

The logo for the City of Edmonton, featuring the word "Edmonton" in white text on a blue square background.

**OFFICE OF
THE CITY AUDITOR**

**REPORT
WASTE
COLLECTIONS AUDIT**

AUGUST 15, 2024

Report Summary

BACKGROUND

The Waste Services Branch in the City Operations Department provides waste management services, including curbside waste collection services for the City of Edmonton. Waste collection services are provided by City employees (internal) and contracted collectors (external).

In September 2019, Council approved the *25-year Waste Strategy* to help the City keep more waste out of the landfill and maintain stable waste rates. Key initiatives under this strategy include the Source Separated Organics and Automated Curbside Cart Collection programs. These programs are aimed at better aligning the curbside collection of waste with its waste processing systems by:

- Reducing waste generation
- Promoting recycling and composting
- Reducing landfill waste

In 2021, these initiatives to the curbside collection program introduced Edmontonians to a four stream waste system:

- Black waste cart for garbage
- Green waste cart for organics (including food scraps)
- Blue bags for recyclables, and
- Seasonal yard waste collection

AUDIT OBJECTIVES & SCOPE¹

The objective of this audit was to determine if the Waste Services Branch is effectively managing its curbside collections program to support waste reduction and divert waste from the landfill.

This audit focused on the curbside collections program for single-unit homes and multi-unit homes, who set out waste at the curb or alley for collection.

¹ We conducted this engagement in conformance with the Institute of Internal Auditors' *International Standards for the Professional Practice of Internal Auditing*.

WHAT WE FOUND

Overall, we found that the Branch is effectively managing its curbside collections program. The Branch has implemented an effective performance management system for its curbside collection programs, aligning with its strategic goals and business plans. This system:

- Defines outcomes.
- Uses consistent key performance indicators derived from different data applications.
- Includes an informed education and outreach program based on feedback from various sources.

However, we also found the Branch can improve the delivery of its curbside collections program and management of waste carts.

We found that there are data integrity issues with the application implemented to assist in managing the curbside collection program and verifying service delivery. These issues include incomplete and inaccurate non-collection data and a lack of data quality assurance processes. This affects the optimization of data and makes the data less useful for management decisions.

We also observed that data quality in the service verification application depends on how collectors are inputting the data. We found issues with data input accuracy, due to a lack of training and guidance documents for collectors. Specifically, we found collectors have an inconsistent understanding of the definition of non-compliance of cart set out to the *Waste Services Bylaw*.

The Branch tries to ensure consistent service delivery and customer service through clear communication, standardized procedures, and performance reviews with contractors. However, we found it lacks documented support for the current division of resources between internal and external service providers.

Additionally, although billing is accurate and maintenance

timely, we found that the Branch lacks cart inventory management processes such as cart inventory validation and processes to review discrepancy in cart reports.

RECOMMENDATIONS

- Recommendation 1 We recommend that the Waste Services Branch implement data assurance and control processes for its service verification application to improve data integrity for decision making and reporting.
- Recommendation 2 We recommend that the Waste Services Branch enhance training and guidance documents for collectors using the service verification application to improve the quality of the data available for management decisions.
- Recommendation 3 We recommend that the Waste Services Branch assess the division of internal and external service providers for collection services to determine if it continues to provide the best value for the City and residents.
- Recommendation 4 We recommend that the Waste Services Branch improve inventory management to provide more oversight over City cart assets.

WHY THIS IS IMPORTANT

Ensuring data is accurate, complete, and reliable is essential for making critical business decisions. Improved management of data will provide the Branch with meaningful information on service delivery and resident sorting and set out behavior. It will also support informed decisions on how to better educate collectors and residents to support the City's waste reduction and landfill diversion goals.

Additionally, assessment of the division of the waste collection areas between internal and external service providers would indicate whether the current division continues to maximize

operational efficiency and provide best value to the City and residents.

Finally, without more oversight on cart inventory, the Branch may not identify or address operational risks such as, accuracy of inventory levels, optimal use of resources, and ordering levels.

