

## **Waste & Recycling Services Collection Services Review Attachment 2 – Efficiency and Effectiveness Analysis**



PRESENTED TO  
**The City of Calgary**

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## 1.0 STRATEGIC, EFFECTIVENESS AND EFFICIENCY ANALYSIS

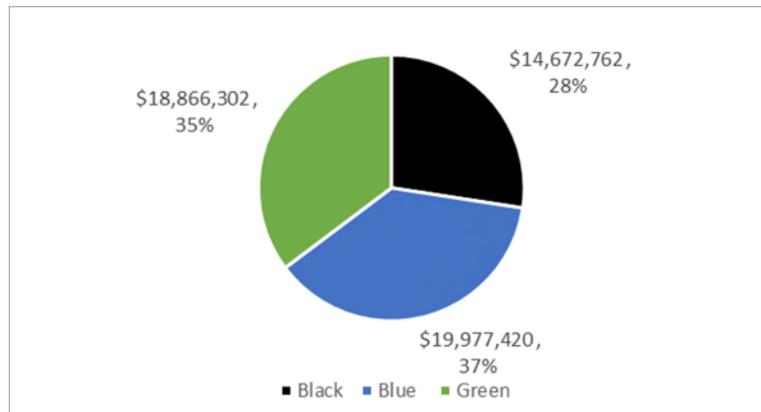
The purpose of this section is to analyze WRS' recent performance for both effectiveness and efficiency regarding the delivery of residential collection services. In addition, it provides a strategic analysis of the waste collections industry's competitive dynamics, including an analysis of competitive advantages between WRS and the private sector.

### 1.1 Financial Overview

This section identifies the significant cost elements which comprise WRS' current residential collection services model. In addition, it itemizes how these costs comprise each the black, blue, and green cart collection services.

A review of the projected 2018 operating and maintenance (O&M) collection costs was performed each for black, blue, and green cart program. These were projected based on actual costs to date (as of the end of June 2018) and projected costs for the remainder of the calendar year. Considerations were also given to a planned change to the green cart service level, which is planned to adjust to once every two weeks at the start of November 2018. On a go-forward basis, it is acknowledged that green cart will be collected once every two weeks across November to March and once every week from April to October. WRS estimates the cost savings over the course of a full year to be approximately \$2 million.

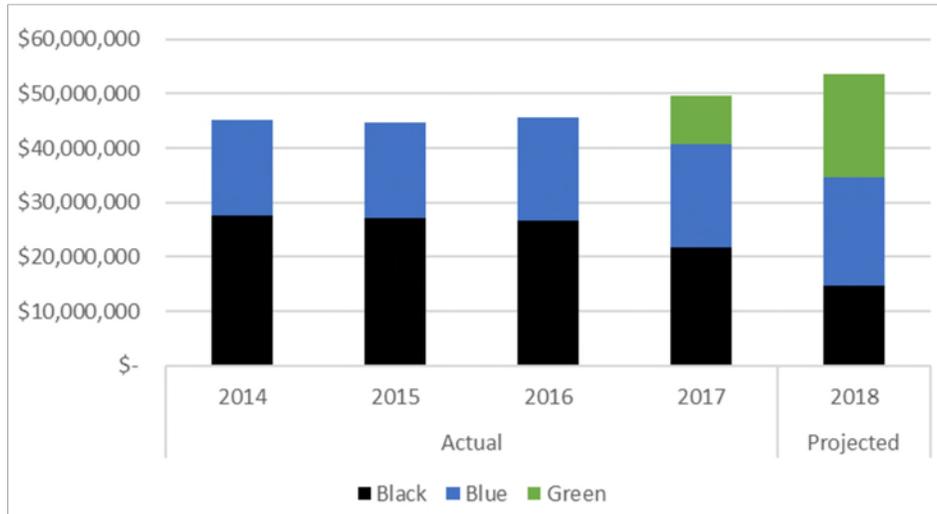
The total projected 2018 O&M costs for each of the curbside programs is detailed in the chart below.



**Figure 4-1: Project 2018 Residential Collection Costs by Service**

This demonstrates that a slightly greater share of the present residential collection programs is focused on the diversion programs. Between the blue and green cart programs, the total collection service O&M costs comprise 72% of the total collection services costs. The remaining 28% is associated with the black cart program. This is not surprising given the scale back in the collection frequency of black cart to once every two weeks across 2018 and the weekly collections (to date) for each the blue and green carts.

