to continue source separation, despite what their neighbours may be doing. The HRM Recycles App could be an easy way to send out these updates.  |
|                 | Educate the general public on waste by-laws and system standards   | The public needs to be more informed on the legal aspects of solid waste management in order to understand the implications of compliance and non-compliance. This is a continuous recommendation.   |
|                 | Mandate requiring Apartment Waste Management Plans (S-M)   | Each apartment building would be required to produce a management plan, including information on hauler contracts, compliance, enforcement and education plans. This would help to provide easy guidance and synchronicity for managers, supers and landlords. This can also help to improve transparency with waste management practices, improving trust with tenants. |
| Apartment Mgmt. | Include and enforce waste management clause in lease agreements  | Landlords should include waste management as a priority within the initial lease in order to promote diversion as high priority.   |
|                 | When tenants are non-compliant, residents should be re-briefed on by-laws, and provide educational information to improve behaviours instead of just alerting tenants to a problem | Tenants should be provided with education. This can include promoting the HRM recycles app, providing information sheets for each unit, posting bulletins in common areas and updating signage in the waste room.  |
|                 | Organize frequent education sessions   | Each building should contact local waste educators to provide a regular (eg. annual) information session on waste management to promote waste management as a priority. Waste educators should not only discuss the role of the tenant, but the roles and responsibilities of management/landlords as well.  |

|        |  |   |
|--------|--|---|
|        | Secure or renegotiate contracts with waste haulers that better reflect building capacity | The appropriate number and size of bins should be expected based on the number of units/residents in a building.  |
|        | Provide tenants with the opportunity to divert more waste                                | Residents should be able to divert additional banned material that does not get collected in the 5-stream system. This does not mean adding recycling or compost as providing all 5 waste streams is the bare minimum.  |
|        | Review by-laws on responsibilities and implement changes                                 | Move bins to within three meters of one another, improve cleanliness of the waste room, and update frequency of material collection.  |
| Hauler | Education on truck capacity and sections   | Educating the public on the waste system and the compartments (recyclables, waste, corrugated cardboard) of hauling trucks could help to eliminate mistrust.  |
|        | Require sufficient bin capacity at each apartment building (S-M)                         | Waste haulers should provide the appropriate number of bins based on the number of units/residents in a building. Haulers should not cut corners to provide cheaper contracts for apartment buildings. As it currently stands, there are no by-laws surrounding capacity. |
|        | Improve communication and relationship with MSW governing bodies                         | Inform the governing body of continuous issues of non-compliance instead of having to enforce by-laws in fear of losing contract.   |

*Note:* Recommendations based on findings of this report.

Table 12:

| <b>Medium-Term Recommendations</b> |  |   |
|------------------------------------|--|---|
| <b>Stakeholder Group</b>           | <b>Recommendations</b>   | <b>Description</b>  |
| Municipal Gov.                     | Create community Drop Sites  | With the implementation of a central community drop site, apartment dwellers (and community members) will have the opportunity to divert more conveniently additional materials from the landfill. Community drop sites also imply a standard of diverting banned materials, despite not being collected. (ie. textiles, electronics, paint, batteries etc.)    |
|                                    | ABWM Guideline Book  | There should be a readily available guidebook highlighting every aspect of apartment building waste management for the region. It should highlight the responsibilities of the tenant, hauler, management company and other stakeholders (such as superintendents and landlords), the meaning behind the by-laws, fees, and how-to secure collection contracts. |
|                                    | Hire Dedicated Solid Waste-Resource Staff for ABWM                   | This will allow for the growing number of apartment buildings to be efficiently serviced in terms of conduction visual waste audits, providing regular education (info sessions or distributing pamphlets), and stopping in for compliance checks.  |
|                                    | Educate the general public on waste by-laws and system standards     | The public needs to be more informed on the legal aspects of solid waste management in order to understand the implications of compliance and non-compliance. This is a continuous recommendation.  |
|                                    | Standardizing waste haulers with the use of a licensing system       | Licensing haulers may give the municipality the opportunity to create a standardized system, minimizing the ability for waste haulers and landlords to cut corners on waste management and giving haulers the ability to enforce by-laws without fear of losing contracts.  |
| Hauler                             | Standardized tiered hauling and tipping fees for different materials | Encourage diversion by pricing hauling of landfill garbage higher than other material streams.  |
|                                    | Emphasize importance of diversion by linking fees to diversion rates | Gauging contract fees by the building's diversion rates and adjusting as the building worsens or improves.  |

*Note:* Recommendations based on findings of this report.