Waste Collections Program & Service Details

BACKGROUND

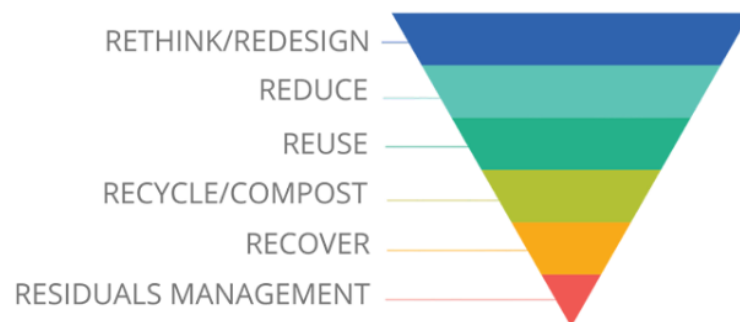
The Waste Services Branch in the City Operations Department provides waste management services for the City of Edmonton. The Branch is separated into three sections: Business Integration and Technical Services, Sustainable Waste Processing, and Waste Collection Services. The focus of this audit is the curbside collections program run by Waste Collection Services.

WASTE STRATEGY

In September 2019, Council approved the *25-year Waste Strategy* to help the City keep more waste out of the landfill and maintain stable waste rates.

As part of the *25-year Waste Strategy*, the City adopted a Zero Waste Framework (Figure 1).

Figure 1: City of Edmonton Zero Waste Framework



The framework lists ways to manage waste, in the City's order of preference:

- **Rethink/Redesign**, **Reduce**, and **Reuse** focus on preventing waste from being created. These actions provide the most environmental, economic, and social benefits.
- **Recycle/Compost** and **Recover** focus on keeping waste out of landfill. These actions aim to turn waste

materials into new products or energy.

- **Residuals** Management focuses on waste that cannot be recycled, composted, or recovered. This includes waste that goes to landfills.

In 2021, the City implemented two waste collection programs under the *25-year Waste Strategy*:

1. Source Separated Organics - Residents separate compostable material, such as food waste, and set it out for collection separately from garbage. The Branch processes the organic material into compost and redistributes it for beneficial use.
2. Automated Curbside Cart Collection - The Branch provides all single-unit and some multi-unit homes with a garbage cart, a food scraps cart, and a food scraps pail. The Branch collects the carts using an automated collection truck. The cart program also introduced a quantity limit, limiting the amount of waste that residents can put out by the size of their cart.

CURBSIDE COLLECTIONS PROGRAM

The Branch collects waste from over 400,000 single and multi-family homes. The Curbside Collections Program includes four waste streams (Figure 2).

Figure 2: Curbside Collections Program



1. **Garbage - black waste cart:** This includes garbage disposed of in the garbage cart provided by the City.
2. **Food scraps - green waste cart:** This includes compostable material, such as food scraps and can be

topped up with yard waste

3. **Recycling - blue bag:** This includes recyclable materials.
4. **Yard waste- clear or paper bags:** This includes yard and garden trimmings. These materials can also be disposed of in the food scraps cart.

In 2023, the Branch completed approximately 31.5 million collections.

Contracted Services

The Branch uses contractors to support its curbside collections program in the following ways:

- Curbside collections - The Branch and three contractors perform curbside collections. Branch crews collect waste from 50 percent of households and the contractors service the other 50 percent.
- Billing for waste services - The Branch has a contract with EPCOR to bill residents for waste services on behalf of the City.
- Cart inventory management - The Branch uses the vendor it purchased the carts from to manage the inventory of carts. The contractor focuses on cart delivery, fulfilling work orders, and repair or warranty of damaged carts. Branch staff also support the management of carts by ordering new carts from the vendor, and investigating lost, stolen, and in-service carts that appear to be in the wrong location.