In addition, analysis was provided to determine how the total collection costs per service have evolved over the previous business cycle. Figure 4-2 below illustrates this. Total collection costs have increased since 2014 from \$45.2 million to a 2018 projected total of \$53.5 million, but the primary source for this has been the introduction of the Green Cart program. Customer growth has been another driver for increased costs, as the number of Black Cart customer accounts has increased from 313,250 to in 2014 to an estimated 332,466 households in 2018. Total costs for Black cart collections have declined as its collection frequency was scaled back to once every two weeks.

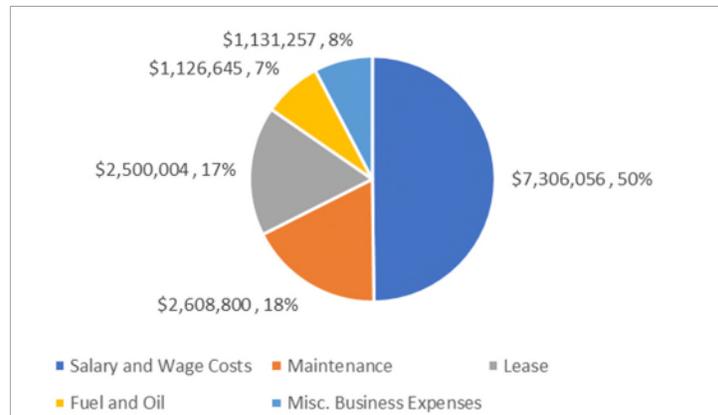


**Figure 4-2: Total Collection Costs**

As noted in Section 3.2, the majority of WRS’ residential collection costs are comprised of fleet management, manpower labour, and administrative expenses. These costs are further itemized for each the black, blue, and green cart programs below.

**Black Cart**

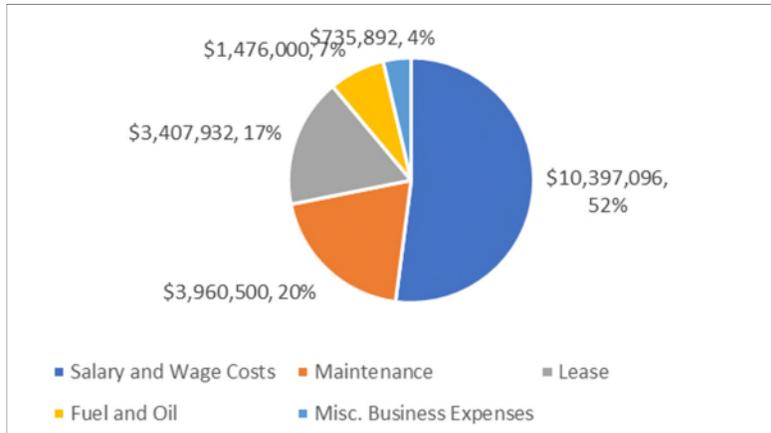
The following chart (Figure 4-3) details the composition of the projected 2018 black cart collection costs by element. Internal labour represents the largest component at 50% (\$7.31 million). Fleet costs comprised of leasing (\$2.50 million), maintenance (\$2.61 million), and fuel and oil (\$1.13 million) together represent 42% of the total costs. The remaining 8% of costs are represented by miscellaneous administration costs, including training, utilities, telecommunications, route design and sanding.



