

Waste Sort, Survey and Equipment Evaluation 2015

City of Fort Saskatchewan

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
1.0 INTRODUCTION	1
2.0 CURRENT WASTE MANAGEMENT SYSTEM REVIEW	2
2.1 Existing System	2
2.2 Interviews	4
2.3 Local Research (Desktop Review)	6
2.4 Solid Waste and Diversion Data Review	6
2.4.1 Garbage to Landfill	7
2.4.2 Waste Diversion Rate	8
3.0 WASTE COMPOSITION	9
3.1 Waste Sort Methodology	9
3.2 Waste Volume Methodology	15
3.3 Assumptions and Limitations	15
3.4 Garbage and Recyclables Composition – Non-Pilot Areas	15
3.4.1 Composition of Garbage to Landfill	15
3.4.2 Composition of Recyclables Collected for Recycling (Blue Bag)	19
3.4.3 Composition of Total Waste (Garbage to Landfill and Recyclables for Recycling)	21
3.4.4 Volume of Total Waste set out for collection (Garbage to Landfill and Recyclables for Recycling)	23
3.5 Garbage, Recyclables and Organics Composition – Pilot Program Areas ..	25
3.5.1 Composition of Garbage to Landfill (Black Cart)	25
3.5.2 Composition of Recyclables Collected for Recycling (Blue Cart)	28
3.5.3 Composition of Organics for Composting (Green Cart)	30
3.5.4 Composition of Total Waste (Garbage to Landfill, Recyclables for Recycling and Organics for Composting)	32
3.5.5 Volume of Total Waste set out for collection (Garbage to Landfill, Recyclables for Recycling and Organics for Composting)	34
3.6 Annual Waste Composition Results (Non-Pilot and Pilot Program Areas) ..	35
3.6.1 Annual Curbside Diversion Rates	35
3.6.2 Estimated Annual Garbage Generation Rates	37
3.6.2 Estimated Annual Waste Volume	40
3.6.4 Annual Curbside Diversion Capture Rates	41
3.7 Greenhouse Gas Savings	43
4.0 SURVEY	45

4.1 Response Rates	46
4.2 Survey Results – Non-Pilot Areas (General)	47
4.4 Survey Results – Pilot Program Areas	75
5.0 EQUIPMENT EVALUATION.....	108
5.1 Waste Collection Options.....	108
5.1.1 Automated Collection.....	108
5.1.2 Semi-Automated Collection	110
5.1.3 User Pay Systems/Volume Limits	111
5.1.4 RFID Tracking Systems.....	112
5.2 Fort Saskatchewan's Current System	113
5.3 Truck and Cart Technology	115
5.4 Cart Options	121
5.5 Findings from current system equipment evaluation	122
6.0 FINDINGS AND RECOMMENDATIONS	123
6.1 Findings	123
6.2 Recommendations	129
7.0 PROJECT LIMITATIONS	134

FIGURES AND TABLES

Figure 2.1 Transfer Station and Recycle Station (8609-111 Street).....	3
Figure 2.2 Garbage sent to landfill per person (kg): 2011 – 2013	7
Figure 2.3 Landfilled and recycled residential waste in 2013.....	9
Figure 3.1 Waste delivered for sort from pilot program areas and non-pilot areas	10
Figure 3.2 Carts set out for collection in the pilot program area	10
Figure 3.3 Carts storage.....	11
Figure 3.4 Waste sort facility set up.....	11
Figure 3.5 Waste after waste sort.....	12
Figure 3.6 Recyclables: (A) Plastics #1-7, mixed paper, plastic bags (B) Corrugated Cardboard (C) Metal/Glass (D) Beverage/Deposit containers	12
Figure 3.7 Organics: food, paper and yard waste	13
Figure 3.8 Transfer Station items (electronic and household	13
hazardous waste, scrap metal, etc.)	13
Figure 3.9 Potential donation items	13
Figure 3.10 Composition of garbage to landfill – Non-Pilot Areas	17
Figure 3.11 Composition of recyclables by weight – Non-Pilot Areas	19
Figure 3.12 Composition of total waste by weight – Non-Pilot Area.....	21
Figure 3.13 City of Fort Saskatchewan divided in to five zones	23
Figure 3.14 Garbage and recyclables by volume per week – Non-Pilot Area	24
Figure 3.15 Number of blue and black bags per household per week – Non-Pilot Areas	24
Figure 3.16 Composition of waste to landfill – Pilot Program Areas.....	26
Figure 3.17 Composition of recyclables by weight – Pilot Program Areas	28
Figure 3.18 Composition of organics by weight – Pilot Program Areas.....	30
Figure 3.19 Composition of total waste by weight – Pilot Program Areas	32
Figure 3.20 Garbage, recyclables and organics by volume per week – Pilot Program Area	34
Figure 3.21 Approximate fullness of waste in carts per household per week – Pilot Program Areas	35
Figure 3.22 Percentage of waste sent to landfill and diversion rates for non-pilot areas	36
Figure 3.23 Percentage of waste sent to landfill and diversion rates for pilot program areas.....	36
Figure 3.24 Percentage of garbage composition sent to landfill.....	39
Figure 3.25 Estimated annual waste volume for pilot program and non-pilot areas	40
Figure 3.26 Actual and potential diversion rates in the non-pilot areas.	42
Figure 3.27 Actual and potential diversion rates in the pilot program areas.	43
Figure 4.1 Comparison of response rates to population percentage.....	46
Figure 4.2 Number of years residents lived in Fort Saskatchewan	47
Figure 4.3 Type of dwelling	48
Figure 4.4 Age group responses	49
Figure 4.5 Number of people living in a survey respondent household	50
Figure 4.6 Garbage day	51
Figure 4.7 Satisfaction with garbage day.....	51
Figure 4.8 Rotation of garbage day	53
Figure 4.9 Place of garbage collection	53
Figure 4.10 Garbage storage	54

Figure 4.11 Concerns about using carts	55
Figure 4.12 Amount of garbage and recyclables generated per week	56
Figure 4.13 Yard waste management.....	57
Figure 4.14 Food waste management	58
Figure 4.15 Frequency of garage and recyclables collection	59
Figure 4.16 Curbside yard and food waste collection service	61
Figure 4.17 Concerns about separating organics	62
Figure 4.18 Support towards garbage reduction.....	63
Figure 4.19 Effort to reduce waste sent to landfill.....	64
Figure 4.20 Cost, convenience and waste reduction importance ranking	65
Figure 4.21 Fort Saskatchewan Transfer Station usages	66
Figure 4.22 Preferred Transfer Station operation hours.....	67
Figure 4.23 Large Item collection and Toxic-Round-Up.....	68
Figure 4.24 Best communication methods.....	70
Figure 4.25 Support to start organics collection program.....	71
Figure 4.26 Number of years respondents lived in Fort Saskatchewan	75
Figure 4.27 Type of dwelling	76
Figure 4.28 Age group responses	77
Figure 4.29 Number of people living in a survey respondent household	78
Figure 4.30 Garbage day	79
Figure 4.31 Satisfaction with garbage day	79
Figure 4.32 Garbage day rotations	80
Figure 4.33 Place of garbage collection.....	81
Figure 4.34 Garbage storage	82
Figure 4.35 Waste separation before the pilot program	83
Figure 4.36 Amount of garbage and recyclables generated per week	84
Figure 4.37 Green cart usages.....	85
Figure 4.38 Carts storage.....	86
Figure 4.39 Frequency of carts set out for collection	87
Figure 4.40 Frequency of waste collection	88
Figure 4.41 Valuability of organic waste collection	89
Figure 4.42 Concerns about separating organics	90
Figure 4.43 Kitchen can and compost bags rating.....	91
Figure 4.44 Concerns with carts provided	93
Figure 4.45 Changes to 'cart system'	94
Figure 4.46 Preference of waste collection system.....	96
Figure 4.47 Support towards garbage reduction.....	97
Figure 4.48 Effort to reduce waste sent to landfill.....	98
Figure 4.49 Cost, convenience and waste reduction importance ranking	99
Figure 4.50 Transfer Station usages	100
Figure 4.51 Preferred Transfer Station operation hours.....	101
Figure 4.52 Special waste collection events	102
Figure 4.53 Best communication methods.....	104
Figure 4.54 Support for the cart system (pilot program).....	105
Figure 5.1 Carts set out in a rear lane	114
Figure 5.2 Carts set out on a cul-de-sac.....	115
Figure 5.4 Heil's STARR	118
Figure 5.5 Rotopac by Ginove.....	119

Figure 5.6 Expert Dual Helping-Hand	120
Figure 5.7 McNeilus auto reach automated side loader	121

Table 2.1 Garbage sent to landfill: 2011 – 2013	7
Table 2.2 Change in waste generation per year and per person (kg): 2011 – 2013	8
Table 2.3 Residential tonnages and diversion rates: 2011 - 2013	8
Table 3.1 Waste sort categories and subcategories	14
Table 3.2 Summary of garbage to landfill data (Non-Pilot Areas)	18
Table 3.3 Summary of recyclables by weight (Non-Pilot Areas)	20
Table 3.4 Summary of total waste generated by weight (Non-Pilot Areas)	22
Table 3.5 Summary of garbage to landfill data (Pilot Program Areas)	27
Table 3.6 Summary of recyclables by weight (Pilot Program Areas)	29
Table 3.7 Summary of organics by weight (Pilot Program Areas)	31
Table 3.8 Summary of total waste generated by weight (Pilot Program Areas)	33
Table 3.9 Estimated annual garbage sent to landfill by disposal material	37
Table 3.10 Capture rates for curbside diversion programs	41
Table 3.11 Greenhouse gas savings from diversion in the pilot program area (2014)	44
Table 4.1 Population percentage and response rate	46

July 8th, 2015

Bradley McDonald
City of Fort Saskatchewan
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Fort Saskatchewan, Alberta, T8L 2S5

Dear Mr. McDonald,

We are pleased to submit the following report to you, completed by Advanced Enviro Engineering Ltd. and its consultants in July 2015.

If you have any questions or require further information, please contact Sewit Yenie at 780-488-7926.

Sincerely yours,
Advanced Enviro Engineering Ltd.
APEGA Permit to Practice Number P10783

Kirstin Castro-Wunsch, P.Eng.
Senior Environmental Engineer
CEO

EXECUTIVE SUMMARY

Advanced Enviro Engineering Ltd. conducted a Solid Waste Sort for residential household garbage, recyclables and organics for the pilot program and non-pilot areas as well as conducted a survey and equipment evaluation for the City of Fort Saskatchewan. The study included a review of the current waste management system, interviews with Councilors, Mayor, City staff and residents and a survey of Fort Saskatchewan residents to measure interest in a range of solid waste options.

Based on results of this work, Advanced Enviro made recommendations to improve solid waste management system that are environmentally responsible and meet the needs of its citizens in a cost effective manner.

REVIEW OF CURRENT SYSTEM

The City of Fort Saskatchewan's existing waste management system, which includes garbage and recyclables collection, is fully funded through a monthly fixed charge per household and transfer station fees. Since 2011

- An average of 4,600 tonnes per year of garbage from curbside collection has been landfilled
- An average of 1,100 tonnes of material from curbside collection has been processed for recycling
- The average curbside diversion rate has been about 19%.

In 2014, the City implemented a Pilot Program Service that involves one-thousand (1,000) households, 200 each in the five garbage collection zones. Program will run from April 28th, 2014 to November 28th, 2015 and includes:

- Black (240L or 65 gal) garbage cart, blue (360L or 95 gal) recyclables cart, and green (360L or 95 gal) organics cart as well as kitchen catcher for kitchen
- Weekly automated curbside collection for the three waste streams

Existing Fort Saskatchewan waste program includes:

1. Garbage Collection
2. Recycling
3. Organics
4. Christmas Tree Collection (curbside)
5. Household Toxic Round-Up
6. Large Item Collection
7. Product Exchange Centre at the Transfer Station
8. Communication Program

INTERVIEWS

Interviews were conducted with Mayor, Councillors, City Manager, Infrastructure and Community Services General Manager, Utility Services Manager, BFI Operations Manager and 10 random residents both in the pilot program areas and in the non-pilot areas.

Interviewees suggested the following:

- Bi-weekly (every two weeks) organics collection during the winter.
- Using blue bags instead of blue carts for recyclables.
- Different collection day for the different waste streams so that residents have enough space to park their cars when carts are set out for collection.
- 80% overall diversion rate is achievable mainly through organics program and with enhanced communication program.
- Waste management system should be cost effective and efficient; residents appear to be willing to pay no more than \$26 - \$30 per month per household for a better service (currently \$24).
- Implementing communication programs between the City and the community.
- Implementing educational programs about recycling in schools.

WASTE COMPOSITION

Residential garbage, recyclables and organics from forty (40) randomly selected households in the pilot program areas and residential garbage and recyclables from sixty (60) randomly selected households in the non-pilot areas were collected and sorted in September 2014 at the City of Fort Saskatchewan Public Works shed to measure waste

generation data specific to the City of Fort Saskatchewan, to measure current program compliance, and to identify target areas for efficiency.

The waste sort was focused on waste collected at curbside and comparisons between households on the pilot program vs households with conventional waste collection (non-pilot areas).

Waste collected from front-load bins at apartments, waste collected at the Transfer Station, commercial waste, and construction waste are not factored into the analysis.

Garbage and Recyclables Composition – Non-Pilot Areas

Composition of Garbage to Landfill

During the waste sort, the following observations were noted:

- Organics comprise 57%, by weight, of the total garbage sorted.
- Twelve percent (12%) of the total garbage sorted was comprised of recyclables and 6% were items that could be taken to the Transfer Station.

Composition of Recyclables Collected for Recycling (Blue Bag)

During the waste sort, the following observations were noted:

- Recycling contamination comprised 7.4% (by weight) of the recyclables sorted. This included garbage (e.g., chips bags, food packaging) and organics (e.g., soiled pizza boxes).

Volume of Total Waste set out for collection (garbage to landfill and recyclables for recycling)

- Based on volume evaluation, households in the non-pilot area generate approximately one (1) blue bag and two (2) garbage bags per household per week.

Garbage, Recyclables and Organics Composition – Pilot Program Areas

Composition of Garbage to Landfill (Black Cart)

During the waste sort, the following observations were noted:

- Organics comprised 43%, recyclables 13%, Transfer Stations items 7% and potential donation items 3% of the total garbage sorted.

Composition of Recyclables Collected for Recycling (Blue Cart)

During the waste sort, the following observations were noted:

- Contamination in the blue carts for recyclables comprised 15% (9% garbage and 6% organics).

Composition of Organics for Composting (Green Cart)

During the waste sort, the following observations were noted:

- There was almost no contamination (0.5%).
- Food waste was uncommon and comprised 10% of the total organics sorted.
- Yard waste comprised 89% of the organics sorted as study was conducted in September.

Volume of Total Waste set out for collection (garbage to landfill and recyclables for recycling and organics for composting)

- Based on the volume evaluation in the pilot program area, on average, black carts for garbage are $\frac{1}{2}$ full, blue carts for recyclables are $\frac{1}{3}$ full and green carts for organics are $\frac{1}{4}$ full.