Service Verification Application

With the implementation of the Source Separated Organics and Automated Curbside Cart Collection programs, the Branch began using a service verification and asset management application (service verification application). This application is intended to assist in managing the delivery of the curbside collections program by:

- Tracking the location of carts.
- Tracking waste collection performance and customer

service to residents.

- Informing outreach and education efforts to increase voluntary compliance with the programs.
- Tracking cart inventory.

The application uses radio frequency identification (RFID) tags on the carts to record data from tipped carts. Collectors use buttons in the truck cabs to record their reason for not tipping a cart (Figure 3). There are three buttons:

1. Spacing - Resident has inappropriately set out the carts, making it difficult for the automated arm to collect the cart.
2. Not out - Resident has not set out their carts or bags on time.
3. Non-compliant - Resident has not set out the carts in compliance with guidelines as per the *Waste Services Bylaw*.

Figure 3: Three-Button System In Truck Cab



Missed Collections and Non-collections

The City maintains a missed collection program in collaboration with 311 and a Waste Services Call Centre. When residents contact the City regarding a missed collection, a Branch employee will verify whether the collection was missed, or if

the resident did not comply with the *Waste Services Bylaw* guidelines for setting out waste. Under the bylaw, valid reasons for non-collection are:

- The cart is not set out on time.
- The cart is not set out appropriately.
- The cart lid is not closed.
- Items in the carts or blue bag are not properly sorted.
- Waste volume exceeds the cart limit.

Each missed collection is investigated using a photo of the set out, GPS data, data from the three button system in the truck, or the findings from an inspector or waste leader's investigation. If a collection was missed, a collector will return to the location to complete the collection. If the City employee verifies that the missed collection does not comply with the set out guidelines, then it is deemed a "non-collection". A representative from the City will contact the resident, or leave an "oops tag" on the cart to communicate why the collection was not completed.

WasteWise App

As part of the Branch's move to digital solutions, they began to provide residents information through the WasteWise app. It provides residents with helpful tips on waste sorting, collection schedules, notifications, and more.

Effective Performance Management

KEY FINDINGS

We found that the Waste Services Branch has an effective performance management system that outlines outcomes for the Source Separated Organics and Automated Curbside Collection programs and identifies key performance indicators (KPIs) that assess program success and align with the Branch's goals.

We also found the Branch has an informed education and outreach program that uses feedback from operations, residents, and external studies. The program helps direct corrective action to improve waste sorting and garbage set out behaviors.

EFFECTIVE PERFORMANCE MANAGEMENT

The Branch has an effective performance management system for the curbside collection programs to assess progress in achieving its strategic goals. This system adequately:

- Defines intended outcomes and KPIs for the Source Separated Organics and Automated Curbside Collection programs.
- Provides reliable, understandable, comparable, and consistent KPIs that align with the intended outcomes of the programs, Waste Services 5-year business plan, and the City's *25-year Waste Strategy*.

Defined Program Outcomes and KPIs

The Branch identified five main outcomes for the Source Separated Organics and Automated Curbside programs. They are:

1. Increase in residential diversion rate by 7 to 11 percent.
2. Decrease the amount of garbage.

3. Send cleaner organics to the Anaerobic Digestion Facility (ADF), leading to higher quality compost.
4. Encourage behavior changes to how residents sort and set out their household waste.
5. Reduce the expected moisture in the Refuse Derived Fuel (RDF).

The Branch has KPIs with targets that align with most of the outcomes (Table 1). While there is no direct KPI for behavior changes to how residents sort and set out their household waste, results can be derived from measures such as the higher residential diversion rate and slight reduction in contamination in organic carts.

Although the biggest changes to waste services during these periods were the implementation of the Source Separated Organics and Automated Curbside programs, other factors might have contributed to these KPI results.

Table 1: KPI Results 2020 to 2023

KPI and Target	2020	2021	2022	2023	Met/Unmet
Residential Diversion Rate - Increase by 7-11%	18%	27%	37%	41%	Met
Per Capita Waste Generation - Annual Decrease	363	333	316	320	Met
Contamination - Annual Reduction	11%	N/A	12%	10%	Not Met*
Moisture in RDF - Annual Reduce	31%	29%	N/A	N/A	**

*Assessed as "Not Met" as there has not been a significant enough change to make an assessment.