**Figure 4-3: 2018 Project Black Cart Collection Service Costs by Element**

**Blue Cart**

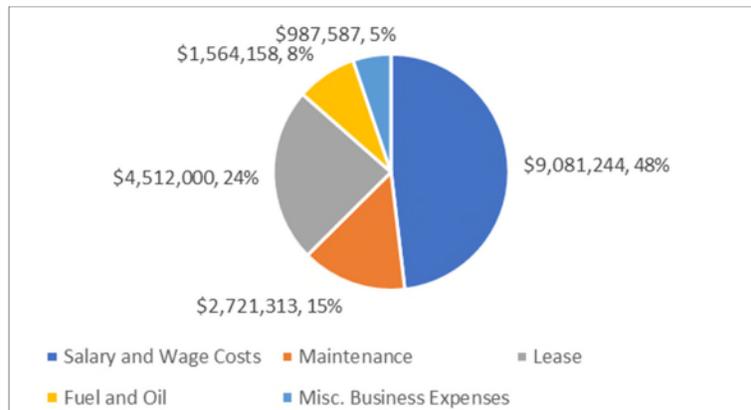
The following chart details the composition of the projected 2018 Blue Cart collection costs by element. Internal labour represents the largest component at 52% (\$10.40 million). Fleet costs comprised of leasing (\$3.41 million), maintenance (\$3.96 million), and fuel and oil (\$1.48 million) together represent 44% of the total costs. The remaining 4% of costs are represented by miscellaneous administration costs, including training, utilities, telecommunications, route design and sanding.



**Figure 4-4: 2018 Project Blue Cart Collection Service Costs by Element**

**Green Cart**

The following chart details the composition of the projected 2018 Green Cart collection costs by element. Internal labour represents the largest component at 48% (\$9.08 million). Fleet costs comprised of leasing (\$4.51 million), maintenance (\$2.72 million), and fuel and oil (\$1.56 million) together represent 47% of the total costs. The remaining 5% of costs are represented by miscellaneous administration costs, including training, utilities, telecommunications, route design and sanding.



**Figure 4-5: 2018 Project Green Cart Collection Service Costs by Element**

## 1.2 WRS Performance Analysis

This section identifies the recent performance for WRS' black, blue, and green cart collection services. This considers performance for each of the priority residential collection services objectives (i.e., customer experience, environment, safety, and cost).

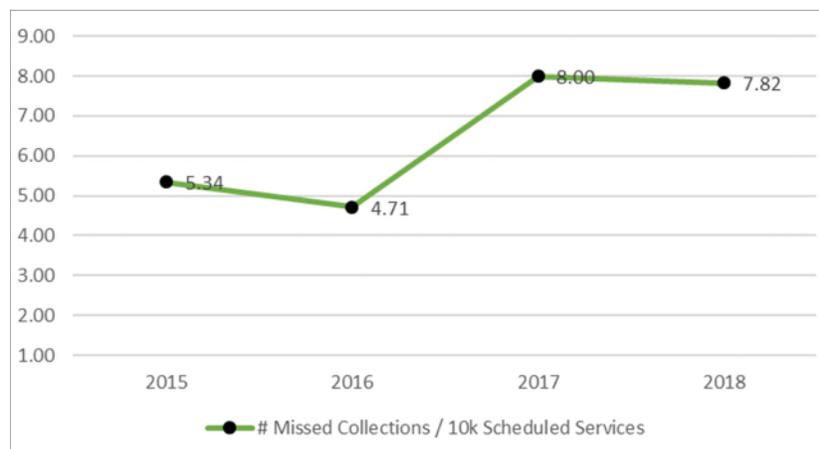
### 1.2.1 Customer Experience Performance

To assess WRS' residential collections customer experience performance, historical data for both the number of missed collections and average days to complete 3-1-1 service requests was obtained.

#### Reliability

The number of missed collections from 2015 to 2018 (projected) per service type was obtained from 3-1-1. While these total numbers are noted as missed collections, they are in fact classified as per intake by 3-1-1 operators and the citizen. True missed collections (where a driver did not service a household despite a cart being properly set out) would be a subset of these total numbers. For example, if a driver was not able to service a household because the cart was not set out appropriately and the customer calls 3-1-1 to log a missed collection, 3-1-1 would add this to the overall list of recorded missed collections. In 2018 WRS has started to track true missed collections by root cause (i.e., distinguish between driver vs. customer issue).