Annual Waste Composition Results (Non-Pilot and Pilot Program Areas)

- Based on the waste sort in the non-pilot and pilot program areas, a total of approximately 4,916 tonnes of garbage will be disposed in the 2014. The actual amount of garbage disposed in 2013 was 4,803 tonnes. This indicates that the results of the waste composition are reflective of the actual behavior and accurately reflect the true waste composition.
- Based on the data analyzed, materials such as electronics, batteries, paint are still entering the waste stream. Six percent (6%) of the garbage sorted in the non-

pilot area and 7% of the garbage sorted in the pilot area should have been separated and disposed of at the Transfer Station or Toxic Round-Up.

Annual Curbside Diversion Capture Rates

Capture rate is equal to the total organics or recyclables collected through diversion programs (blue bag, blue cart and green cart programs) divided by the total organics or recyclables available in the total waste set out (garbage or black cart, blue bag or blue cart and green cart).

- In the non-pilot area, the blue bag program has 71% capture rate whereas in the pilot program area the blue cart has 73% and the green cart has 85% capture rate.

Non-Pilot

- 44% of the total curbside waste stream is organics (estimated 1,943 tonnes annually).
- 29% of the total curbside waste stream is food and other household organic waste (estimated 1,304 tonnes annually).
- 0% of these organics are being diverted.
- 58% of curbside garbage sent landfill is organics; an estimated 1,935 tonnes annually could be captured.
- 31% of the total curbside waste stream is recyclable (estimated 1,382 tonnes annually).
- 71% of these recyclables are being diverted.
- 12% of curbside garbage sent to landfill is recyclable; an additional estimated 395 tonnes annually could be captured.

Pilot Program Area

- 75% of the total curbside waste stream is organics (estimated 1,374 tonnes annually).
- 18% of the total curbside waste stream is food and other household organic waste (estimated 325 tonnes annually).
- 85% of these organics are being diverted.
- 43% of curbside garbage sent landfill is organics; an estimated 195 tonnes annually could be captured.

- 12% of the total curbside waste stream is recyclable (estimated 226 tonnes annually).
- 80% of these recyclables are being diverted.
- 25% of curbside garbage sent to landfill is recyclables; an additional estimated 57 tonnes annually could be captured.

Annual Curbside Diversion Rates

Annual curbside diversion rates reflect the quantity of waste that is diverted from landfill through the recycling program in the non-pilot areas and through recycling and composting programs in the pilot program areas.

During the waste sort, the following observations were noted:

- Non-pilot area has a diversion rate of 22% through the blue bag program.
- Total diversion in the non-pilot area can be increased to between 67% and 81% if an organics program was implemented and separation of recyclables increased.
- Pilot program area has 70% diversion rate through blue and green cart programs.
- Total diversion in the pilot program areas can be increased to between 89% and 90% if separation of organics and recyclables increased.

Volume of total waste set out for collection

Approximate volume of garbage, organics and recyclables from randomly selected households in the pilot and non-pilot areas was recorded.

Non-pilot (100 house sample)

- 30% of households did not set out garbage.
- 50% of households did not set out recycling.
- On average, two (2) garbage bags and one (1) blue bag per household were set out.

Pilot (75 house sample)

- 23% did not set out garbage.
- 37% did not set out recycling.
- 48% did not set out organics.

- On average black carts were ½ full, blue carts were 1/3 full, and green carts were ¼ full.

SURVEY RESULTS

A total of 1,108 responses (727 from non-pilot areas and 381 from pilot program areas) were received and analyzed.

The survey results provided direction in the following areas:

Common findings for both the non-pilot and pilot program areas

- Response rates are overall representative of the population.
- Almost all respondents know their garbage day and are satisfied with the day.
- In general respondents use the different services offered at the Transfer Station.
- Majority of the respondents (66% - 67%) want late operation hours (i.e. till 8pm) at the Transfer Station.
- There is resistance to change (garbage limit, fees based on amount of garbage and/or user fees for optional services) from residents.

Non-Pilot Areas

- **In general there is support for or openness to an organics program in the non-pilot area** (43% from survey support organics program and 18% are unsure).
- More than half of the survey respondents (58%) seem concerned about cart storage or placement or ease of use.
- Majority of the respondents (68%) divert their yard waste from the landfill.

Pilot Program Areas

- Sixty nine percent (69%) of the respondents indicated that organic waste collection is a valuable service to them.
- In general, there is high support (70%) for the cart system.
- Residents who participated in the pilot had significantly less concerns with organics separation than persons who had not tried it.
- Seventy percent (70%) of the survey respondents prefer to use carts than bags and/or cans.

- 30% of the respondents set out their garbage carts (black cart) less often than every week as well as almost 50% and 75% set out blue and green cart respectively less often than every week.

RECOMMENDATIONS

Based on the review of the current system, waste composition data analysis, survey results and equipment evaluation and through application of solid waste management “best practices” and Advanced Enviro’s experience and knowledge of successful program, Advanced Enviro recommends the following for the City of Fort Saskatchewan to make an informed decision regarding its waste management system going forward.

1. A clear waste diversion goal in terms of percent diversion desired and at what cost should be determined for Fort Saskatchewan.
2. Expand organics collection citywide. Use a cart and automated collection system for the organics waste stream.
3. Include options to expand the cart system for recyclables and garbage collection on the next waste collection tender.
4. Implement bi-weekly (every two weeks) garbage collection.
5. Implement bi-weekly (every two weeks) organics collection during the winter, weekly collection during the summer, and also switch to a smaller cart (360L to 240L). Allow biodegradable bags or paper bags for extra yard waste in the summer.
6. It is recommended to supply residents with a kitchen can for household organics.
7. Maintain weekly collection of recyclables.
8. It is recommended to collect different waste streams on different days as the automated collection equipment currently used in Fort Saskatchewan shows some limitations especially in rear lanes and cul-de-sacs due to lack of space for carts on the roads. This also reduces the large footprint that the carts take and difficulties that residents face.
9. It is recommended that residents have a choice of cart size. Size of garbage cart should not exceed the size of recyclables or organics carts. This will help accommodate storage and cart placement.

10. Implement a stronger communication and education program.
11. It is recommended to review the parking by-law for collection day, including a provision for collection day when carts are set out.
12. Update garbage by-law to clarify cart placement rules. This will minimize resident's concerns.
13. It is recommended to further evaluate the suitable cart TYPES and configurations.
14. It is recommended to open the Transfer Station until 8pm.
15. It is recommended to evaluate alternative side loader trucks to reduce lifting arm manipulation challenge for the truck driver as well as dangerous backups on a public street.
16. It is recommended to expand variety of materials accepted at the Transfer Station to include aerosols, pesticides, etc. that are currently only accepted annually at the Toxic Round-Up to limit the risk of this material in the neighbourhood and to limit cost.
17. It is recommended that an incentive program be provided to persons who help reduce costs by managing their waste directly (e.g. home composting, bring material directly to Transfer Station / Recycle Depot).
18. It is recommended to conduct another waste sort to evaluate seasonal fluctuations.
19. It is recommended to complete a waste sort and analysis of waste at the Transfer Station and from properties receiving front-load service.
20. It is recommended to conduct a waste sort every two years to monitor trends and evaluate the effectiveness of waste reduction and diversion programs.
21. Implement a 'tag' system for extra garbage bag or extra carts to accommodate occasional times when excess garbage cannot be avoided.
22. A full cost analysis is recommended.
23. It is recommended that the survey and full study results made publicly accessible.

1.0 INTRODUCTION

Advanced Enviro Engineering Ltd. (Advanced Enviro) was retained by the City of Fort Saskatchewan (City) to complete a Solid Waste Sort for residential household garbage, recyclables and organics for the pilot program and non-pilot areas as well as to conduct a survey and equipment evaluation.

The objectives of the waste sort were to establish data identifying solid waste composition, waste quantities, and current diversion and capture rates for the City. A physical waste sort was conducted for three waste sub-streams: 1) **garbage** sent to landfill (black cart), 2) **recyclables** diverted from landfill (blue cart) and 3) **organics** diverted from landfill (green cart) for the pilot program areas. Likewise two waste sub-streams: 1) **garbage** sent to landfill (black bag), and 2) **recyclables** diverted from landfill (blue bag program) for the non-pilot areas were sorted. Additional information was gathered through interviews of key people and review of the existing waste management system.

The objectives for the survey were to inform residents of the current diversion success, to measure interest in the development of diversion programs and their commitment to participate, and to develop a compatible common vision of residents and council. At the same time the feedback from pilot program areas allowed identification of common themes, obstacles and opportunities for improvement and to provide information to support the decision making process to implement the pilot program city wide.

The equipment currently used to collect waste was reviewed in detail in order to provide recommendations going forward.

This report summarizes the following:

- Current waste management system
- Methodology, results and recommendations of the waste sort and volume evaluation
- Survey results and analysis
- Equipment evaluation and recommendation

2.0 CURRENT WASTE MANAGEMENT SYSTEM REVIEW

This section provides a brief summary of the current waste management system and an analysis of annual waste and diversion data.

2.1 Existing System

The City of Fort Saskatchewan's existing waste management system that is covered in the monthly fee of \$24/household/month (single family residential) includes the following programs:

1. Waste Collection

- Weekly manual curbside residential garbage collection by BFI Canada Inc.
- No limit on the amount of garbage set out at curbside for collection
- Residents can drop off garbage, mattress, box springs, sofas, loveseats, chairs, etc., and construction waste at Transfer Station (8609-111 Street)

2. Recycling:

- Weekly curbside blue bag collection of co-mingled recyclables (Plastics #1-7, tin cans, aluminum containers and cans, paper products, boxboard, cardboard, glass containers and jars) by BFI Canada Inc.
- Curbside Recycling Program began in May of 2006 with the support of Shell Canada
- Residents can drop off mixed paper, phone books, plastics, glass, tin, newspaper, cardboard at the Recycle Station (8609-111 Street) which is open 24 hours a day, seven days a week
- Residents can drop off wood, shingles, rocks and concrete (small amounts), car and household batteries, passenger tires, electronic waste, e-waste (microwaves, stereos, VCRs, electronic toys, calculators, etc.), propane bottles, used oil, glycol, metals, white goods, paint at the Transfer Station

3. Organics Recycling

- Residents can drop off grass clippings and yard waste at the Recycle Station
- Residents can drop off tree branches and Christmas trees at the Transfer Station
- Home composting

4. Christmas Tree Collection (curbside)
 - Two weeks annually in January
5. Household Toxic Round-Up
 - Once a year at the Public Works Yard (11121-88 Street)
6. Large Item Collection (curbside)
 - Limit of two items per household
 - 1 week annually in April
7. Product Exchange Centre at the Transfer Station
 - Items that work and in good condition can dropped and picked up
8. Pilot Program
 - Involves one-thousand (1,000) households, 200 each in the five garbage collection zones
 - Program will run from April 28th, 2014 to November 28th, 2015
 - Black (246 L or 65 gal) garbage cart, blue (360 L or 95 gal) recyclables cart, and green (360 L or 95 gal) organics cart, kitchen catcher for kitchen
 - Weekly automated curbside collection
9. Communication Program
 - City website (<http://www.fortsask.ca>)
 - Signage at the Recycle Station and Transfer Station
 - Curbside Waste and Recycling Collection Schedule sent to residents once a year and also available at City Hall, Community and Protective Services, the Dow Centennial Centre, and Public Works



Figure 2.1 Transfer Station and Recycle Station (8609-111 Street)

2.2 Interviews

Interviews associated with waste management activities were held with:

- Mayor and Council
- City Administration
- Waste Collection Contractor
- 7 randomly selected residents in the pilot program areas
- 3 randomly selected residents in the non-pilot areas

Some of the key themes mentioned during the interviews include:

- **Current collection system**

All the people interviewed think that an automated collection system instead of manual collection is going to be the future for the City because it involves less labour and is convenient. Most agree on bi-weekly (every two weeks) organics collection during the winter season but support weekly collection in the summer as there will be odour problem during the summer season. In order to save money and to push residents to recycle more, some of the interviewees agree on having garbage collection every two weeks, year round, and weekly recyclables collection.

- **Pilot project**

Interviewees stated that the three carts pilot project seems to be an overall success. They want to carry on with the project for the whole City but the system has to be fine-tuned. Some think that there has been a lack of communication with residents before the start of the pilot project.

The organics collection is widely accepted mostly because it allows diverting waste from the landfill although there was poor communication as many residents are not aware of what to put in the green cart.

Many interviewees think that the recyclables should still be collected in blue bags as items such as cardboard are bulky and don't fit in the cart.

The main concern for the pilot project is related to the size and the number of carts. Most of the resident's complaints include no room to store the carts and on collection day when the carts are set out there is no room for cars (especially in the cul-de-sacs). Some concerns are also related to the winter season where the room for carts will be even a bigger issue because of snow windrows. Some suggestions include reducing the

number of carts and the size as well as having different collection days for the different streams as residents don't have to take out all the carts at the same time.

Some of the interviewees didn't expect such big carts when discussed in council and wouldn't have approved the choice. Providing big garbage carts are contrary to recycling idea.

Most of the interviewees would use carts for garbage and organics, but blue bags for recyclables.

- **Goal for the City**

Most of the people interviewed believe that 80% diversion rate is an achievable goal for the City, probably in the next 4 – 6 years, and that they should work in this direction. They believe that the goal can be reached step by step where organics program would be a good start followed by communication program. Some of the interviewees think that the implementation of a pay-as-you-throw system and an enforcement policy would lead to a good result although currently the City is not ready and does not have the structure. They would consider these options at a later time when the system is more settled.

- **Cost for the service**

Most of the interviewees think that residents won't be willing to pay more than \$26 – \$30/month/household (currently \$23.5). They believe that the system has to be efficient, not expensive and this can be achieved, for example, by reducing collection frequency of organics and maybe garbage. They believe communicating the importance of investing at the beginning to develop a better long term system will benefit the residents as well as the environment.

- **Communication programs**

The common feeling is that there is a lack of communication between the City and the residents. The community needs to be informed about the importance of recycling specially organics, how to do it as well as share resident's success stories. People should be acknowledged for job well done. Most interviewees believe that the City has to invest in different communication programs in order to reach all residents. Some agree on educational programs at schools, on recycling, which is important for the kids who in return can teach their parents. In addition allow residents in the pilot program area to give their feedback regarding their carts on the City's website.

Findings:

- Interviewee supported bi-weekly (every two weeks) organics collection during the winter.
- Interviewee suggested using blue bags instead of blue carts for recyclables. This reduces the number of carts and the issue of fitting bulky cardboards in the cart.
- Interviewee suggested different collection day for the different waste streams so that residents have enough space to park their cars when carts are set out for collection. (This could be included in the updated bylaw).
- 80% overall diversion rate is achievable mainly through organics program and with enhanced communication program.
- Interviewee suggested waste management system should be cost effective and efficient; residents appear to be willing to pay no more than \$26 - \$30 per month per household for a better service (currently \$24).
- Interviewee suggested implementing communication programs between the City and the community.
- Interviewee suggested implementing educational programs about recycling in schools.