**In 2022 and 2023, the RDF did not operate consistently enough to provide accurate moisture readings.

Annual Targets

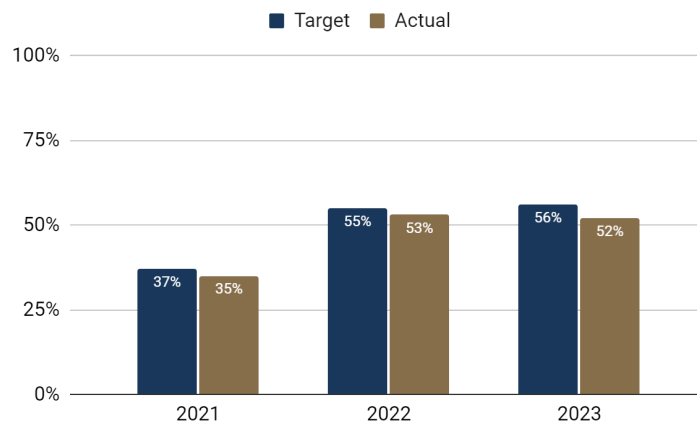
The Branch also has defined performance measures with annual targets in their Annual Report, two of which related directly to the performance of collection services:

- Per Capita Waste Generation
- Curbside Organics & Recyclables Collected

We found that the annual targets for these measures were reasonably met.

The annual results for the Per Capita Waste Generation measure met the annual target of lower than 363 Kg per capita for each of the years since 2021 (Table 1). The results for the Curbside Organics and Recyclables Collected² measure was close but fell short of its targets, on average being about 2 to 4 percent lower than the targeted percentages (Figure 4).

Figure 4: Curbside Organics and Recyclables Collected Annual Performance



² This is a measure of the amount (in tonnes) of organics (food scraps and yard waste) and recyclables collected as a percentage of total waste set out for curbside waste collection. This helps evaluate changes over time in waste sorting and set out by residents with curbside collection.

Improve Service Verification Application Data Integrity

KEY FINDINGS

Data integrity refers to the overall accuracy, consistency, and completeness of data throughout its lifecycle.

The service verification application records and archives data from tipped carts and provides reasons for not collecting a cart. This application is intended to assist the Branch in managing the delivery of the curbside collections program. However, we found issues with the integrity of the data that include:

- Incomplete and inaccurate non-collection data.
- Incorrect data in the cart tipping location mismatch field.

We also found that the Branch does not have data assurance and control processes in place to ensure the data in the service verification application is accurate, consistent, and complete.

As a result of these data integrity issues, we observed that the Branch is not able to make optimal use of the data.

INCOMPLETE AND INACCURATE NON-COLLECTION DATA

We observed that when a non-collection event occurred the data was incomplete and inaccurate.

Waste collection trucks scan carts when they are tipped into the truck. This event creates a data point in the service verification application. The application confirms the collection and records cart related information such as address and cart type.

When carts are not tipped into a truck, the driver should use the non-collection buttons in the truck to record a reason, such as the cart is not out, set out with incorrect spacing, or other non-compliance with the *Waste Services Bylaw*. This button also triggers a data record. However, it does not fill in any other cart

related information. It only provides the reason for non-collection and a geolocation of the non-collection event.

Our data analysis revealed instances where a collector would tip a cart and press a non-compliance button. This creates two conflicting data points on the same day for collection and non-collection.

As a result of these inaccuracies and the incompleteness issues, the Branch is not able to use the aggregate non-collection data to analyze and monitor resident non-compliance.

CART TIPPING LOCATION MISMATCH FIELD ERROR

Our data analysis uncovered an error in the logic to the cart tipping location mismatch field in the service verification application. This field is for identifying tipping location mismatches. It flags when a cart tip is completed and the geolocation of the tip does not reasonably match the address the cart is assigned to. For example, when a cart has been successfully tipped, but its assigned house was in another neighborhood, this field would be indicated with an "x" value and highlight that the cart tipping location does not match the assigned location.