In addition, the number of scheduled collection services per service was obtained in order to normalize the measurement and truly understand the frequency upon which there are reported collection issues for each scheduled customer collection event. The graph below illustrates the frequency of total missed collections across all services from 2015 to 2018 (projected) for every 10,000 scheduled collection services:



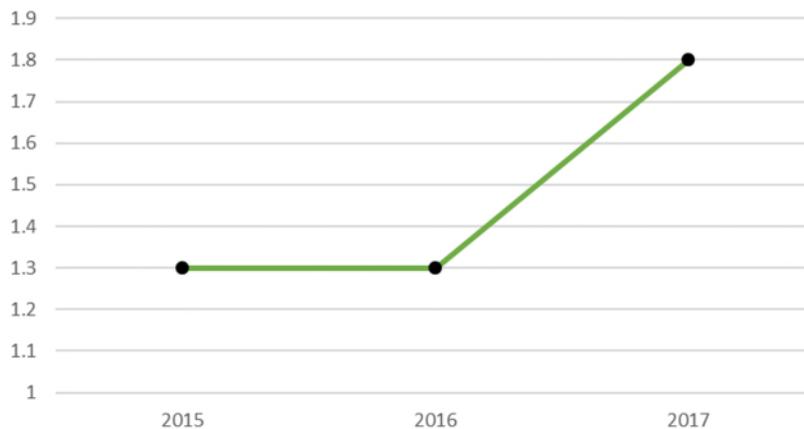
**Figure 4-6: WRS Missed Collections**

It was found that, prior to the roll-out of the green cart program and change of the black cart program to every-other-week collection, WRS averaged close to 5 missed collections for every 10,000 scheduled services. Upon roll-out of the green cart program, this frequency increased to approximately 8 missed collections. This increase is easily explained by the introduction of the green cart program and changing service levels for the black cart program (i.e., adjusted from weekly collection to once every two weeks collection).

By comparison to the results of the external scan, it is noted that WRS is performing better than those municipalities who have reported on this number, with the exception of Edmonton (Edmonton uses an application and Foremen to track any collections which are not completed by drivers such that any 3-1-1 call can be properly handled). This demonstrates WRS' ability to provide dependable, reliable collection services on the scheduled day of pick-up.

### Responsiveness

In addition, the number of days required to respond to and complete 3-1-1 service requests was obtained from 2015 to 2017. These were specific to the residential collection program (i.e., not including service requests related to other functions and services within WRS). The 2018 numbers to date were not yet available. The graph below illustrates the average number of days to complete 3-1-1 service requests:



**Figure 4-7: WRS Service Request Response Time**

This shows that WRS has consistently completed collection services-related service requests between 1-2 days. This is directly in-line with data received from comparable municipalities in the external scan. The relative increase in 2017 is explained by the introduction of the green cart program. In addition, it is noted that WRS' target responsiveness for collection service requests is 6 days. As such, WRS' recent performance has been greatly superior to its target. Given this demonstrated performance, there is an opportunity for WRS to evaluate the appropriateness of this target.

### 1.2.2 Environment Performance

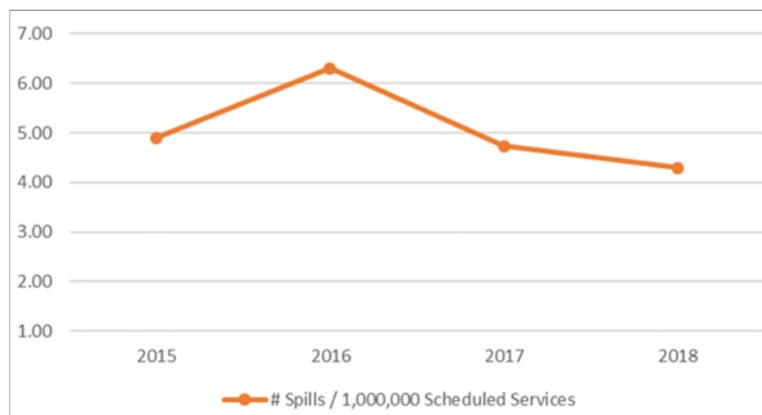
To assess WRS' residential collections environmental performance, historical data for both the number of vehicle spills and GHG emissions was obtained. The number of vehicle spills is reported annually, and data was made available from 2015 to 2018 (projected). The total GHG emissions for WRS was obtained for 2017 and was calculated based on the total diesel fuel consumption for each service type with a constant Diesel Emission Factor of 2,754.28 (gCO<sub>2</sub>e/L).

The 2017 actual GHG emissions per cart service type and per scheduled service are itemized below:

- Black Cart:
  - 3,710 tonnes
- Blue Cart:
  - 4,527 tonnes
- Green Cart:
  - 1,651 tonnes

Based on each service’s individual consumption of fuel and number of scheduled services, it was found that each service incurs approximately 2.72 tonnes of CO2 emissions per every 10,000 scheduled services.