2.3 Local Research (Desktop Review)

As part of this process the City's website and a number of documents were reviewed:

- City website (<http://www.fortsask.ca>)
- Community Sustainability Plan, City of Fort Saskatchewan, 2009
- City of Fort Saskatchewan Strategic Plan, 2013
- Residential garbage and recyclables tonnage provided by Fort Saskatchewan, Public Works Department

2.4 Solid Waste and Diversion Data Review

Solid waste and diversion data provided by the City for 2011 to 2013 was reviewed and analyzed to establish annual solid waste generation and diversion rates and a baseline for measuring future progress.

2.4.1 Garbage to Landfill

The average annual amount of residential garbage sent to landfill, based on 2011 to 2013 data, is approximately 4,507 tonnes. This includes garbage collected at the curbside and large items collected at curbside on Large Item Pick Up days. Based on 2013 data, 4,803 tonnes of residential garbage, or 220 kg/capita is sent to landfill each year; compared to the provincial residential garbage disposal average of 272 kg/capita¹.

The annual tonnes of residential solid garbage landfilled (per capita) for the years 2011 to 2013 is provided in Table 2.1 and illustrated in Figure 2.2.

Table 2.1 Garbage sent to landfill: 2011 – 2013

Year	Total residential garbage to landfill* (Tonnes)	Population	Per capita (kg)
2011	4,225	19,051	222
2012	4,493	20,475	219
2013	4,803	21,795	220

*Includes large items picked up at curbside in April of each year.

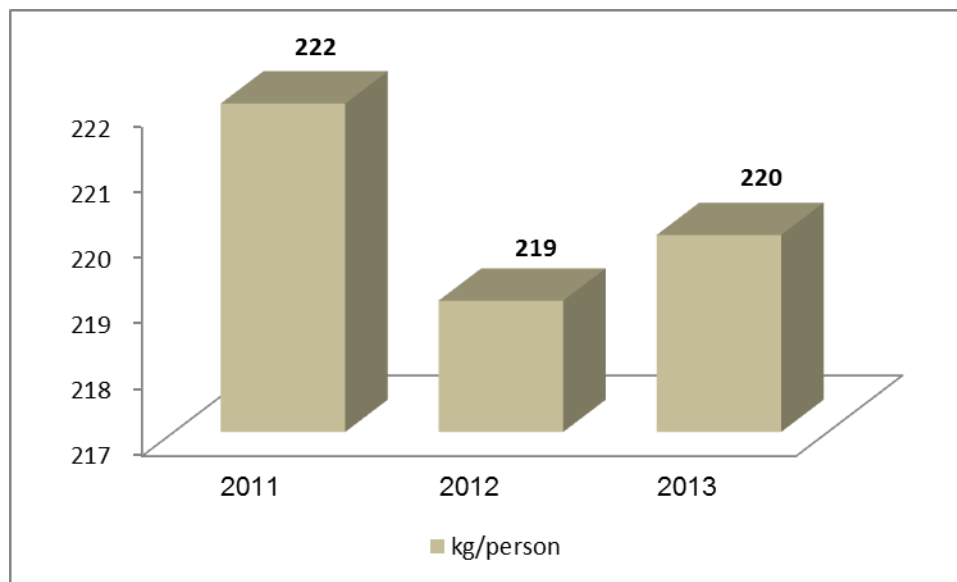


Figure 2.2 Garbage sent to landfill per person (kg): 2011 – 2013

¹ Based on 2010 Statistics Canada residential waste disposal data and Statistic Canada 2010 Population data

2.4.2 Waste Diversion Rate

Table 2.2 shows total residential waste generated, the per capita waste generation rate and the percentage change between the years 2011 and 2013. Total residential waste generated is equal to the quantity of waste landfilled plus the quantity of waste diverted through recycling programs. Decreases in the per capita waste generation rate indicate changes that have been made at the source (i.e. household). Examples of source reduction changes include increases in grass cycling, backyard composting and changes in purchasing decisions.

Table 2.2 Change in waste generation per year and per person (kg): 2011 – 2013

Year	Total residential waste generated (Tonnes)	Per capita rate (kg)	% Change (in per capita rate)
2011	5,412.53	284	
2012	5,664.26	277	-2.7%
2013	5,863.24	269	-2.8%

The percentage change in total waste generated/capita showed a slight decrease from 2012 to 2013 (-2.7% to -2.8%).

Table 2.3 shows the diversion rates for the years 2011 to 2013. Diversion rate is equal to the quantity diverted divided by total waste generated. Diversion was achieved through the blue bag program.

Table 2.3 Residential tonnages and diversion rates: 2011 - 2013

Waste type (Tonnes)	Year		
	2011	2012	2013
Landfilled	4225	4493	4803
Recycled (Curbside Blue Bag)	1188	1171	1061
Total Residential Waste Generated	5413	5664	5863
Diversion Rate	22%	21%	18%

The City of Fort Saskatchewan's current residential waste diversion rate (2013) is 18%. The percentage of waste that was recycled compared to the percentage that was landfilled in 2013 is illustrated in Figure 2.3.

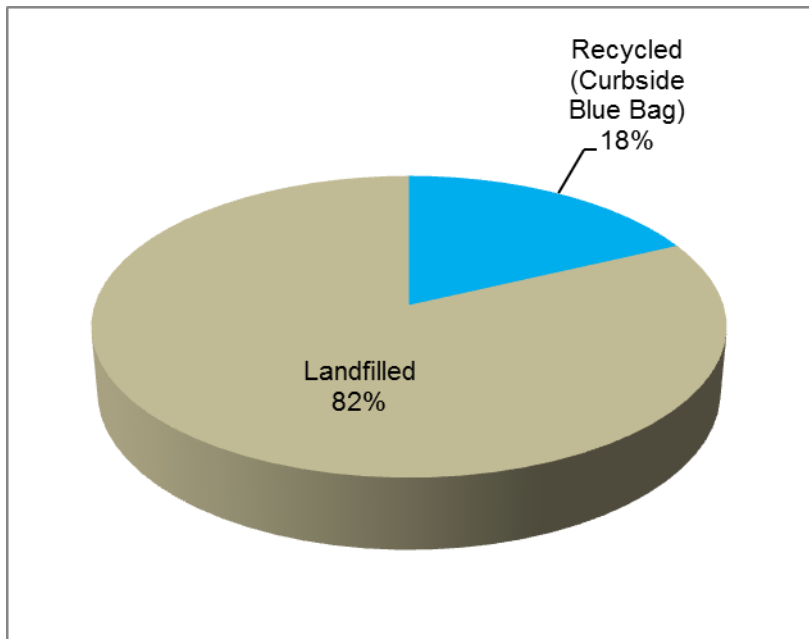


Figure 2.3 Landfilled and recycled residential waste in 2013

Findings:

- **The City of Fort Saskatchewan's current residential waste diversion rate (2013) is 18%.**
- **Per capita waste production is declining; however diversion rates are also declining.**

3.0 WASTE COMPOSITION

3.1 Waste Sort Methodology

Residential garbage, recyclables and organics from forty (40) randomly selected households in the pilot program areas and residential garbage and recyclables from sixty (60) randomly selected households in the non-pilot areas were collected by BFI Canada Waste Management on September 22, 23, 24 and 26, 2014. Households were not informed of the waste sort to ensure households' waste behaviour remained consistent. The materials were transported to the City of Fort Saskatchewan Public Works shed (11121-88 Avenue) for sorting. Haulers unloaded materials in a designated area and

made sure that the different waste streams of both pilot program areas and non-pilot areas were piled separately.

A team of three persons sorted all the waste at the Public Works shed (11121-88 Avenue) on September 24th and 26th, 2014.

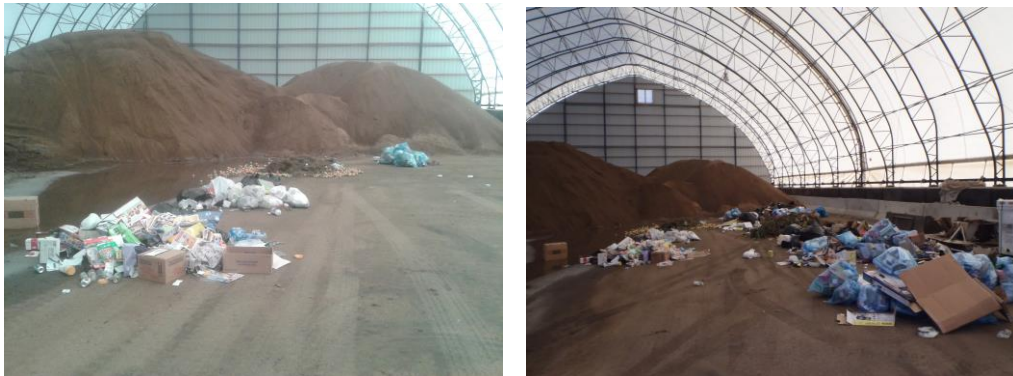


Figure 3.1 Waste delivered for sort from pilot program areas and non-pilot areas



Figure 3.2 Carts set out for collection in the pilot program area





Figure 3.3 Carts storage



Figure 3.4 Waste sort facility set up

Waste sort personnel sorted and weighed garbage, recyclables and organics according to predetermined categories (Table 3.1). Sort categories were identified through interviews, information provided by City employees and review of existing information (City website).

Garbage, recyclables and organics were sorted into pre-weighed 76L (20 gallons) plastic storage totes/baskets and weighed using an ANYLOAD EC100 Counting Scale. The

tare weight (tote) was subtracted from the gross weight (tote plus waste) to obtain net weight (waste).

Following the waste sort, garbage, recyclables and organics were piled separately (Figure 3.5 – 3.9) and loaded back for disposal and recycling. Transfer Station items were taken to the Transfer Station.

Weights were recorded and analyzed using Microsoft Excel 2010.



Figure 3.5 Waste after waste sort



Figure 3.6 Recyclables: (A) Plastics #1-7, mixed paper, plastic bags (B) Corrugated Cardboard (C) Metal/Glass (D) Beverage/Deposit containers



Figure 3.7 Organics: food, paper and yard waste



Figure 3.8 Transfer Station items (electronic and household hazardous waste, scrap metal, etc.)



Figure 3.9 Potential donation items

Table 3.1 Waste sort categories and subcategories

Fort Saskatchewan - Waste Sort Categories (2014)			
Category	Subcategory	Abb.	Description / Notes
Garbage	General Waste	GW	Any item that does not fit in the Organics, Recycling, and Hazardous Category. INCLUDES BUT NOT LIMITED TO Ashes, Ceramics and clay, Diapers / Baby Wipes, Hygiene and Sanitation products, Broken glass, Soiled plastics, Soiled metal, Styrofoam, Fabric / Rags, Foil gift wrap, Frozen juice cans, Loose can lids, Plastic film and bubble wrap, Styrofoam cups & plates, etc., Toothpaste tubes, Window glass, C & D (unless listed under Transfer Station)
	Food Waste	Or-FW	Fruit and vegetable peels and cores, Meat, Meat bones, Dairy, Egg shells, Breads, Cereals, Grains, Baking ingredients, Coffee grounds and filters, Tea leaves and bags, Table scraps and Spoiled food
Organics	Household Waste	Or-HW	Dog droppings, Kitty litter, Wood or paper cage lining, Fur and feathers, Soiled paper (tissues, napkins, paper cups, paper plates, pizza boxes, etc.), Dirt and Dust
	Yard Waste	Or-YW	Flowers, Weeds, Grass, Leaves, Twigs, Small sticks
Recycling	Mixed paper	R-MPa	Printer and writing paper, newspaper, magazines, flyers, envelopes, cards, books, catalogues, cereal boxes, pasta boxes, tissue boxes, paper egg cartons and paper coffee cups (remove lids), shredded paper
	Metal / Glass	R-MGI	Steel cans (place lid inside and pinch shut), glass jars (all colors) (remove lids), aluminum foil, pie plates
	Plastics 1-7	R-PI	Plastics #1 - 7; look for the triangular symbol with a number in the middle, usually on container bottom, plastic bags
	Beverage /Deposit Containers	R-Bev	Milk cartons and jugs, pop and beer cans, wine, water, beer and juice bottles, Tetra Paks
	Corrugated cardboard	R-Card	Flatten and place under bagged items
Other Programs			
Transfer Station	Electronic Waste	EW	VCRs, stereos, microwaves, electronic toys, calculators, (Computer monitors and processors, televisions, DVD players, printers, laptops) etc.
	Household Hazardous Waste	HHW	Car and household batteries, propane bottles, oil, glycol, paints, pesticides, harsh cleaners, fluorescent bulbs, propane tanks, fire extinguishers
	Tires	Tire	Passenger tires
	Organic Waste	Tree	Tree branches, Christmas trees
	Construction	C&D	Construction waste, Gravel truck construction waste (wood, shingles), rocks, concrete
	Household Items	Lglt	Mattress, box spring, sofa, loveseat, chair, etc.
	White Goods	Whi-Goo	Fridge, stove, etc.
Transfer Station	Scrap Metal	Met	Scrap metal pieces
Potentials			
	Donation Programs	P-Don	e.g., Clothing (good condition)

3.2 Waste Volume Methodology

A representative from Advanced Enviro Engineering Ltd. recorded waste volume data from randomly selected hundred (100) non-pilot households and seventy five (75) pilot program households. These sample households are different from the sample households for the waste sort. The data included number of items (e.g. carts, blue bags, black bags, etc.) set out and approximate volumes (e.g. $\frac{1}{2}$ cart full, 2 full blue bags, $\frac{3}{4}$ full black bag). These data will help to understand the average volume of residential waste generation in the City.

3.3 Assumptions and Limitations

- Randomly selected and sampled households in the non-pilot area are representative of the total waste generated by single-family non-pilot residential households in the City.
- Randomly selected and volume checked households in the non-pilot area are representative of the total volume of waste generated by single-family non-pilot residential households in the City.
- Randomly selected and sampled households in the pilot program area are representative of the total waste generated by single-family pilot program residential households in the City.
- Randomly selected and volume checked households in the pilot program area are representative of the total volume of waste generated by single-family pilot program residential households in the City.

3.4 Garbage and Recyclables Composition – Non-Pilot Areas

Garbage in black bags or cans, and recyclables in blue bags were collected and sorted from 60 representative random sample households in the non-pilot areas.

3.4.1 Composition of Garbage to Landfill

During the waste sort, the following garbage (to landfill) characteristics were noted:

- General garbage was largely composed of styrofoam cups and plates, hygiene and sanitation products, diapers, food wrappers and snack/food bags, soiled plastic containers, soiled aluminum foil, foil gift wraps, toys, and broken glasses.

- Recyclables in garbage were largely composed of mixed paper, plastics (#1-7), cardboard and box board. Metal (food cans), glass and beverage/deposit containers were also regularly encountered.
- Majority of the organics in garbage were food waste and then yard waste.
- Potential donations were mainly composed of clothing (good condition), toys, and grocery bags.
- Electronic materials were uncommon and included phones, blender, radio, and a vacuum.
- Household hazardous waste was uncommon and included aerosol containers, paint, and batteries.
- Construction waste was uncommon and included ceramic tiles, bathroom faucets and door handles.
- No tires, scrap metal, large items (household items) and tree branches (could be due to date of waste sort) were encountered during the waste sort.