Table 13:

| Long-term Recommendations |  |   |
|---------------------------|--|---|
| Stakeholder Group         | Recommendations  | Description   |
| Municipal Gov.            | Standardize Waste Management Practices and By-laws across the province (at least with municipalities in the same MCR | Standardizing waste management across the province may help to eliminate misunderstandings and provide the same collection services across the province. This would help to create a standard and improve clarity for tenants moving throughout the province, haulers with reach in different regions and apartment management companies that own properties in multiple jurisdictions. |
|                           | Educate the general public on waste by-laws and system standards   | The public needs to be more informed on the legal aspects of solid waste management in order to understand the implications of compliance and non-compliance. This is a continuous recommendation.  |
| Haulers                   | Change apartment material collection to municipal responsibility (all or partial)                                    | Following the lead of cities in the best practices jurisdictional scan, creating a centralized and regulated system for partial or all waste collection helps to promote industry-wide standards and allows for better waste tracking, audits and enforcement. The municipality can then distribute kitchen catchers to apartment dwellers to encourage composting.                     |

*Note:* Recommendations based on findings of this report.

**12.2 Conclusion**

As much as tenants are the ones who consciously make the choice to source separate or not, this extends beyond individuals putting an apple core into the garbage bin instead of the compost. The issues pertaining to ABWM, though widespread and tedious, are not overly complicated. The choices of some have affected the overall system and have led to the issues that HRM is currently facing. Where apartment buildings are dense communities, they provide opportunities for focused and meaningful change through the implementation of best practices. The challenges that have presented themselves in HRM are not isolated, and therefore looking outward to other jurisdictions to implement new initiative is necessary to remedy the issues pertaining to waste haulers, apartment management companies/landlords and the municipal governments ability to create policy change and provide enforcement, and ultimately improve waste diversion in HRM.

**12.3 Limitations**

In order to create a well balanced report on all stakeholders involved in ABWM, interviews were to be conducted with representatives from each MCR, waste haulers and apartment management companies. Unfortunately despite numerous attempts to organize interviews, efforts yielded no results in securing interviews with a sufficient number of waste haulers or apartment management companies. This is not to demonize those stakeholder groups but to highlight that the interviews and thematic analysis are one-sided. Due to time constraints, the project had to move forward without their input. It is recommended that

additional attention be given to waste haulers and management companies in the future in order to better understand their barriers, limitations and opportunities.

Additionally, the survey data is not representative of any population. The responses represent a small sample size of the diverse apartment population in HRM and should not be taken as normative. The survey does have an overall bias due to methods of circulation, access to the internet, privilege of time (among other factors). Despite the bias, the survey data may benefit from a statistical analysis to gauge fully the complete meaning behind the responses as this project only provided basic descriptive statistics.

## 13. Appendix

### Appendix A

List of Nine Provincial Waste Collection Regions in Nova Scotia, including their jurisdictions and links to relevant websites.