In addition, the number of vehicle spill events (for all WRS vehicles, not just residential collection services) was analyzed and compared to the number of scheduled collection services. The graph below illustrates the general downward trend in number of these events from 2016 to 2018 (projected). It is noted, however, that comparative vehicle spill data was not collected in the external scan and would represent a difficult measure upon which to assess WRS’ residential collection fleet environmental performance.



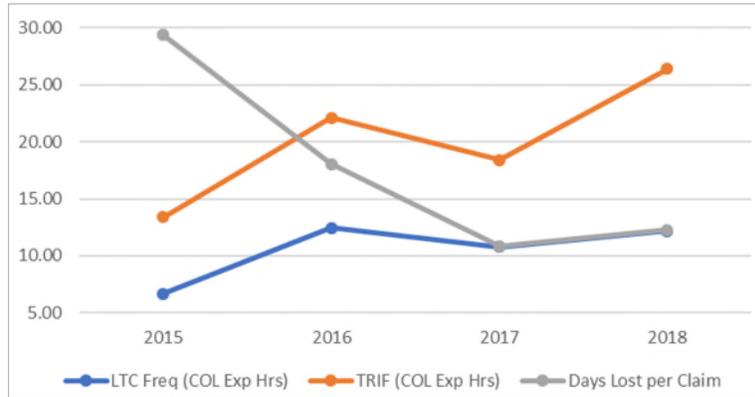
**Figure 4-8: WRS Spills**

### 1.2.3 Safety Performance

To assess WRS’ residential collections safety performance, historical data for the number of driver Worker Compensation Board (WCB) claims, Lost Time Claims (LTC) Frequency, Total Reportable Injury Frequency (TRIF), and Public Damage expenses were obtained.

## Residential Collections Workforce Safety

The following graph illustrates the historical performance for residential collections workers' safety. It includes LTC Frequency, TRIF, and Days Lost per Claim.

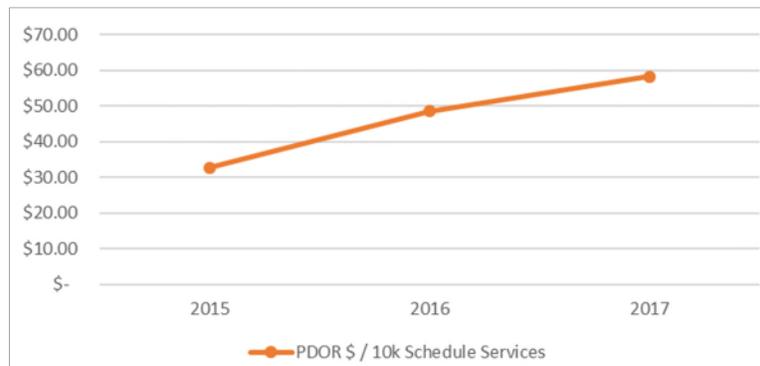


**Figure 4-9: WRS Residential Collection Employee Injury Data**

Generally, it shows that the number of safety-related incidents for drivers has been trending upwards across 2015 to 2018 (projected). In discussions with WRS subject-matter-experts, it is acknowledged that small muscle repetitive strain-type injuries have been increasing due to the increased automation of the collection vehicles. WRS has already modified worker training programs to better address this growing issue from both a prevention and rehabilitation perspective. Driver safety is an area that WRS Management Team will continue to monitor closely.

## Public Safety

To analyze public safety performance, the total public damage (PDOR) accident claims expenses were obtained and compared against the total number of scheduled services. The following graph illustrates the trend of this performance from 2015 to 2017:



**Figure 4-10: WRS Residential Collection PDOR**

As detailed in the graph, the total PDOR expenses per every 10,000 scheduled services has increased in each of the two years from 2015. It has almost doubled from a total of \$32.68 to \$58.23 (for every 10,000 scheduled services).

It is noted that comparative safety data was not collected in the external scan and would represent a difficult measure upon which to assess WRS' residential collection safety performance. However, given this objective's importance, WRS should continue to measure its own performance over time. Moving forward performance measurement system maturity would require support from other municipalities and industry on this type of reporting.