A summary of garbage composition by weight is provided in Figure 3.10. As illustrated, organics was the largest component of garbage by weight (57%), followed by garbage (23%). Twelve percent (12%) of sorted garbage was comprised of recyclables and 6% was comprised of electronics, household hazardous waste and household C&D waste (Transfer Station). Potential donation items comprised 2% of the total garbage sorted (Fig. 3.10).

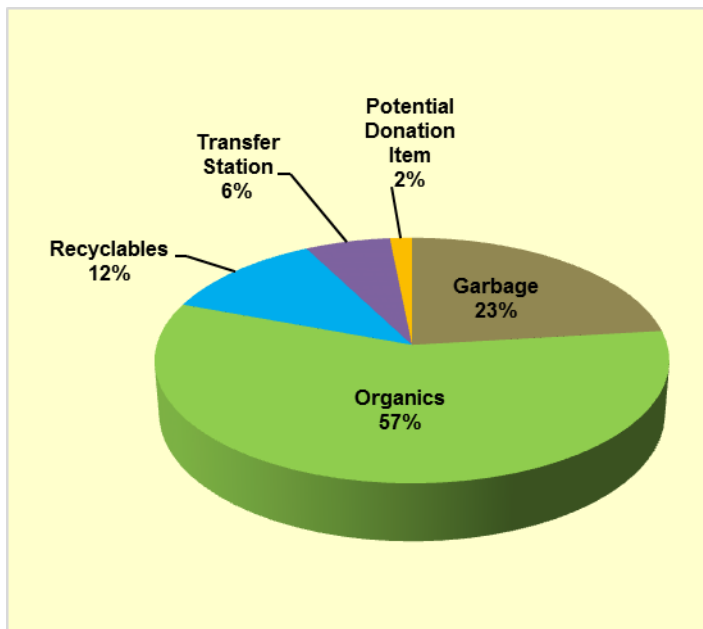


Figure 3.10 Composition of garbage to landfill – Non-Pilot Areas

Table 3.2 summarizes the weight data for sorted garbage sent to landfill from the non-pilot areas.

Table 3.2 Summary of garbage to landfill data (Non-Pilot Areas)

Composition of Garbage to Landfill				
GARBAGE				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	138.16	23%	2.30
Organic Waste	Food Waste	230.02	39%	3.83
	Household Waste	0.22	0%	0.004
	Yard Waste	113.32	19%	1.89
Recyclables	Mixed Paper	28.39	5%	0.47
	Metal / Glass	7.06	1%	0.12
	Plastics (#1-7)	20.02	3%	0.33
	Beverage / Deposit Containers	4.98	1%	0.08
	Cardboard (corrugated)	9.59	2%	0.16
Transfer Station	Electronic Waste	11.55	2%	0.19
	Household Hazardous Waste	9.63	2%	0.16
	Trees	0.00	0%	0.00
	C&D	14.96	3%	0.25
	Household Items	0.00	0%	0.00
	Scrap Metal	0.00	0%	0.00
Potentials	Donations	9.35	2%	0.16
Total Garbage		138.16	23.1%	2.30
Total Organics		343.56	57.5%	5.73
Total Recyclables		70.03	11.7%	1.17
Total Transfer Station		36.14	6.1%	0.60
Total Potentials		9.35	1.6%	0.16
GRAND TOTAL		597.24	100%	9.95

Findings:

1. Organics comprise 57%, by weight, of the total garbage sorted.
2. Twelve percent (12%) of the total garbage sorted was comprised of recyclables and 6% were items such as electronics, household hazardous waste, etc. that should not be included in curbside solid waste.

3.4.2 Composition of Recyclables Collected for Recycling (Blue Bag)

During the waste sort, the following recyclables (from current curbside co-mingled recycling programs) characteristics were noted:

- Recyclables were largely composed of mixed fiber (e.g., computer paper, newspapers and magazines) and cardboard. Plastics #1-7, metal (food cans), glass and beverage/deposit containers were regularly encountered.
- Recycling contamination comprised 7.4% of recyclables sorted (by weight). This included garbage (e.g., chips bags, food packaging) and organics (e.g., soiled pizza boxes).

A summary of recyclables composition by weight is provided in Figure 3.11. As illustrated, mixed paper was the largest component of recyclables by weight (56%), followed by cardboard which comprised 21.7%. Plastics #1-7 comprised 9%, metal (food cans) and glass comprised 4% and beverage/deposit containers comprised 1% by weight. Contamination comprised 7.4% of the recyclables sorted (6.7% garbage and 0.7% organics) (Fig. 3.11).

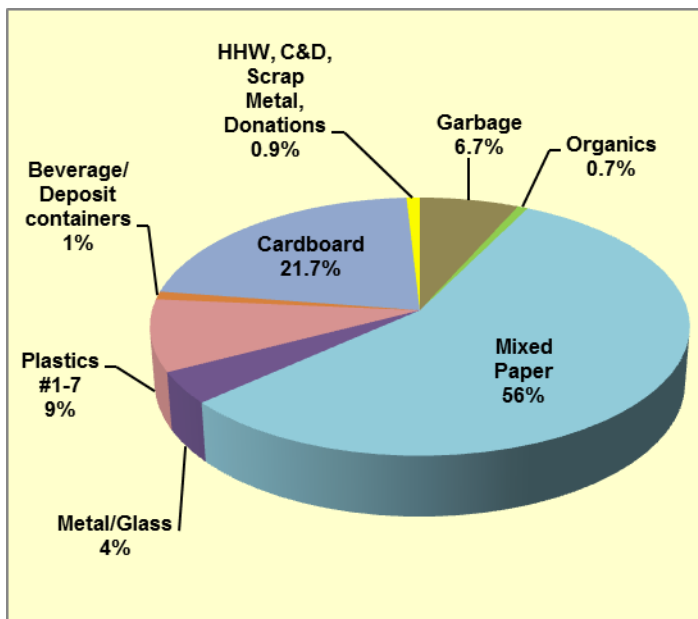


Figure 3.11 Composition of recyclables by weight – Non-Pilot Areas

Table 3.3 summarizes weight data for sorted recyclables.

Table 3.3 Summary of recyclables by weight (Non-Pilot Areas)

Composition of Recyclables				
RECYCLING				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	12.81	7%	0.21
Organic Waste	Food Waste	1.32	1%	0.02
	Household Waste	0.00	0%	0.00
	Yard Waste	0.00	0%	0.00
Recyclables	Mixed Paper	105.37	56%	1.76
	Metal / Glass	8.47	4%	0.14
	Plastics (#1-7)	17.35	9%	0.29
	Beverage / Deposit Containers	2.05	1%	0.03
	Cardboard (corrugated)	41.00	22%	0.68
Transfer Station	Electronic Waste	0.00	0%	0.00
	Household Hazardous Waste	0.22	0%	0.00
	Trees	0.00	0%	0.00
	C&D	0.68	0%	0.01
	Household Items	0.00	0%	0.00
	Scrap Metal	0.36	0%	0.01
Potentials	Donations	0.34	0%	0.01
Total Garbage		12.81	6.7%	0.21
Total Organics		1.32	0.7%	0.02
Total Recyclables		174.24	91.7%	2.90
Total Transfer Station		1.26	0.7%	0.02
Total Potentials		0.34	0.2%	0.01
GRAND TOTAL		189.95	100%	3.17

Findings:

- Recyclables sorted from the blue bags had 7.4% contamination.

3.4.3 Composition of Total Waste (Garbage to Landfill and Recyclables for Recycling)

A summary of total waste composition by weight is provided in Figure 3.12. By weight, organics was the largest component, followed by recyclables and garbage. Transfer Station items (electronics, household hazardous waste, etc.) comprised the smallest component of total waste next to potential donation items. Refer to Table 3.4 for specifics on total waste subcategories.

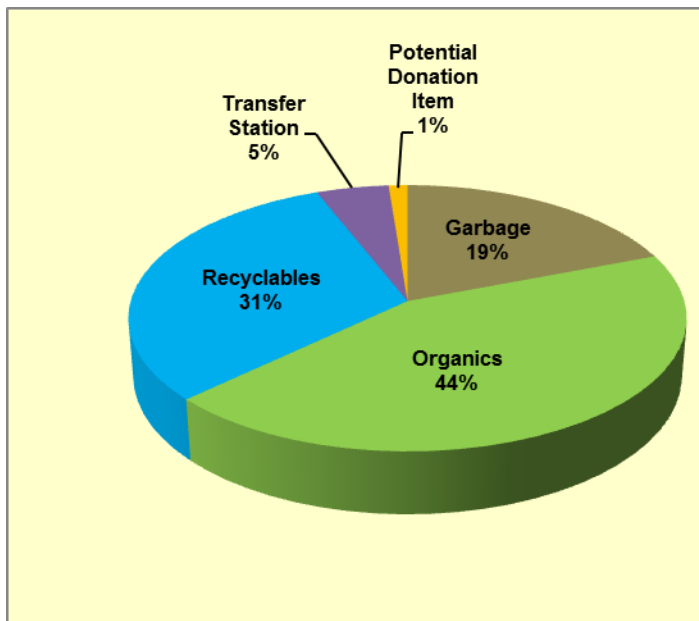


Figure 3.12 Composition of total waste by weight – Non-Pilot Area

Table 3.4 Summary of total waste generated by weight (Non-Pilot Areas)

Total Waste Composition				
GARBAGE + RECYCLING				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	150.96	19%	2.52
Organic Waste	Food Waste	231.34	29%	3.86
	Household Waste	0.22	0%	0.00
	Yard Waste	113.32	14%	1.89
Recyclables	Mixed Paper	133.76	17%	2.23
	Metal / Glass	15.53	2%	0.26
	Plastics (#1-7)	37.37	5%	0.62
	Beverage / Deposit Containers	7.03	1%	0.12
	Cardboard (corrugated)	50.59	6%	0.84
Transfer Station	Electronic Waste	11.55	1%	0.19
	Household Hazardous Waste	9.85	1%	0.16
	Trees	0.00	0%	0.00
	C&D	15.64	2%	0.26
	Household Items	0.00	0%	0.00
	Scrap Metal	0.36	0%	0.01
Potentials	Donations	9.69	1%	0.16
Total Garbage		150.96	19%	2.52
Total Organics		344.88	44%	5.75
Total Recyclables		244.27	31%	4.07
Total Transfer Station		37.40	5%	0.62
Total Potentials		9.69	1%	0.16
GRAND TOTAL		787.19	100%	13.12

Findings:

- Organics comprise 44% of the total waste sorted.

3.4.4 Volume of Total Waste set out for collection (Garbage to Landfill and Recyclables for Recycling)

Approximate volume of garbage (black bags) and recyclables (blue bags) set out from a total of one hundred (100) randomly selected households (twenty (20) households each from the five zones (Fig. 13)) in the non-pilot areas were recorded with the assumption of 1 regular garbage bag equals to 75L. These sample households are different from the sample households selected for the waste sort. This was done to cover different parts of the City. The approximate total volume of garbage and recyclables per week is provided in Figure 3.14.

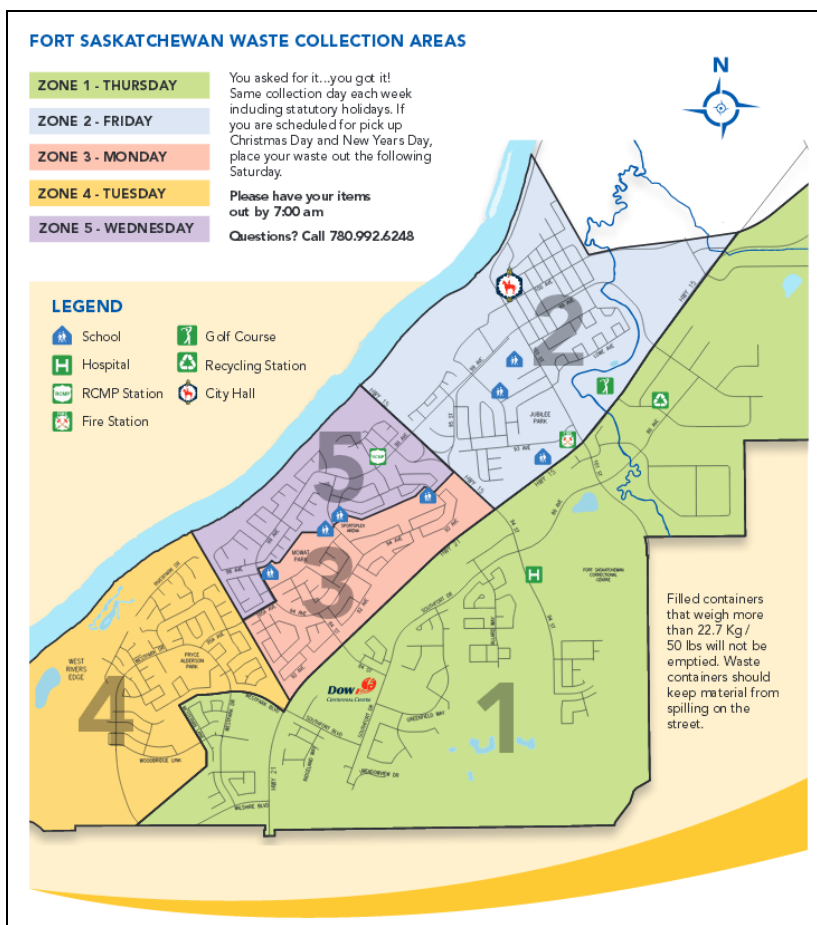


Figure 3.13 City of Fort Saskatchewan divided in to five zones

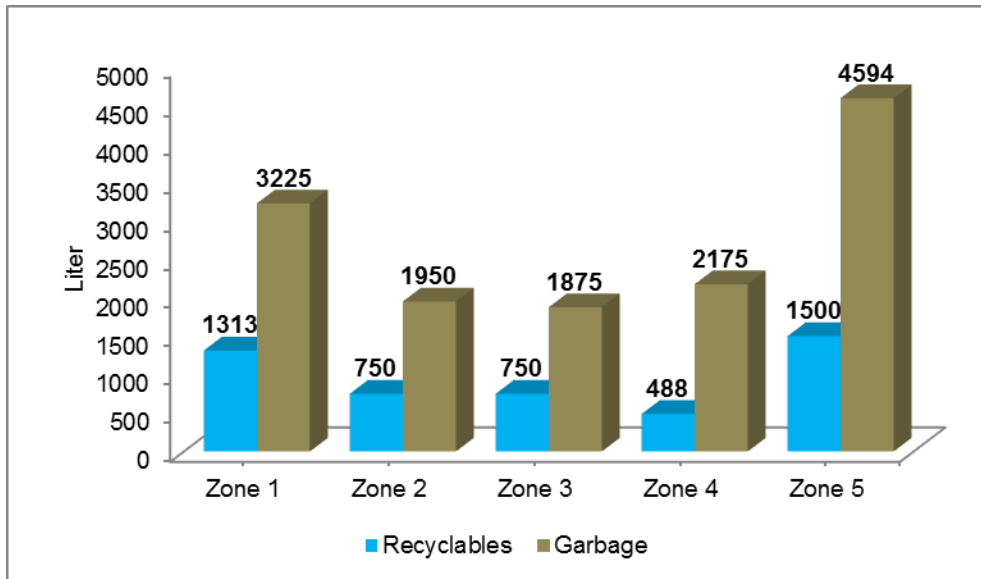


Figure 3.14 Garbage and recyclables by volume per week – Non-Pilot Area

Fifty percent (50%) of the sample households did not set out blue bags and 30% did not set out garbage bags or cans. On average the non-pilot areas generate approximately one (1) blue bag per household per week and two (2) garbage bags per household per week. Figure 3.15 shows the average blue and black bag generation per household per week in the five zones (Fig. 3.13).