| Region  | Jurisdiction (with waste sorting guides)   |
|---|--|
| 1A<br>Cape Breton   | Inverness <a href="https://invernesscounty.ca/wp-content/uploads/2019/05/FinalSortingSheet.pdf">https://invernesscounty.ca/wp-content/uploads/2019/05/FinalSortingSheet.pdf</a>  |
|   | Victoria<br><a href="https://www.victoriacounty.com/images/Sort_Sheet_August_2017.jpg">https://www.victoriacounty.com/images/Sort_Sheet_August_2017.jpg</a>  |
|   | Richmond <a href="http://www.richmondcounty.ca/municipal-solid-waste-management.html">http://www.richmondcounty.ca/municipal-solid-waste-management.html</a>   |
|   | Port Hawkesbury<br><a href="http://www.townofporthawkesbury.ca/upload/1604411260Recycling%20Guide%203.pdf">http://www.townofporthawkesbury.ca/upload/1604411260Recycling%20Guide%203.pdf</a>   |
| 1B<br>Cape Breton   | Cape Breton Regional Municipality<br><a href="https://www.cbrm.ns.ca/images/Solid_Waste/CBRM_2019-2020_Curbside_Collection_Schedule_and_Waste_Separation_Guide.pdf">https://www.cbrm.ns.ca/images/Solid_Waste/CBRM_2019-2020_Curbside_Collection_Schedule_and_Waste_Separation_Guide.pdf</a> |
| 2A<br>Eastern<br><br>(Committee)<br><a href="https://www.erswm.ca/">https://www.erswm.ca/</a>               | Municipality of District of Guysborough<br>(No sorting guide)  |
|   | Municipality of the County of Antigonish<br><a href="https://www.erswm.ca/county-of-antigonish/">https://www.erswm.ca/county-of-antigonish/</a>  |
|   | Municipality of the Town of Antigonish<br><a href="https://www.townofantigonish.ca/waste-management/150-antigonish-town-residential-collection/file.html">https://www.townofantigonish.ca/waste-management/150-antigonish-town-residential-collection/file.html</a>                          |
|   | Mulgrave<br>(No sorting guide)   |
|   | St. Mary's<br><a href="https://www.saint-marys.ca/waste-management/187-waste-sorting-guide/file.html">https://www.saint-marys.ca/waste-management/187-waste-sorting-guide/file.html</a>  |
| 2B<br>Eastern<br><br>(Authority)<br><a href="https://www.pcwastemgmt.com/">https://www.pcwastemgmt.com/</a> | Pictou County<br><a href="https://www.pcwastemgmt.com/assets/9d8117d093/bylaw.pdf">https://www.pcwastemgmt.com/assets/9d8117d093/bylaw.pdf</a>   |



|   |   |
|---|---|
| <p>3<br/>Northern<br/><br/>(Partial Regional Authority)<br/><a href="http://www.cjsma.ns.ca/overview.html">http://www.cjsma.ns.ca/overview.html</a></p> | <p>Municipality of the County of Colchester<br/><a href="https://www.colchester.ca/garbage-and-recycling-1/2740-apartment-guide/file">https://www.colchester.ca/garbage-and-recycling-1/2740-apartment-guide/file</a></p>   |
|   | <p>Municipality of East Hants<br/><a href="https://www.easthants.ca/government/municipal-departments/infrastructure-operations/solid-waste/curbside-collection/solid-waste-service-literature/">https://www.easthants.ca/government/municipal-departments/infrastructure-operations/solid-waste/curbside-collection/solid-waste-service-literature/</a></p>   |
|   | <p>Cumberland Joint Services Management Authority<br/><a href="http://www.cjsma.ns.ca/overview.html">http://www.cjsma.ns.ca/overview.html</a></p> <ul style="list-style-type: none"> <li>● Municipality of the County of Cumberland</li> <li>● Town of Amherst<br/><a href="http://www.cjsma.ns.ca/newsletters/2018_AmherstNewsletter.pdf">http://www.cjsma.ns.ca/newsletters/2018_AmherstNewsletter.pdf</a></li> <li>● Town of Oxford<br/><a href="https://town.oxford.ns.ca/images/Dual_Stream_Mail_Out.pdf">https://town.oxford.ns.ca/images/Dual_Stream_Mail_Out.pdf</a></li> </ul> |
| <p>4<br/>Halifax</p>  | <p>Halifax Regional Municipality<br/><a href="https://www.halifax.ca/sites/default/files/documents/home-property/garbage-recycling-green-cart/Household%20-%20English%202020%20-%20UPDATED%20NOV%202020.pdf">https://www.halifax.ca/sites/default/files/documents/home-property/garbage-recycling-green-cart/Household%20-%20English%202020%20-%20UPDATED%20NOV%202020.pdf</a></p>  |
| <p>5<br/>Valley<br/><br/>(Authority)<br/><a href="https://www.vwrm.com/">https://www.vwrm.com/</a></p>  | <p>Town of Kentville<br/>Municipality of the County of Kings<br/>Town of Wolfville<br/>Town of Berwick<br/>Town of Middleton<br/>Town of Annapolis Royal<br/>Bridgetown<br/>Hantsport</p>   |
| <p>6<br/>South Shore/West Hants<br/><br/>(Inter-Municipal Committee)<br/><a href="https://www.region6swm.ca/">https://www.region6swm.ca/</a></p>        | <p>County of Shelburne<br/><a href="https://www.municipalityofshelburne.ca/waste-sorting.html">https://www.municipalityofshelburne.ca/waste-sorting.html</a></p>  |
|   | <p>Queens <a href="https://www.regionofqueens.com/municipal-services/works/waste-management/blue-bag-recyclables">https://www.regionofqueens.com/municipal-services/works/waste-management/blue-bag-recyclables</a></p>   |
|   | <p>Lunenburg<br/><a href="https://www.communityrecycling.ca/sorting-guide">https://www.communityrecycling.ca/sorting-guide</a></p>  |