### 1.2.4 Cost Performance

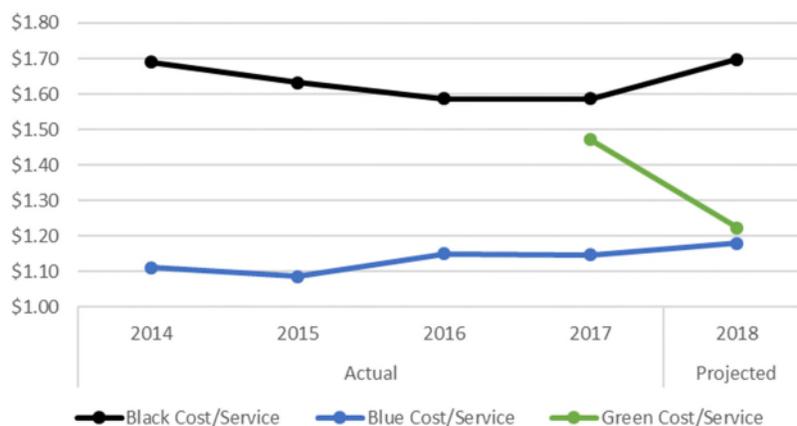
To assess WRS' residential collections cost performance, historical and projected data for the major expenses for each the black, blue, and green cart collection services functions were obtained. In addition, the costs for the service's primary cost elements was obtained in order to assess trends for the individual resources required to support the delivery of the services. To assess trending performance, the results were normalized against the total number of scheduled services.

Cost analysis is presented and discussed in the following order:

1. Cost trends at the service level (i.e., black, blue, and green cart programs); and
2. Cost trends for major cost elements (i.e., salary and wages, fleet leasing, fleet maintenance, fuel and oil, and miscellaneous administration expenses).

#### 1.2.4.1 Overall Collection Costs per Cart Program

The following graph illustrates the trend in the collections cost per scheduled service for each cart program:



**Figure 4-11: Cost per Scheduled Collection**

As can be seen in Figure 4-11, black cart collection costs per scheduled collection are consistently higher than either blue or green carts. The primary reason for this is the increased service levels which exist for black (i.e., collecting excess materials customers set out beside their carts), which result in a fewer number of households which can be collected in a single beat. In addition, it can be seen that the total cost per scheduled collection decreased from 2014 (\$1.69) to 2017 (\$1.58) before rising back up in 2018 (\$1.70).

Blue cart costs per scheduled collection are relatively stable across 2014 to 2018, albeit with a slight increase in costs. Costs per scheduled collection are projected to increase from \$1.11 (2014) to \$1.18 (2018). This is an average increase of approximately 1.6% per year.

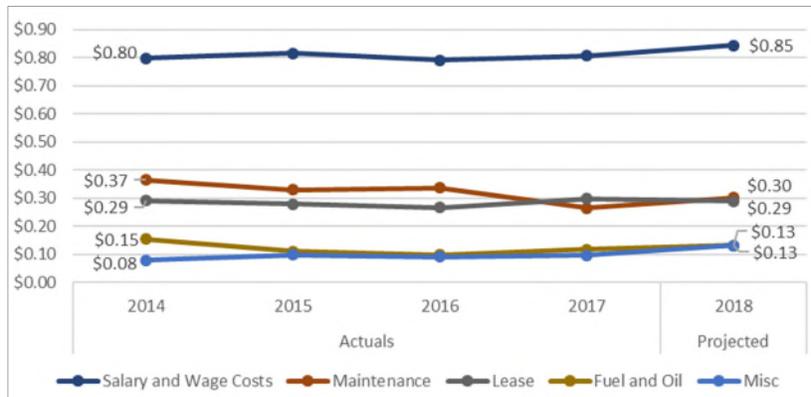
Green cart costs were first recorded in 2017 when the roll-out of the green cart program commenced. Projected costs per scheduled service are estimated to be lower for 2018 as the service stabilizes. However, further cost stabilization will likely continue across 2019 as the service levels switch to a less frequent collection schedule (i.e., once every two weeks) during the winter months.

Overall, an initial observation from this analysis is that WRS' residential costs per scheduled collection are fairly consistent. A more in-depth analysis of major cost elements was required to further understand individual changes and trends across 2014 to 2018. This is discussed in the following section.