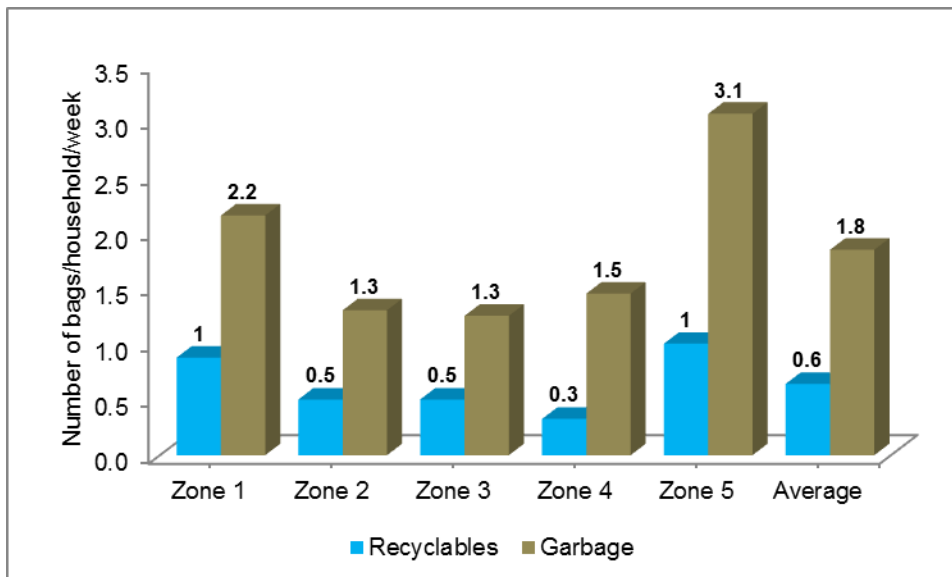


Figure 3.15 Number of blue and black bags per household per week – Non-Pilot Areas

Findings:

- **Households in the non-pilot area generate approximately one (1) blue bag and two (2) garbage bags per household per week.**

3.5 Garbage, Recyclables and Organics Composition – Pilot Program Areas

Garbage from 65 gal (246L) black carts, recyclables from 95 gal (360L) blue carts and organics from 95 gal (360L) green carts from forty (40) representative random sample households in the pilot program areas were collected and sorted.

3.5.1 Composition of Garbage to Landfill (Black Cart)

During the waste sort, the following waste (to landfill) characteristics were noted:

- Garbage was largely composed of styrofoam cups and plates, hygiene and sanitation products, diapers, food wrappers and snack/food bags, soiled plastic containers, soiled aluminum foil and foil gift wraps.
- Recyclables in garbage were largely composed of mixed paper, plastics (#1-7) and beverage/deposit containers. Cardboard, box board, metal (food cans), and glass were also regularly encountered.
- Almost all the organics in the garbage were food waste. Household waste (dog droppings, kitty litter, etc.) was also regularly encountered.
- Potential donations were mainly composed of clothing (good condition), home decorations and grocery bags.
- Electronic materials were uncommon and included phones, chargers, calculator, and electronic toys.
- Household hazardous waste was uncommon and included aerosol containers, paint, and batteries.

- Construction waste was uncommon and included shower curtain hanger, plastic mesh and hinges.
- Scrap metal was uncommon and included oven trays, home decorations and small metal rods.
- No tires, large items (household items) and tree branches were encountered during the waste sort (could be due to season at time of sort).

A summary of garbage composition by weight is provided in Figure 3.16. As illustrated, organics was the largest component of garbage by weight (43%), followed by garbage (34%). Thirteen percent (13%) of sorted garbage was comprised of recyclables and 7% was comprised of electronics, household hazardous waste, household C&D waste and scrap metal (Transfer Station). Potential donation items comprised 3% of the total garbage sorted (Fig. 3.16).

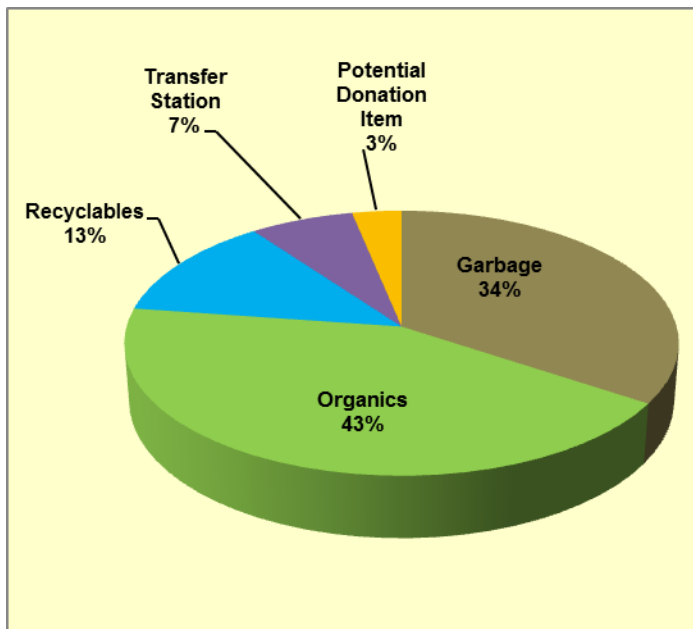


Figure 3.16 Composition of waste to landfill – Pilot Program Areas

Table 3.5 summarizes the weight data for sorted garbage sent to landfill from the pilot program areas.

Table 3.5 Summary of garbage to landfill data (Pilot Program Areas)

Composition of Garbage to Landfill				
GARBAGE				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	119.52	34%	2.99
Organic Waste	Food Waste	146.73	42%	3.67
	Household Waste	2.88	1%	0.07
	Yard Waste	0.30	0%	0.01
Recyclables	Mixed Paper	12.45	4%	0.31
	Metal / Glass	6.61	2%	0.17
	Plastics (#1-7)	9.10	3%	0.23
	Beverage / Deposit Containers	10.41	3%	0.26
	Cardboard (corrugated)	5.56	2%	0.14
Transfer Station	Electronic Waste	7.24	2%	0.18
	Household Hazardous Waste	4.04	1%	0.10
	Trees	0.00	0%	0.00
	C&D	3.92	1%	0.10
	Household Items	0.00	0%	0.00
	Scrap Metal	8.68	2%	0.22
Potentials	Donations	11.33	3%	0.28
Total Garbage		119.52	34%	2.99
Total Organics		149.91	43%	3.75
Total Recyclables		44.13	13%	1.10
Total Transfer Station		23.87	7%	0.60
Total Potentials		11.33	3%	0.28
GRAND TOTAL		348.77	100%	8.72

Findings:

- Organics comprised 43%, primarily food waste. It appeared many households were using the green carts for yard waste only.
- Recyclables comprised 13% of the total garbage sorted.
- Transfer Stations items (electronics, household hazardous waste, household C&D, and scrap metal) comprised 7% of the total garbage sorted.
- Potential donation items comprised 3% of the total garbage sorted.

3.5.2 Composition of Recyclables Collected for Recycling (Blue Cart)

During the waste sort, the following recyclables (from blue carts) characteristics were noted:

- Recyclables in blue cart were largely composed of mixed paper (e.g., computer paper, newspapers and magazines) and cardboard. Plastics #1-7, beverage/deposit containers, metal (food cans) and glass were regularly encountered.
- Recycling contamination in blue cart comprised approximately 15% of recyclables sorted (by weight). This included garbage (e.g., chips bags, food packaging) and organics (e.g., soiled pizza boxes).

A summary of recyclables composition by weight is provided in Figure 3.17. As illustrated, mixed paper was the largest component of recyclables by weight (32%), followed by cardboard which comprised 24%. Plastics #1-7 comprised 9%, beverage/deposit containers comprised 8%, and metal (food cans) and glass comprised 6% by weight. Contamination comprised 15% of the recyclables sorted (9% garbage and 6% organics) (Fig. 3.17).

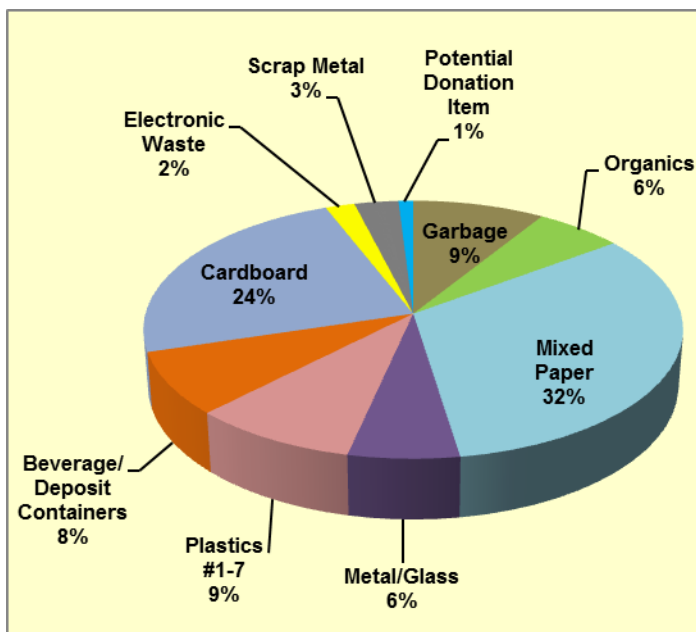


Figure 3.17 Composition of recyclables by weight – Pilot Program Areas

Table 3.6 summarizes weight data for sorted recyclables.

Table 3.6 Summary of recyclables by weight (Pilot Program Areas)

Composition of Recyclables				
RECYCLING				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	14.05	9%	0.35
Organic Waste	Food Waste	8.75	6%	0.22
	Household Waste	0.40	0%	0.01
	Yard Waste	0.00	0%	0.00
Recyclables	Mixed Paper	52.22	33%	1.31
	Metal / Glass	9.48	6%	0.24
	Plastics (#1-7)	14.57	9%	0.36
	Beverage / Deposit Containers	12.44	8%	0.31
	Cardboard (corrugated)	38.17	24%	0.95
Transfer Station	Electronic Waste	2.99	2%	0.07
	Household Hazardous Waste	0.00	0%	0.00
	Trees	0.00	0%	0.00
	C&D	0.43	0%	0.01
	Household Items	0.00	0%	0.00
	Scrap Metal	4.12	3%	0.10
Potentials	Donations	1.08	1%	0.03
Total Garbage		14.05	8.9%	0.35
Total Organics		9.16	5.8%	0.23
Total Recyclables		126.89	79.9%	3.17
Total Transfer Station		7.54	4.7%	0.19
Total Potentials		1.08	0.7%	0.03
GRAND TOTAL		158.71	100%	3.97

Findings:

- Contamination in the blue carts for recyclables comprised 15% (9% garbage and 6% organics).
- Contamination of blue carts was noticeably higher than contamination of blue bags (15% in pilot area vs 7% in non-pilot area).

3.5.3 Composition of Organics for Composting (Green Cart)

During the waste sort, the following organics (from green carts) characteristics were noted:

- Organics were largely composed of yard waste.
- Food waste was uncommon and comprised 10%.
- Organics contamination was insignificant (0.3% recyclables and 0.2% garbage).

A summary of organics composition by weight is provided in Figure 3.18. As illustrated, yard waste was the largest component of organics by weight (89%), followed by food waste which comprised 10.5%. Contamination was insignificant and comprised 0.5% of the organics sorted (0.3% recyclables and 0.2% garbage) (Fig. 3.18).



Figure 3.18 Composition of organics by weight – Pilot Program Areas

Table 3.7 summarizes weight data for sorted organics.

Table 3.7 Summary of organics by weight (Pilot Program Areas)

Composition of Organics				
ORGANICS				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	1.39	0.2%	0.03
Organic Waste	Food Waste	94.44	10.5%	2.36
	Household Waste	2.64	0%	0.07
	Yard Waste	800.76	89%	20.02
Recyclables	Mixed Paper	1.22	0.1%	0.03
	Metal / Glass	0.00	0%	0.00
	Plastics (#1-7)	1.62	0.2%	0.04
	Beverage / Deposit Containers	0.00	0%	0.00
	Cardboard (corrugated)	0.00	0%	0.00
Transfer Station	Electronic Waste	0.00	0%	0.00
	Household Hazardous Waste	0.21	0%	0.01
	Trees	0.00	0%	0.00
	C&D	0.00	0%	0.00
	Household Items	0.00	0%	0.00
	Scrap Metal	0.00	0%	0.00
Potentials	Donations	0.00	0%	0.00
Total Garbage		1.39	0.2%	0.03
Total Organics		897.83	99.5%	22.45
Total Recyclables		2.84	0.3%	0.07
Total Transfer Station		0.21	0.0%	0.01
Total Potentials		0.00	0.0%	0.00
GRAND TOTAL		902.27	100%	22.56

Findings:

- The green cart seems the most effective cart as there was almost no contamination (0.5%).
- Yard waste comprised 89% of the organics. As the study was conducted in September, yard waste appeared to be related to fall clean-up (leaves, mix of grass from mower and dry grass from raking, apples). Seasonal variations in volumes, weight, and type of yard waste will occur.

- Yard waste collected from pilot areas significantly exceeded yard waste collected in non-pilot areas (801kg from 40 pilot households vs 113kg from 60 non-pilot households). The public survey findings suggest that many households already bring yard waste to the Transfer Station.

3.5.4 Composition of Total Waste (Garbage to Landfill, Recyclables for Recycling and Organics for Composting)

A summary of total waste composition by weight is provided in Figure 3.19. By weight, organics was the largest component, followed by recyclables and then garbage. Transfer Station items (electronics, household hazardous waste, scrap metal, etc.) comprised the smallest component of total waste, next to potential donation items. Refer to Table 3.8 for specifics on total waste subcategories. Yard waste has contributed to the highest percentage of organics as the waste sort was conducted in September.