While reviewing the data, we found that this field had 99 percent of data records labeled as mismatches. The vendor confirmed that the field calculation in the application was incorrectly calculating tipping location mismatches.

Because the mismatched data did not make sense, the Branch is not using or reporting on the data. This example speaks to a larger issue of lack of data control and assurance processes that would address issues like this.

LACK OF DATA INTEGRITY ASSURANCE AND CONTROL PROCESSES

We did not observe any data assurance or control processes to validate the integrity of the data in the service verification application.

The Branch does administer assurance and control processes for other applications³ it uses, these include:

- Identifying and correcting errors and inconsistencies in data.
- Analyzing data for patterns and assessing its quality.
- Regularly reviewing data with operational groups.

While the Branch has only been using the service verification application for three years, good data integrity assurance and control processes would ensure data is accurate, consistent, and complete, and ensure metrics derived from this data are comparable and consistent.

OPTIMIZE DATA USAGE

The Branch is not optimizing how it uses the data in the service verification application. The Branch intended to use the data to assist in providing service verification of confirmed cart tips, non-set outs, and non-compliance, and have higher visibility of cart inventory.

We found the Branch is only using the information from the application for activities like cart investigations (i.e., finding missing carts and confirming carts at an address) and identifying collection areas missed on collection days. It is not using the aggregate data, reviewing the integrity of the data, or making decisions based on the data. This could inform areas of improvement for resident non-compliance, and allow for reporting on the overall non-collection.

The Branch performs some activities that encourage changes to residents' waste sorting and set out behavior, such as leaving non-compliant carts, education through oops tags, and characterization studies. The Branch may also follow-up with residents via phone or in-person visits to discuss waste collection issues. However, without data-driven insights, the Branch lacks a clear understanding of overall changes in

³ The Branch uses various applications to track other key information such as: financial transactions, movement of materials in and out of processing facilities, routing for waste collection, customer billing, and operational management.

resident behavior, application performance, and potential areas of improvement. The absence of review of the aggregate data has also impeded the ability to proactively address issues, use application features, and ensure the application meets its intended objectives.

WHY THIS IS IMPORTANT

Data assurance and control processes help to ensure the Branch is using accurate, consistent, and complete information to make key business decisions and report to stakeholders. Inaccurate or incomplete data can lead to flawed analysis and uninformed decisions.

RECOMMENDATION 1

Implement data assurance and control processes for its service verification application to improve data integrity for decision making and reporting.



Responsible Party

Branch Manager, Waste Services



Accepted by Management

Management Response

Administration will implement data management practices and a standard operating procedure to archive and improve the accuracy of the service verification data, ensuring it can be relied on for future reporting and decision making.



Implementation Date

June 30, 2025

Improve Service Verification Application Data Quality

KEY FINDINGS

Data quality is an essential subset of data integrity. It refers to the reliability of the data. Data quality in the service verification application depends largely on how well collectors are inputting the data.

We found that the Branch has training and guidance for internal and external collectors on collection and non-collection events. This includes:

- The City's *Waste Services Bylaw*.
- Standard operating procedures (SOPs) for collection processes.
- Presentations of common bylaw infractions, when to tip carts, or contact a supervisor.

However, we found that the Branch lacks training and guidance documents for internal and external collectors on how and when to use the buttons in their truck cabs to record the reason for non-collections. Specifically, we found collectors have an inconsistent understanding of the definition of non-compliance. This has impacted how and when they press the "non-compliant" button, which in turn affects the quality of the data.