### 1.2.4.2 Collection Cost Elements

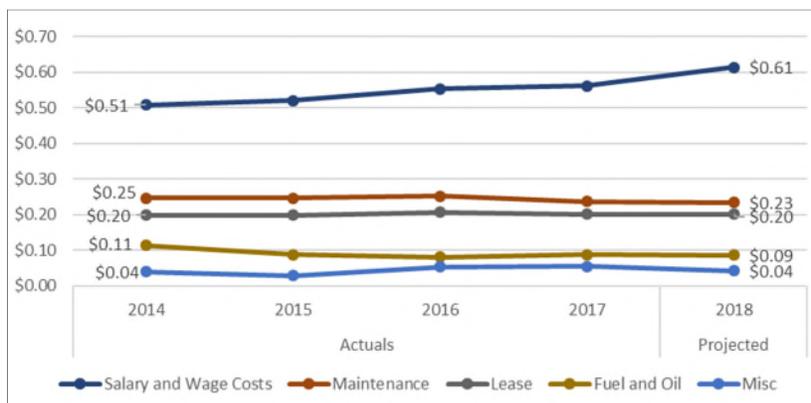
This section provides further detail on the 2014-2018 cost trends for major cost elements which comprise the black and blue cart collection services.

The collection costs per scheduled collection for each cost element within the black cart service are plotted below:



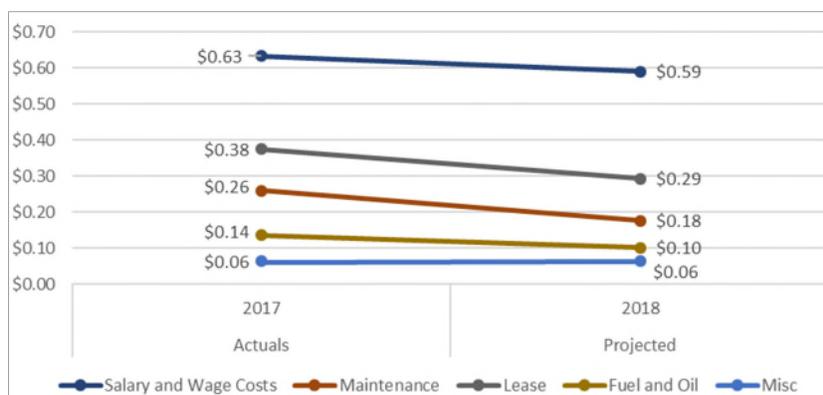
**Figure 4-12: Black Cart Cost Elements per Scheduled Service**

Similarly, the collection costs per scheduled collection for each cost element within the blue cart service are provided:



**Figure 4-13: Blue Cart Cost Elements per Scheduled Service**

Finally, the collection costs per scheduled collection for each cost element within the green cart service are provided. It is noted that results are only provided for 2017 and 2018.



**Figure 4-14: Green Cart Cost Elements per Scheduled Service**

Discussion on each cost element is provided below.

### Salary and Wages

Key observations from the analysis across both black and blue cart services include the following:

- Salary and wage costs increase on a per scheduled collection basis each for black and blue as follows:
  - Black: increased from \$0.80 (2014) to \$0.85 (2018), or an average annual increase of 1.5%.
  - Blue: increased from \$0.51 (2014) to \$0.61 (2018), or an average annual increase of 5.2%.
- It should be noted that these salary and wage costs are subject to approved union labour wage increases which occurred across 2015 to 2018. The annual wage increases per year were 3.2%, 3.5%, and 4.0% for 2015, 2016, and 2017, respectively. If these approved wage increases are removed (as WRS does not directly control these collective bargaining decisions), then more meaningful observations can be made regarding how efficiently WRS' collections manpower have been deployed. The following table summarizes this analysis:

**Table 4-1: Salary and Wage Analysis**

| Service                      | 2014 Salary and Wage Cost per Scheduled Collection | 2018 Adjusted Salary and Wage Cost (Adjusted for Wage Increases) per Scheduled Collection | 2018 Adjusted vs. 2014 Change |
|------------------------------|--|---|-------------------------------|
| <b>Black</b>                 | \$0.80   | \$0.75  | -5.4%                         |
| <b>Blue</b>                  | \$0.51   | \$0.55  | +7.9%                         |
| <b>Black + Blue Combined</b> | <b>\$0.65</b>                                      | <b>\$0.62</b>   | <b>-5.6%</b>                  |