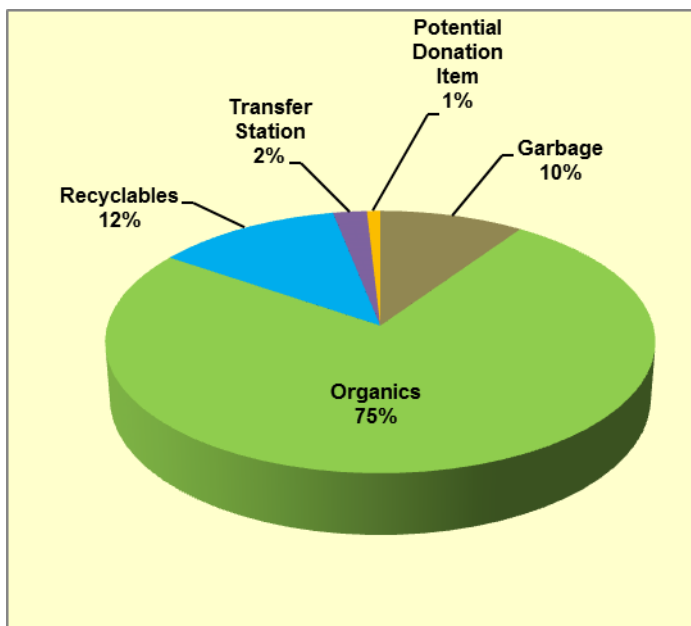


Figure 3.19 Composition of total waste by weight – Pilot Program Areas

Table 3.8 Summary of total waste generated by weight (Pilot Program Areas)

Total Waste Composition				
GARBAGE + RECYCLING + ORGANICS				
Category	Subcategory	Net Weight	% Weight	Per Household
Garbage	Garbage	134.96	10%	3.37
Organic Waste	Food Waste	249.92	18%	6.25
	Household Waste	5.93	0%	0.15
	Yard Waste	801.06	57%	20.03
Recyclables	Mixed Paper	65.90	5%	1.65
	Metal / Glass	16.09	1%	0.40
	Plastics (#1-7)	25.28	2%	0.63
	Beverage / Deposit Containers	22.86	2%	0.57
	Cardboard (corrugated)	43.73	3%	1.09
Transfer Station	Electronic Waste	10.23	1%	0.26
	Household Hazardous Waste	4.25	0%	0.11
	Trees	0.00	0%	0.00
	C&D	4.35	0%	0.11
	Household Items	0.00	0%	0.00
	Scrap Metal	12.80	1%	0.32
Potentials	Donations	12.41	1%	0.31
Total Garbage		134.96	10%	3.37
Total Organics		1056.90	75%	26.42
Total Recyclables		173.86	12%	4.35
Total Transfer Station		31.62	2%	0.79
Total Potentials		12.41	1%	0.31
GRAND TOTAL		1409.75	100%	35.24

Findings:

- Out of the total waste (garbage, recyclables and organics) sorted, organics comprised 75%, recyclables 12%, garbage 10%, Transfer Station items (electronics and scrap metal) comprised 2% and potential donation items comprised 1%.

3.5.5 Volume of Total Waste set out for collection (Garbage to Landfill, Recyclables for Recycling and Organics for Composting)

Approximate volume of garbage in black carts (1 back cart = 65 gal or 246L), recyclables in blue carts (1 blue cart = 95 gal or 360L) and organics in green carts (1 green cart = 95 gal or 360L) set out from a total of seventy five (75) randomly selected households (fifteen (15) households each from the five zones, Fig. 3.13) in the pilot program areas were recorded. These sample households are different from the sample households selected for the waste sort. This was done to cover different parts of the City. The approximate total volume of garbage, recyclables and organics per week is provided in Figure 3.20.

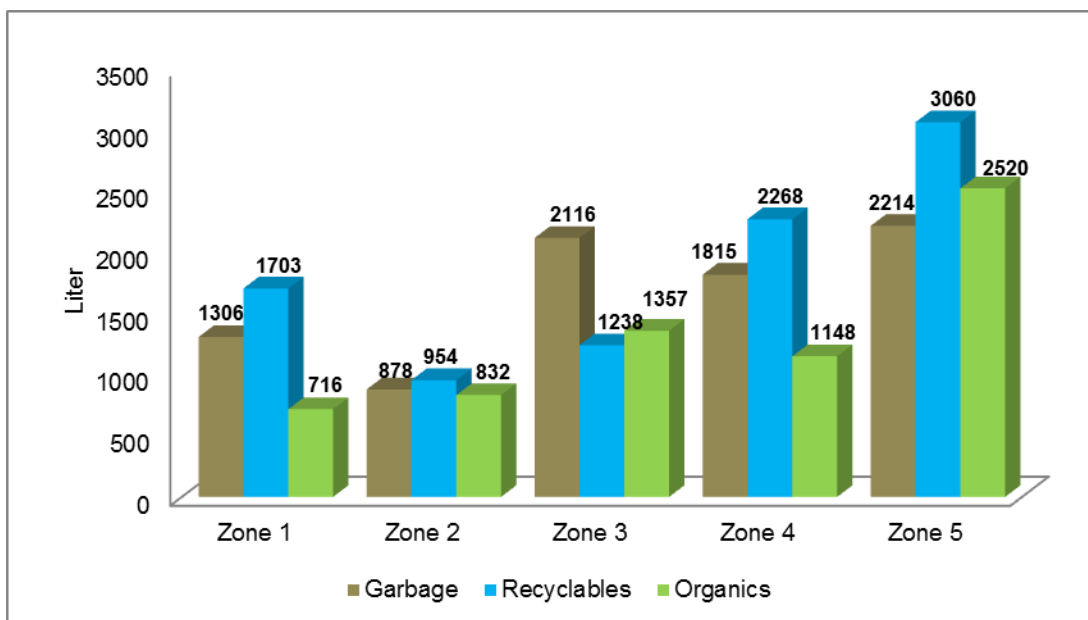


Figure 3.20 Garbage, recyclables and organics by volume per week – Pilot Program Area

Thirty seven percent (37%) of the sample households did not set out blue carts, twenty three percent (23%) did not set out black carts and forty eight percent (48%) did not set out green carts of the total 75 households observed. On average, black carts are half full, blue carts are 1/3rd full, and green carts are 1/4 full. Figure 3.21 shows the average fullness of waste per household per week in the five zones in the pilot program areas.

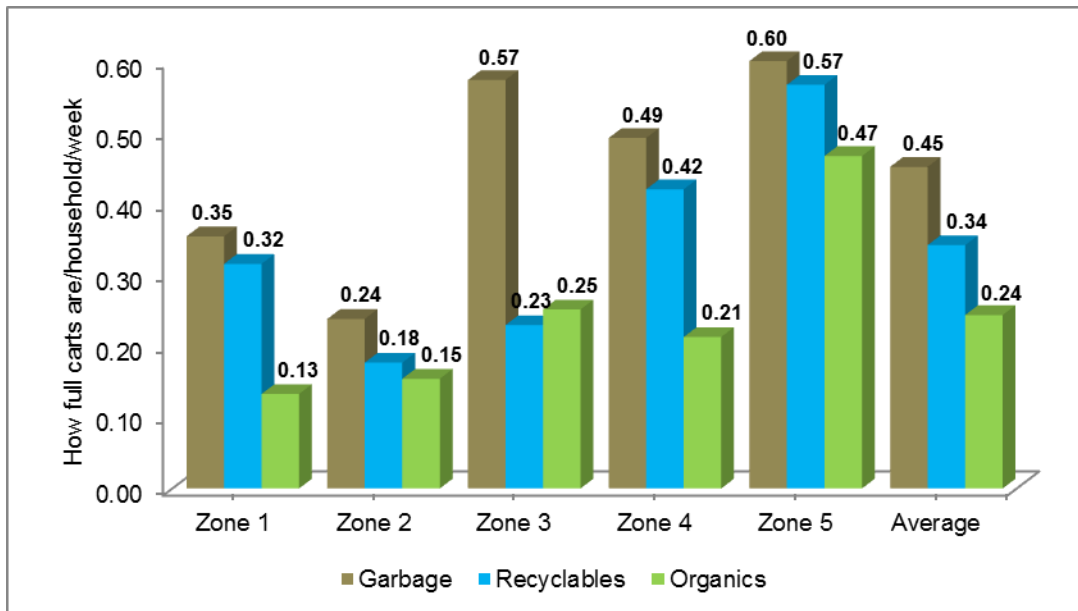


Figure 3.21 Approximate fullness of waste in carts per household per week – Pilot Program Areas

Findings:

- Based on the volume evaluation in the pilot program area, on average, black carts for garbage are $\frac{1}{2}$ full, blue carts for recyclables are $\frac{1}{3}$ full and green carts for organics are $\frac{1}{4}$ full.

3.6 Annual Waste Composition Results (Non-Pilot and Pilot Program Areas)

3.6.1 Annual Curbside Diversion Rates

Annual curbside diversion rates reflect the quantity of waste that is diverted from landfill through the recycling program in the non-pilot areas and through recycling and composting programs in the pilot program areas. Figure 3.22 and Figure 3.23 show the percentage of waste sent to landfill and the diversion rates for Fort Saskatchewan's curbside waste management programs for the non-pilot and pilot program areas respectively based on waste sort results.

As illustrated in Figure 3.22, Fort Saskatchewan sends 76% of total waste set out to landfill and diverts **24%** of the waste through recycling in the **non-pilot area**. The non-

pilot area has a potential of diverting additional 9% through blue bag program, 5% through Transfer Station, and 40% through organics program if it is in place.

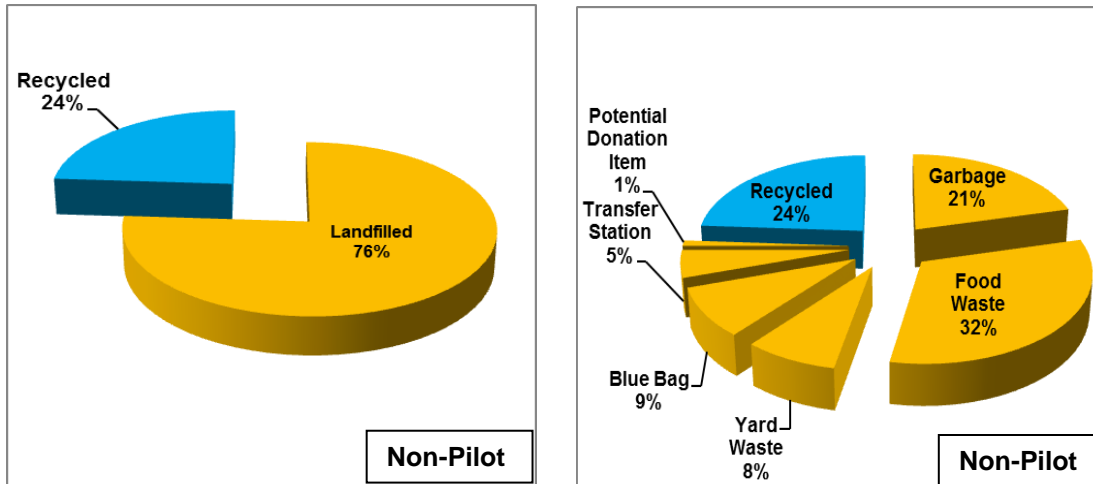


Figure 3.22 Percentage of waste sent to landfill and diversion rates for non-pilot areas

As illustrated in Figure 3.23 below, Fort Saskatchewan sends 27% of total waste set out to landfill and diverts **73%** of the waste through recycling (9%) and composting (64%) in the **pilot program area**.

The 2013 data shows an 18% diversion rate as compared to above result of diversion rate of 24% in 2014. These findings suggest an increase in the diversion rate for the curbside program between 2013 and 2014.

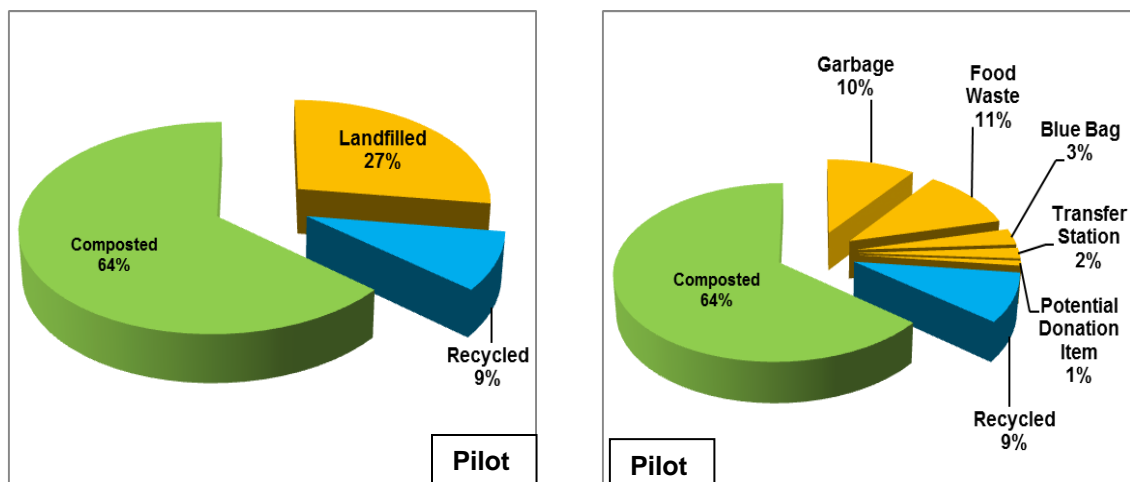


Figure 3.23 Percentage of waste sent to landfill and diversion rates for pilot program areas

The pilot program areas show a much higher diversion rate of 73%. If all the eligible items are captured, there is a potential of diverting additional 17% (11% through green cart organics program, 5% through blue cart and Transfer Station recycling programs and 1% through donation programs). The above result is based on weight and shows 64% yard waste. It is recommended to conduct another waste sort in the winter to evaluate seasonal fluctuations as there will not be yard waste in the winter season.

3.6.2 Estimated Annual Garbage Generation Rates

Table 3.9 provides an estimate of annual disposal of materials that end up in landfill based on garbage composition data.

Table 3.9 Estimated annual garbage sent to landfill by disposal material

Category	Subcategory	NON-PILOT			PILOT		
		% of Weight Stream	Estimated Garbage Disposed Annually (Tonnes)	Annual % of Weight Stream	% of Weight Stream	Estimated Garbage Disposed Annually (Tonnes)	Annual % of Weight Stream
Garbage	Garbage	23%	778	26%	34%	155	34%
Organic Waste	Food Waste	39%	1296	43%	42%	191	42%
	Household Waste	0%	1	0%	1%	4	1%
	Yard Waste	19%	319	11%	0%	0	0%
Recyclables	Mixed Paper	5%	160	5%	4%	16	4%
	Metal / Glass	1%	40	1%	2%	9	2%
	Plastics (#1-7)	3%	113	4%	3%	12	3%
	Beverage / Deposit Containers	1%	28	1%	3%	14	3%
	Cardboard (corrugated)	2%	54	2%	2%	7	2%
Transfer Station	Electronic Waste	2%	65	2%	2%	9	2%
	Household Hazardous Waste	2%	54	2%	1%	5	1%
	Trees	0%	0	0%	0%	0	0%
	C&D	3%	84	2%	1%	5	1%
	Household Items	0%	0	0%	0%	0	0%
	Scrap Metal	0%	0	0%	2%	11	2%
Potentials	Donations	2%	53	2%	3%	15	3%
All Categories	Total	100%	3,045	100%	100%	453	100%

Based on the waste sort, annual tonnes of garbage disposed are estimated to be 3,045 tonnes for the non-pilot areas and 453 tonnes for the pilot program areas. Based on the waste composition result, approximately 1,167 tonnes of organic waste will be diverted through the green cart program in the pilot program area which makes the total amount of garbage to be disposed approximately 4,665 tonnes if the pilot program has not been implemented. Pilot program started in April 2014. The actual amount of garbage disposed in 2013 was 4,803 tonnes from the non-pilot and pilot areas together. This indicates that the results of the waste composition are reflective of the actual behavior and accurately reflect the true waste composition. Figure 3.24 provides an estimate of the annual garbage that ends up in landfill in tonnes available to be captured by diversion programs.