INCONSISTENT UNDERSTANDING OF NON-COMPLIANCE

We found that collectors have an inconsistent understanding of what non-compliance means and are using the "non-compliant" button in their cabs to mean different things. Collectors who viewed non-compliance as only relating to set out guidelines would press the button in these events:

- The cart is incorrectly orientated
- The lid of the cart is open

Other collectors saw non-compliance encompassing both set out and sorting infractions, which in addition to the above, includes:

- The cart or bag shows visible contamination
- The cart is overflowing

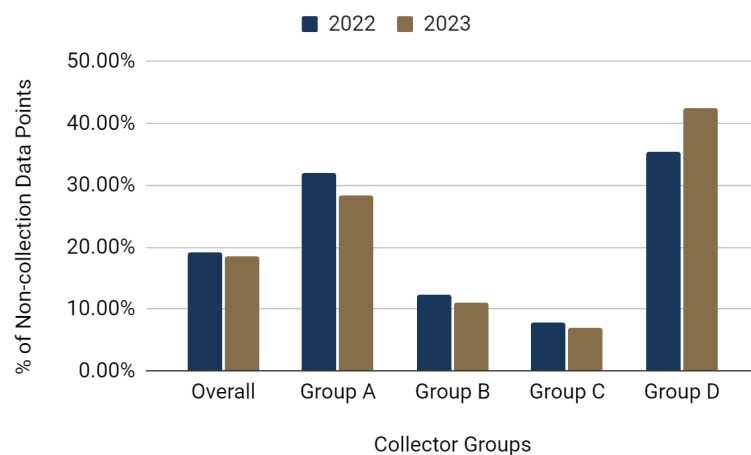
This inconsistent understanding of the “non-compliant” button has led to:

- Inconsistent data collection between collector groups
- Inconsistencies in how collectors treat non-compliance

Inconsistent Data Collection Between Collector Groups

As a result of their inconsistent understanding of non-compliance and inaccurate use of the buttons, we found that data from the four different collector groups (City and three different contractors) showed high variability of overall non-collection data (Figure 6).

Figure 6: Inaccurate Non-Collection Data by Collector Group in the Service Verification Application



The inaccurate data suggests that one collector group has an annual non-collection rate in 2023 as high as 42 percent. While another has a rate as low as 7 percent and that the overall non-collection rate in 2023 was 18.5 percent. This is not supported by the number of resident notifications received in those same years. This difference is likely explained by

inconsistent use of the buttons by the different collector groups rather than the level of service received by the residents in these areas.

Accurate non-compliance data is critical in assessing consistent service delivery and how residents change their waste sorting and set out behaviors.

Inconsistent Treatment Of Non-Compliance

We also observed that because of the inconsistent understanding of non-compliance, collector groups treated non-compliance events differently. In some groups, we found they did not pick up clearly visible non-sorted carts or recycling bags, or excess waste infractions, and pressed a button in the application to indicate non-compliance. In other groups we found they picked up the carts and bags with non-compliance infractions. In these cases, they did not press one of the non-collection buttons.

WHY THIS IS IMPORTANT

Training and guidance for collectors on what non-compliance is and how to deal with it will improve the consistency of service delivery and provide higher quality data. This will allow the Branch to derive useful insights on service delivery and make informed decisions based on reliable data.

RECOMMENDATION 2

Enhance training and guidance documents for collectors using the service verification application to improve the quality of the data available for management decisions.



Responsible Party

Branch Manager, Waste Services



Accepted by Management

Management Response

Administration will develop and administer formal training documents with planned recurrency training intervals to ensure there is a consistent understanding and use of the service verification buttons, leading to improved data quality.

**Implementation Date**

June 30, 2025

Assess Division of Resources for Internal and External Service Providers

KEY FINDINGS

The Branch uses a combination of City employees (internal) and three contractors (external) to deliver curbside collections. We assessed if the Branch is managing the delivery of its curbside collections program to ensure consistent performance and customer service.

We found that the Branch has several strategies to ensure consistent service delivery between both groups. These include clear communication, standardized processes and procedures, and regular performance reviews. We also found that the Branch:

- Meets regularly with contractors and has established good working relationships with each contractor.
- Monitors all waste collection areas and follows up on customer complaints.
- Manages contractors appropriately and is reasonably applying administrative processing fees associated with customer complaints.