From this analysis, it can be shown that black cart manpower cost efficiency per scheduled collection has improved by 5.4% across 2014 to 2018. Conversely, it shows that blue cart manpower has required an additional 7.9% additional resourcing across this same period. However, when considering total manpower costs across both black and blue services relative to the number of scheduled services, WRS has decreased its overall manpower

requirements on a per scheduled collection basis from \$0.65 to \$0.62. This represents an approximate 5.6% manpower cost efficiency improvement in 2018 relative to 2014.

It is also noted that green cart salary and wages costs per scheduled collection decreased from \$0.63 in 2017 to \$0.59 in 2018, but it is also noted that these costs are still in midst of stabilization given adjustments to service levels.

### **Fleet Leasing Costs**

Fleet leasing costs stay very consistent across 2014 to 2018 each for black cart and blue cart. Black cart leasing costs per scheduled collection are maintained at \$0.29 while blue cart's respective costs are maintained at \$0.20.

Green cart fleet leasing costs per scheduled collection have decreased from \$0.38 (2017) to \$0.29 (2018 projected), but it is also noted that these costs are still in midst of stabilization given adjustments to service levels.

It is noted that, since 2014, several initiatives were taken to improve the level of efficiency and effectiveness of Fleet. These comparative costs demonstrate a stabilization of the required fleet leasing resources and costs to support delivery of the collection services.

### **Fleet Maintenance Costs**

Fleet maintenance costs per scheduled collection show improvement across each of the black, blue, and green cart services. Between 2014 to 2018, black cart fleet maintenance costs per scheduled collection decrease from \$0.37 to \$0.30 while blue cart's respective costs decrease from \$0.25 to \$0.23. Green cart fleet maintenance costs per scheduled collection have decreased from \$0.26 (2017) to \$0.18 (2018 projected), but it is also noted that these costs are still in midst of stabilization given adjustments to service levels.

Overall, this shows continued fleet maintenance cost efficiency relative to the reported 2014 performance.

### **Fuel and Oil Costs**

Fuel and oil costs per scheduled collection has also decreased for both black and blue cart programs across 2014 to 2018. However, this primarily indicates the difference in market prices for fuel and oil over this time, as neither differences in truck fuel economy nor internal purchasing practices can justifiably be attributed with these cost efficiency improvements.

### **Miscellaneous Administrative / Business Expenses**

Overall, there has been an increased cost per scheduled collection across all cart programs for miscellaneous administrative and business expenses. This has been primarily the case for the black cart program. Given the extent of increase, a further review by WRS may be warranted.

#### **1.2.4.3 Overall Collection Costs across All Cart Programs**

An overall review of WRS' entire residential collection services costs per scheduled collection was calculated and analyzed. The results of this analysis are summarized in the table below:

**Table 4-2: Collection Cost Analysis**

| Services                             | 2014   | 2015   | 2016   | 2017   | 2018   | 2018 vs. 2014 Change | 2018 Adjusted Costs vs. 2014 Change |
|--------------------------------------|--------|--------|--------|--------|--------|----------------------|-------------------------------------|
| <b>Black + Blue Combined</b>         | \$1.40 | \$1.36 | \$1.37 | \$1.34 | \$1.35 | <b>-3.5%</b>         | <b>-8.8%</b>                        |
| <b>Black, Blue, + Green Combined</b> | \$1.40 | \$1.36 | \$1.37 | \$1.36 | \$1.31 | <b>-6.5%</b>         | <b>-10.2%</b>                       |

This analysis demonstrates that, overall, WRS' collection services costs per scheduled collection have decreased across the current business cycle. Considering just the black and blue cart programs, the collection costs per scheduled collection have decreased by 3.5% since 2014 (despite collective bargaining labour wage increases across 2015 to 2017). If those labour wage increases are backed out, the costs per scheduled collection show an improvement of 8.8%.

Further, if the costs and scheduled collections for green cart are included (which started in 2017), the 2018 average cost per scheduled collection is \$1.31, which is down from the \$1.40 in 2014.

Overall, this shows that WRS has been effective in increasing its residential collection services efficiency.