Based on the waste composition results, the City is not capturing the available organic stream which comprises 53.6% of total garbage stream (1,616t) in the non-pilot areas.

Based on the waste composition results, if all recyclables are captured, 21% (651t) of the total garbage stream can be diverted through diversion programs (19% through the curbside blue bag and Transfer Station recycling programs and 2% through donation programs) in the non-pilot areas.

In the pilot program areas, based on the waste composition results, the City is not effectively capturing the full organic waste stream (43% of total garbage stream) and the greatest potential for increased efficiencies is focusing on increased participation and capture rates for kitchen waste (195t).

If all the recyclables and organics are captured in the pilot program areas, based on the waste composition results, 66% (298t) of the total garbage stream can be diverted through diversion programs (43% through the organics green cart program, 20% through blue cart curbside and Transfer Station recycling programs and 3% through donation programs).

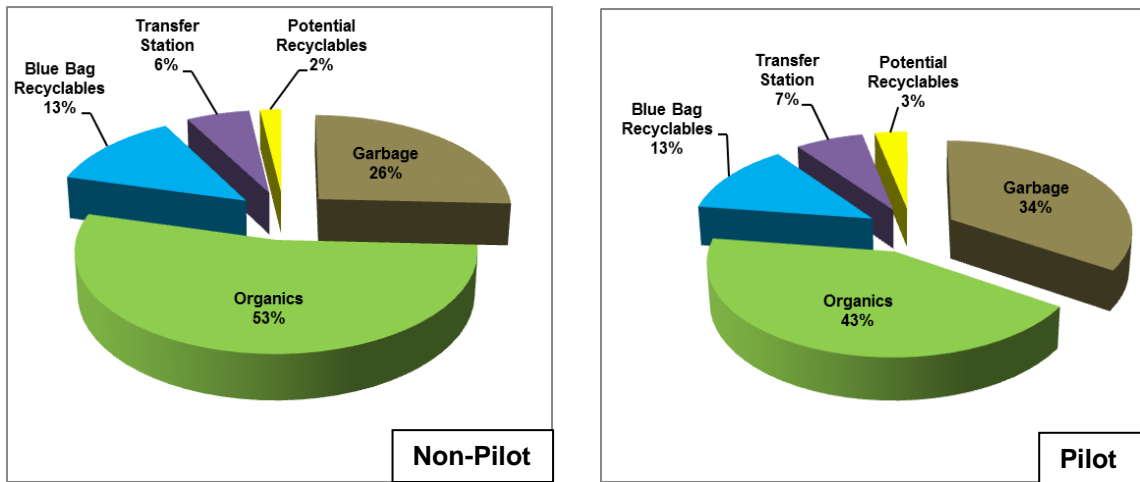


Figure 3.24 Percentage of garbage composition sent to landfill

Findings:

- Based on the waste sort in the non-pilot and pilot program areas, a total of approximately 4,665 tonnes of garbage will be disposed in the 2014. The actual amount of garbage disposed in 2013 was 4,803 tonnes. This indicates that the results of the waste composition are reflective of the actual behavior and accurately reflect the true waste composition.
- Based on the data analyzed, the Transfer Station could be better used (6% of the garbage sorted in the non-pilot area and 7% of the garbage sorted in the pilot program area could be taken to the Transfer Station).

Non-Pilot

- City is not capturing about 1,616t of organics (54%) of the total garbage disposed of in the non-pilot area.
- The blue bag program could capture additional 395t of recyclables (13%) through effective communication and education programs.

Pilot Program Area

- Results show that the green cart program is not capturing about 195t of kitchen waste (43%) of the total garbage disposed of.
- The blue cart program could capture additional 57t of recyclables (13%) through effective communication and education programs.

3.6.3 Estimated Annual Waste Volume

The following graph (Fig. 3.25) shows the estimated annual volume of waste generation based on the waste volume observation. In general, a total of 7,500 households (1,000 pilot households and 6,500 non-pilot households) generate approximately 77,380 m³ waste comprised of 52,482 m³ garbage, 22,619 m³ recyclables and 2,279 m³ organics per year. The volume of organics shown in the pilot program areas is for six month since based on the waste composition data, organic carts are used for yard waste. Note that the volume of garbage for the non-pilot areas may reduce by approximately 1/3rd since there is no yard waste for about six months of the year.

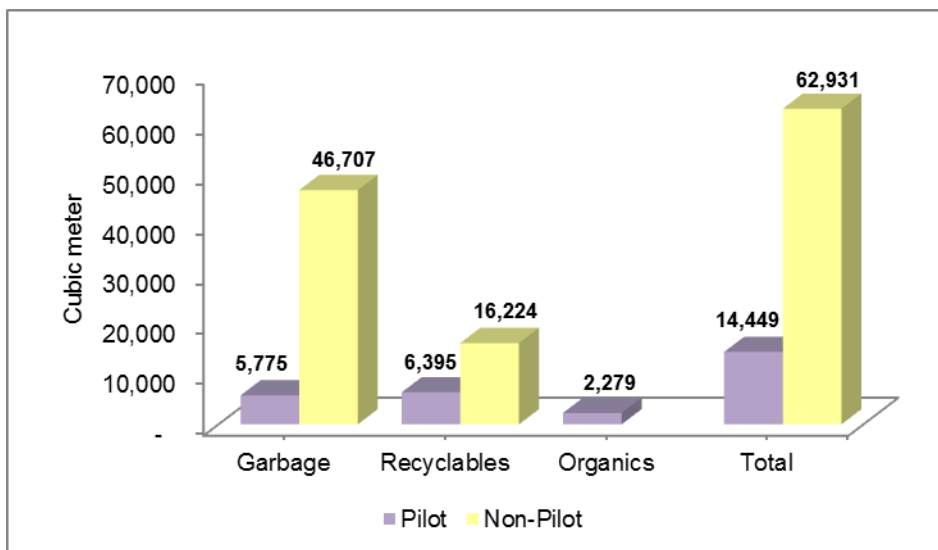


Figure 3.25 Estimated annual waste volume for pilot program and non-pilot areas

Findings:

- Based on the volume evaluation, the non-pilot area generates approximately 62,931m³ waste per year out of which (if all captured) 16,224m³ (26%) could be diverted through the blue bag program.
- Based on the volume evaluation, the pilot-program area generates 14,449m³ waste per year out of which (if all captured), 6,395m³ (44%) and 2,279m³ (16%) could be recycled and composted through the blue cart and green cart program respectively.

3.6.4 Annual Curbside Diversion Capture Rates

Based on waste sort data, capture rates for the current curbside diversion programs are provided in Table 3.10. Capture rate is equal to the total organics or recyclables collected through diversion programs (blue bag, blue cart and green cart programs) divided by the total organics or recyclables available in the total waste set out (garbage or black cart, blue bag or blue cart and green cart).

Table 3.10 Capture rates for curbside diversion programs

	Material	NON-PILOT			PILOT		
		Total Available in Waste Stream (Tonnes) (A)	Total Captured (Tonnes) (B)	Capture Rate (C)	Total Available in Waste Stream (Tonnes) (D)	Total Captured (Tonnes) (E)	Capture Rate (F)
Organic Waste	Food Waste	1304	0	0%	325	123	38%
	Household Waste	1	0	0%	8	3	45%
	Yard Waste	319	0	0%	521	521	100%
	Total organics	1,624	0	0%	854	647	85%
Recyclables	Mixed Paper	759	475	63%	86	68	79%
	Metal / Glass	87	38	44%	21	12	59%
	Plastics (#1-7)	211	78	37%	33	19	58%
	Beverage / Deposit Containers	40	9	23%	30	16	54%
	Cardboard (corrugated)	285	185	65%	57	50	87%
	Total recyclables	1382	785	57%	227	165	73%

Note: (A) = Annual total organics and recyclables available in the garbage and blue bag curbside programs in the non-pilot areas based on the waste sort results.

- (B) = Annual recyclables captured through the curbside blue bag program in the non-pilot areas
 (C) = (B)/(A) = (Capture rate = (total captured/total available))
 (D) = Annual total organics and recyclables available in the black cart (garbage), blue cart (recyclables) and green cart (organics) curbside programs in the pilot program areas based on the waste sort results.
 (E) = Annual total organics and recyclables captured through the curbside blue and green carts program.
 (F) = (E)/(D) = (Capture rate = (total captured/total available))

The blue bag program has a capture rate of 57% in the non-pilot area. Cardboard and mixed paper have the highest capture rates. On the other hand the blue cart program has 73% capture rate and the green cart program has 85% capture rate in the pilot program area. Yard waste, mixed paper and cardboard have the highest capture rates. Figure 3.26 shows the comparison of annual percentage of materials actually diverted through the curbside blue bag program and annual percentage of materials that could potentially be diverted if 100% of kitchen waste, yard waste and recyclables in the total waste streams (black bag/can and blue bag) are diverted in the non-pilot areas.

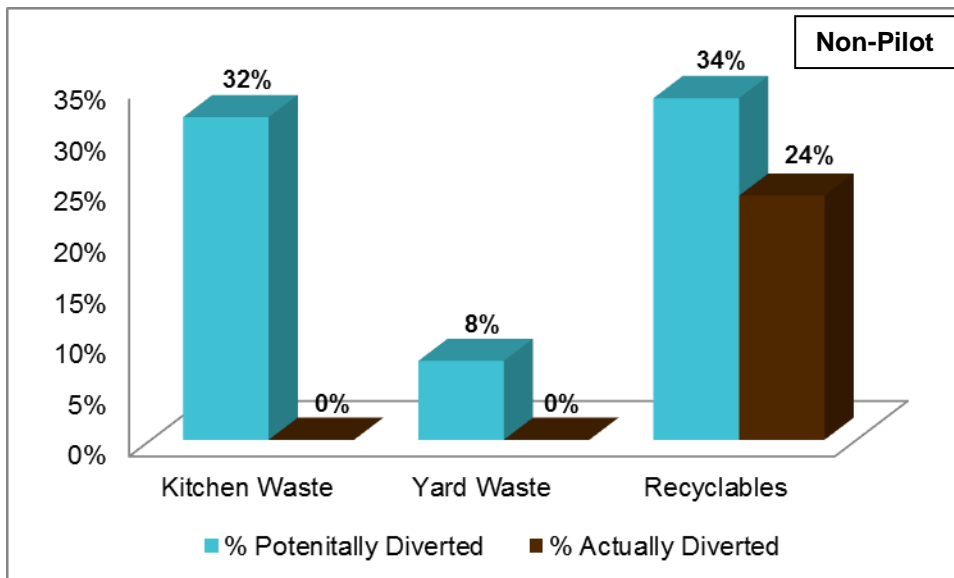


Figure 3.26 Actual and potential diversion rates in the non-pilot areas.

Figure 3.27 shows the comparison of annual percentage of materials actually diverted through the curbside blue and green cart program and annual percentage of materials that could potentially be diverted if 100% of kitchen waste, yard waste and recyclables in the total waste streams are diverted in the pilot program areas.

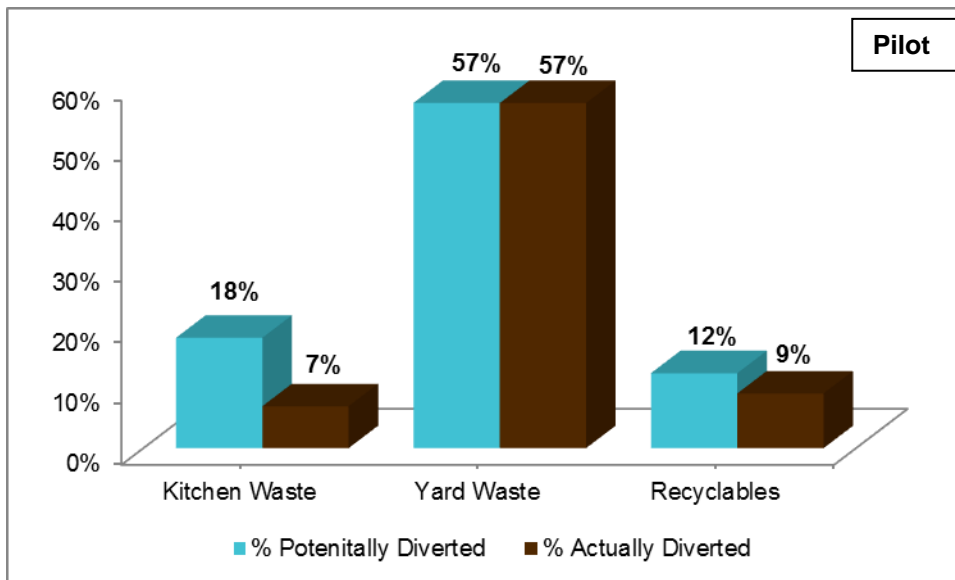


Figure 3.27 Actual and potential diversion rates in the pilot program areas.






Findings and Recommendations:

- **Organics program should be implemented in the non-pilot area as all the organics (40%) end up in a landfill.**
- **In the non-pilot area, the blue bag program has 57% capture rate whereas in the pilot program area the blue cart has 73% and the green cart has 85% capture rate.**
- **Communication and education programs should be implemented to increase recyclables diversion throughout the City and to capture kitchen waste in the pilot program area.**

3.7 Greenhouse Gas Savings

Table 3.11, on the following page, shows estimated annual greenhouse gas (GHG) savings that will potentially be achieved through Fort Saskatchewan's residential diversion program in the pilot program areas based on the waste sort result and the equivalencies of these savings.

Table 3.11. Greenhouse gas savings from diversion in the pilot program area (2014)

GHG Savings (eCO ₂)	Number of Items
<i>1,066t of materials diverted from landfill is equivalent to any one of the following</i>	
Annual CO₂ emissions from  Passenger Cars	323
CO₂ emissions from  Barrels of Oil Used	3,564
CO₂ emissions from  Tanker Truck's Use of Gasoline	20.3
Annual CO₂ emissions from  Energy Use of Homes	140
Carbon Sequestered from  Tree Seedlings (grown for 10 years)	39,291

Source: EPA GHG Equivalencies Calculator

4.0 SURVEY

The survey was designed in a questionnaire format to provide City of Fort Saskatchewan residents with information regarding their current waste management system and some waste reduction alternatives as well as to gather information on the pilot and non-pilot areas. Currently the City is running a pilot program (April 28, 2014 to November 28, 2015) on 1,000 households to test both the mechanized collection of waste carts and the separation of organics from other household waste. The survey will provide the City with feedback regarding the current pilot project and allows identification of common themes, obstacles and opportunities for improvement as well as feedback from the rest of the residents (non-pilot areas). This approach has the benefit of bringing everyone to a similar education level about their current system.