|   |  |
|---|--|
|   | <p>West Hants Region/Windsor<br/> <a href="https://www.westhants.ca/public-works/2481-sort-guide-2020-end/file.html">https://www.westhants.ca/public-works/2481-sort-guide-2020-end/file.html</a><br/> <a href="https://www.westhants.ca/waste-and-recycling/2470-windsor-limit-2020-sorting-guide/file.html">https://www.westhants.ca/waste-and-recycling/2470-windsor-limit-2020-sorting-guide/file.html</a></p> |
| <p>7<br/> Western<br/> (Authority)<br/> <a href="http://www.wastecheck.ca/aboutus.html">http://www.wastecheck.ca/aboutus.html</a></p> <p>(Authority)<br/> <a href="https://www.munargyle.com/en/waste-management.html">https://www.munargyle.com/en/waste-management.html</a></p> | <p>Town of Digby<br/> <a href="https://www.digby.ca/garbage-recycling-and-compost.html">https://www.digby.ca/garbage-recycling-and-compost.html</a></p>  |
|   | <p>Municipality of Digby<br/> <a href="https://www.digbydistrict.ca/solid-waste.html">https://www.digbydistrict.ca/solid-waste.html</a></p>  |
|   | <p>Municipality of Clare <a href="https://www.clarenovascotia.com/en/services-en/waste-management">https://www.clarenovascotia.com/en/services-en/waste-management</a></p>   |
|   | <p>Yarmouth County Solid Waste Management Authority</p> <ul style="list-style-type: none"> <li>● Municipality of Argyle</li> <li>● District of Yarmouth</li> <li>● Town of Yarmouth <a href="https://www.townofyarmouth.ca/waste-separation.html">https://www.townofyarmouth.ca/waste-separation.html</a></li> </ul>   |

*Note.* This information has been collected through provincial sources and verbal communication with members of all nine municipal collection regions.

**Appendix B**

MCR Interview Questions

1. Tell me about your overall experience working with apartment building waste management.
2. How often do compliance officers visit buildings in your region, and are they scheduled visits or by demand (e.g, tenant filing a complaint)?
3. How often do tenants or the general public lodge complaints about apartment building waste management practices?
4. Tell me about the by-laws and fines in place for buildings or tenants that do not comply.
5. Does your MCR have specific guidelines on apartment building waste management for apartment managers/landlords to follow (i.e. information packets for new superintendents or building developers)?
6. Tell me about your experiences working alongside apartment management companies/landlords.
7. What area of apartment building waste management do you think needs the most attention?
8. In your opinion, who should be taking on the brunt of the responsibility for the issues of non-compliance, despite source separation being primarily up to the tenant?
9. Is your region currently working on anything surrounding improving apartment building waste management?
10. Are you aware of any practices that you have heard or that you feel might be beneficial to the system?
11. Do you have any additional comments on apartment building waste management?

## **Appendix C**

### Tenant Survey Questions

1. If you agree to participate in this research project, please select 'agree' to the terms.
2. Select your age range.
3. How do you identify?
4. Level of education obtained.
5. Have you lived in an apartment building in Halifax, Nova Scotia in the past 5 years?
6. What size apartment building have you lived in?
7. How long have you lived in Halifax, Nova Scotia?
8. How long have you lived in an apartment building in Halifax, Nova Scotia?
9. Does your apartment building have a compost bin?
10. Do you regularly compost?
11. If you answered 'no' to the previous question, why not?
12. Does your apartment building have a recycling bin?
13. Do you regularly recycle?
14. If you answered 'no' to the previous question, why not?
15. Does your apartment building have a garbage chute?
16. Are you aware of the by-laws surrounding sorting waste in Halifax, Nova Scotia?
17. Were you taught about waste management growing up?
18. How important is proper waste management to you when apartment hunting?
19. Please feel free to provide any additional comments about apartment building waste management.

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