However, although there is institutional knowledge and experiential validation, we found that there is no documented support for the current division between internal and external collection service providers.

LACK OF JUSTIFICATION OF DIVISION

We found that the Branch does not have documentation to justify the current division of collection services work between internal and external service providers.

The Branch made the original decision to balance internal and external provided collections services at a 50/50 split in 1989 with Council's approval. Management indicated that the Branch has reviewed this division periodically, and it was last assessed in 2017. While there are valid reasons to use external contracted services such as cost effectiveness, expertise, and investments in capital assets, it is important to regularly assess and document the justification for the division to ensure the reasons are still applicable.

Some of the components the Branch could evaluate as part of the justification are:

- Cost analysis
- Quality and performance
- Risk management
- Stakeholder and customer impact

Regularly assessing and documenting the division between internal and external service providers is essential for maximizing operational efficiency and achieving strategic objectives.

WHY THIS IS IMPORTANT

A formal assessment of the division of the waste collection areas would validate that the current division continues to provide best value to the City and residents.

RECOMMENDATION 3

Assess the division of internal and external service providers for collection services to determine if it continues to provide the best value for the City and residents.



Responsible Party

Branch Manager, Waste Services



Accepted by Management

Management Response

Administration will develop an assessment of the division of work between internal and external service providers for curbside collection.



Implementation Date

December 31, 2026

Improve Cart Inventory Management Processes

KEY FINDINGS

The Branch uses the service verification application to assist with billing and managing their cart inventory. While reviewing the cart inventory management and billing processes, we found that the Branch is:

- Accurately billing residents.
- Completing cart maintenance work orders appropriately and in a timely manner.

However, we found that the Branch does not have a cart inventory validation process to ensure accurate inventory records and decide when to order new and replacement carts.

LACK OF CART INVENTORY VALIDATION PROCESS

The Branch is in charge of ordering black and green carts from the vendor. To make informed decisions about ordering carts, the Branch needs accurate inventory level data for the number of carts with various statuses. For example:

- In service carts - Assigned to residents and being used
- Damaged carts - Repairs needed and located in vendor yard
- Lost carts - Reported lost by resident and not yet found
- Available carts - Fixed, found, or warranty replacement carts in City or vendor yards
- Disposed carts - Damaged beyond repair

However, we found that the Branch does not regularly validate cart inventory levels to confirm how many carts the Branch has based on a master asset listing, how many carts are in the various statuses listed above, and if those numbers all reconcile. We found discrepancies in data included in various reports from the service verification application as well as

discrepancies between the assets in the damaged, lost, and available statuses. For example, we found instances of:

- Carts included on a work order as having been delivered by the vendor and placed in the City yard. However, these carts would not appear on the asset listing report from the service verification application.
- Carts that had the status of “lost” assigned in 2022 and are still marked “lost” at the time of our testing, but were tipped in 2023 and 2024 either at the assigned address or a different address.

Without a regular validation of cart inventory levels in different statuses, there is an increased chance that the Branch’s cart inventory is not correct. This could lead to the Branch procuring either too many or too few carts, which will result in excess or deficient carts for business needs, increased storage or freight costs, or lack of service if citizens do not receive their carts when needed.

WHY THIS IS IMPORTANT

By determining the appropriate amount of cart inventory and managing it in an organized way, the Branch can make informed decisions, mitigate risks and reduce costs.

Implementing regular inventory validations would:

- Enhance order forecasting and inform cart orders.
- Improve lifecycle management of cart assets.
- Keep citizens accountable for the number of carts they have and the size of the carts.

RECOMMENDATION 4

Improve inventory management to provide more oversight over City cart assets.



Responsible Party

Branch Manager, Waste Services



Accepted by Management

Management Response

Administration will develop and implement a standard operating procedure to monitor and validate cart inventory levels.



Implementation Date

March 31, 2025

ACKNOWLEDGEMENT

We would like to thank the staff in the Waste Services Branch for their cooperation during the audit.