Questions were based on the consultants' experience regarding suitable waste management alternatives and the input provided by the City staff. Two types of surveys were prepared, one for residents in the pilot program areas (Pilot Areas) and one for the rest of the residents (General).

The Pilot Areas survey was mailed out to 1,000 residents who participated in the City of Fort Saskatchewan pilot program. The General survey was distributed through the newspaper. Both surveys were also put on Survey Monkey, survey software and questionnaire tool, and made available for the residents. The survey was made to appear as a pop-up when residents went to the City of Fort Saskatchewan home page. A link to the survey was also made available on the City's Facebook page as well as a link was posted at the radio station web page. The survey was advertised on-line, on the radio and in the paper from January 8th to January 25th, 2015.

Households in the **non-pilot areas** were encouraged to either complete a hard copy from a newspaper or to complete the survey online. Six hundred seventy one (671) online responses were collected of which twenty two (22) responses were disqualified because the households are in the pilot program (17) or have duplicate responses (5). A further eighty (80) hard copy responses were collected of which two (2) were disqualified because they are in the pilot program. A total of **727 responses** were analyzed. A sample of the survey form is in Appendix C.

Households in the **pilot program areas** were encouraged to either complete the hard copy sent to each household or to complete the survey online. Two hundred fifty four (254) online responses were collected of which 10 responses were disqualified because the households are not in the pilot program. A further one hundred thirty nine (139) hard

copy responses were collected. A total of **381 responses** were analyzed. A sample of the survey form is in Appendix D.

4.1 Response Rates

In order to test for non-response bias; the responses (representing their households) by population category were compared to the actual population percentages. For example, the percentages of responses from respondents between the ages of 25 to 49 were compared to the percentage of Fort Saskatchewan adult population between these same ages. As illustrated in Figure 4.1, **the response rates are more or less the same as the actual population.**

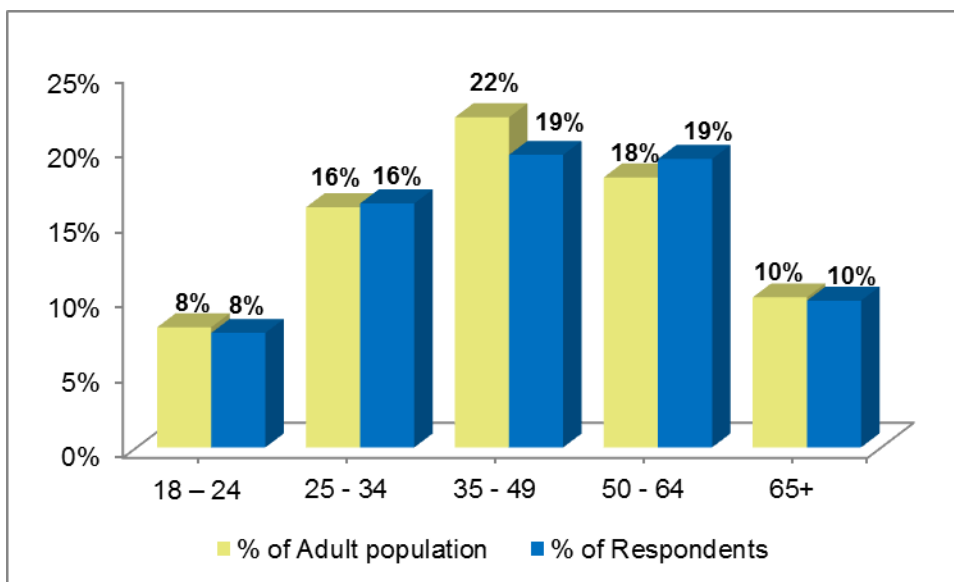


Figure 4.1 Comparison of response rates to population percentage

Table 4.1 Population percentage and response rate

Population	City of Fort Saskatchewan*	%	Survey Total***	%
Total Population	19,070		3,303	
<13 (≤14**)	3,680	19%	722	22%
13 – 17 (15 – 19**)	1,290	7%	190	6%
18 – 24 (20 – 24**)	1,465	8%	252	8%
25 - 34	3,015	16%	537	16%
35 - 49	4,180	22%	644	19%
50 - 64	3,460	18%	635	19%
65+	1,980	10%	323	10%

*2011 population data

**Actual census age range

***Respondents including their family

Based on a population of 21,795 and assuming random sampling, responses provide a confidence interval of 3.8 with a confidence level of 99%. For example, if 85% of the respondents answer yes to a particular question then the City can be 99% sure that the actual population would respond yes between 82% and 89% of the time.

Responses for each survey question are provided below.

4.2 Survey Results – Non-Pilot Areas (General)

Question 1: How many years have you lived in Fort Saskatchewan?

- ☐ Less than 1
- ☐ 1 to 5
- ☐ 6 to 10
- ☐ More than 10

The purpose of Question 1 is to determine if there are differences in opinion between long-term residents and recent settlers.

As illustrated in Figure 4.2, fifty two percent (52%) of the survey respondents have lived in Fort Saskatchewan for more than ten years, twenty five percent (24%) have lived there 1-5 years, eighteen percent (18%) have lived there 6-10 years and six percent (6%) have lived there less than five years.

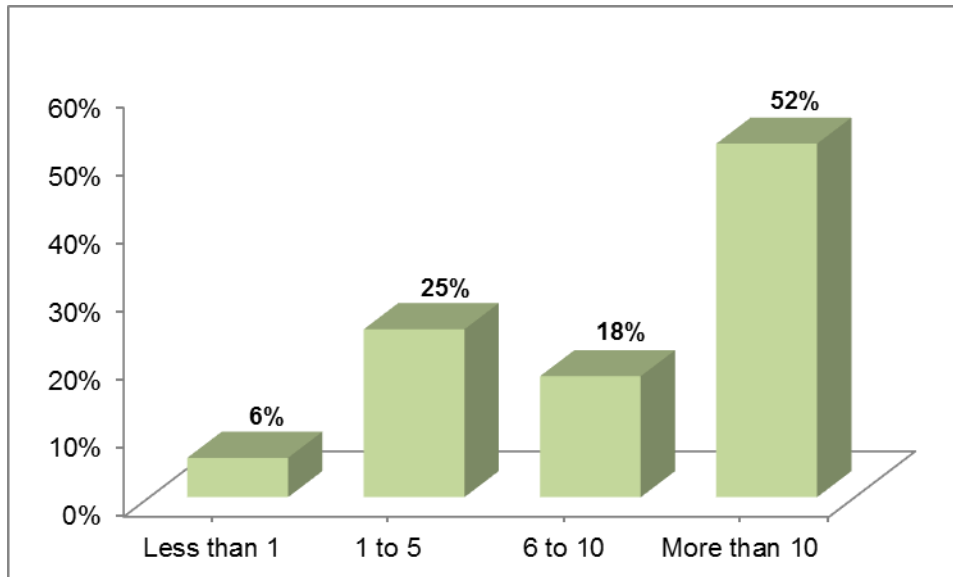


Figure 4.2 Number of years residents lived in Fort Saskatchewan

Question 2: What type of dwelling do you live in?

- ☐ Detached House
- ☐ Duplex
- ☐ Townhouse (e.g. 4-plex)
- ☐ Multi-Level Apartment/Condo

The purpose of Question 2 is to confirm that the respondent is from a single family residence as the program does not currently apply to those living in multi-family residences and to determine differences in opinion between occupants of various housing types.

Figure 4.3 shows that eighty percent (80%) of the survey respondents live in single family detached house, thirteen percent (13%) live in duplex, four percent (4%) live in townhouse whereas three percent (3%) of the survey respondents live in multi-family houses.

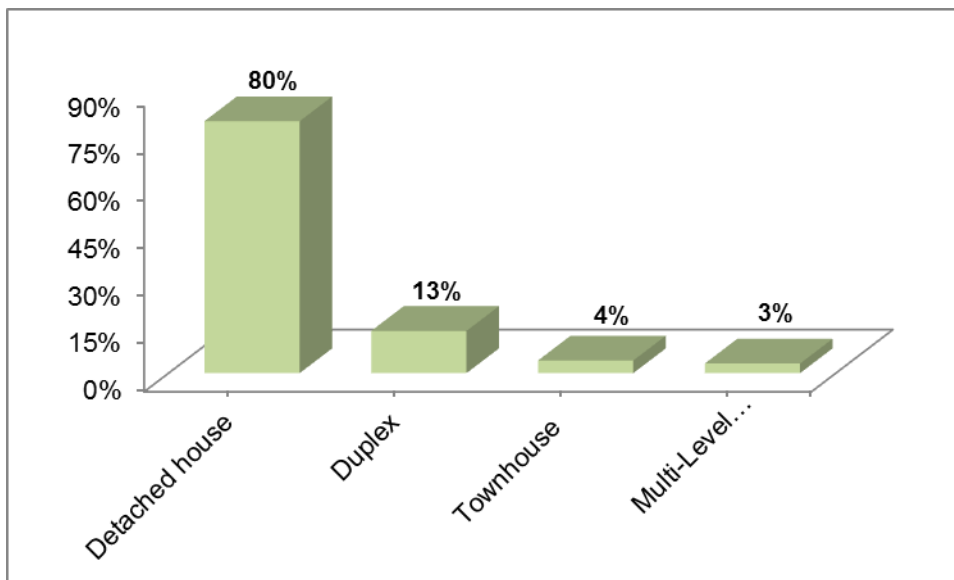


Figure 4.3 Type of dwelling

Question 3: Including yourself, how many people in each age group typically live in your household?

Age Group	Number of People
<input type="checkbox"/> Under 13	_____
<input type="checkbox"/> 13 – 17	_____
<input type="checkbox"/> 18 – 24	_____
<input type="checkbox"/> 25 – 34	_____
<input type="checkbox"/> 35 – 49	_____
<input type="checkbox"/> 50 – 64	_____
<input type="checkbox"/> 65 and Over	_____

The purpose of Question 3 is to see how many people and what age group are represented by one household.

According to Figure 4.4, twenty five percent (25%) of households that participated in the survey are comprised of children under the age 13, twelve percent (12%) are comprised between the age of 13 and 24, fifty four (54%) are comprised between the age of 25 and 64 and 9% are comprised of 65 years and above. Based on 2011 Census, fifty six percent (56%) of the City's population are within the age group of 25-64 and ten percent (10%) are 65 and above. **This shows that the response rates are overall representative of the population.**

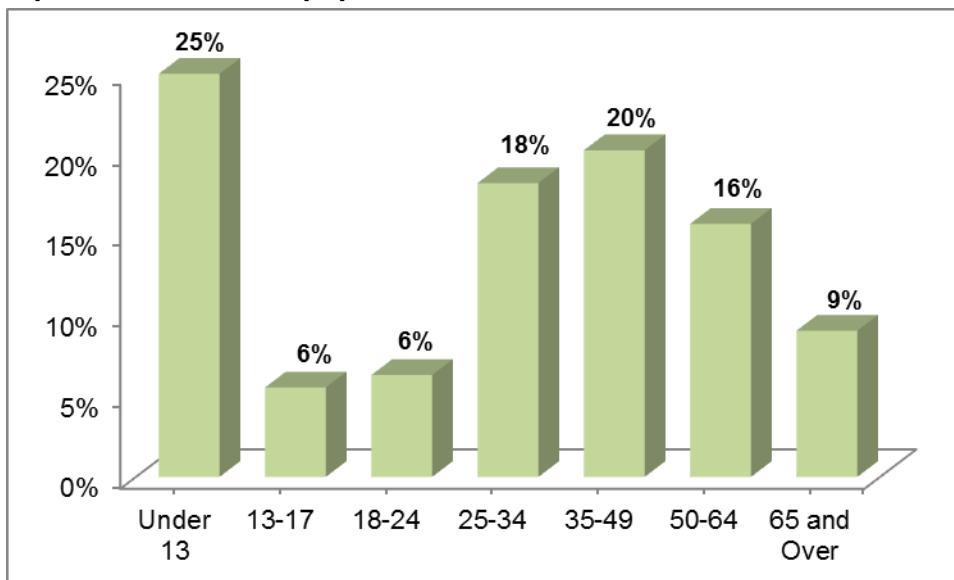


Figure 4.4 Age group responses

As shown in Figure 4.5, six percent (6%) of the households that participated in the survey are comprised of 1 person, thirty seven percent (37%) are comprised of 2 people, and forty five percent (45%) are comprised of 3 or 4 persons. Only 12% of the respondents have more than 4 people in a household.

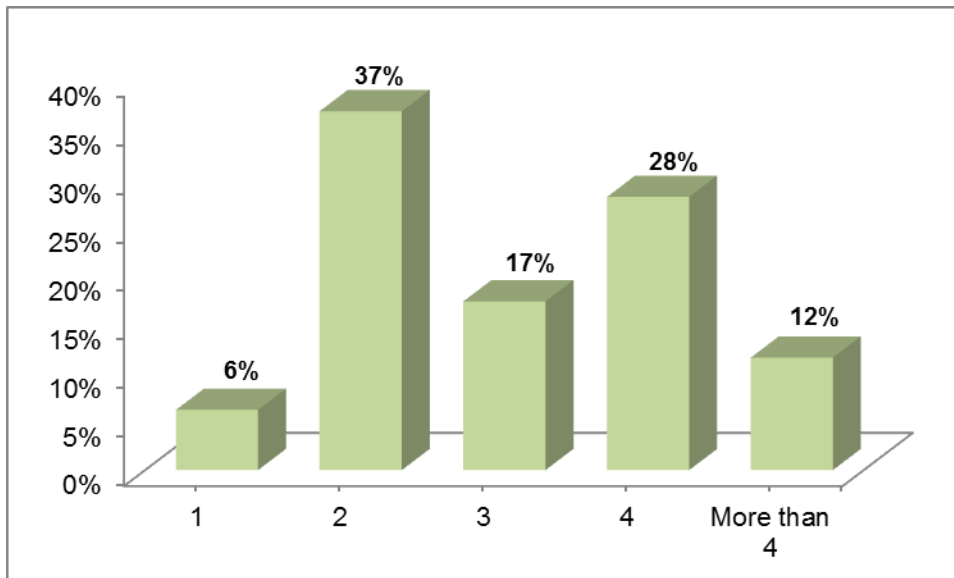


Figure 4.5 Number of people living in a survey respondent household

Question 4: When is your garbage day?

- | | |
|------------------------------------|-----------------------------------|
| <input type="checkbox"/> Monday | <input type="checkbox"/> Thursday |
| <input type="checkbox"/> Tuesday | <input type="checkbox"/> Friday |
| <input type="checkbox"/> Wednesday | <input type="checkbox"/> Unsure |

Question 5: Are you satisfied with your garbage day?

- ☐ Yes ☐ No

Comments: _____

The purpose of Question 4 and 5 is to see if resident's their garbage day works for them and to see if there are statistical differences between various areas of the City.

As shown in Figure 4.6 and 4.7, **majority of the respondents (98%) know their garbage day and are satisfied (97%) with the day.** Only two percent (2%) of the survey respondents are unsure of their garbage day and three percent (3%) are not satisfied with their garbage day.



Figure 4.6 Garbage day

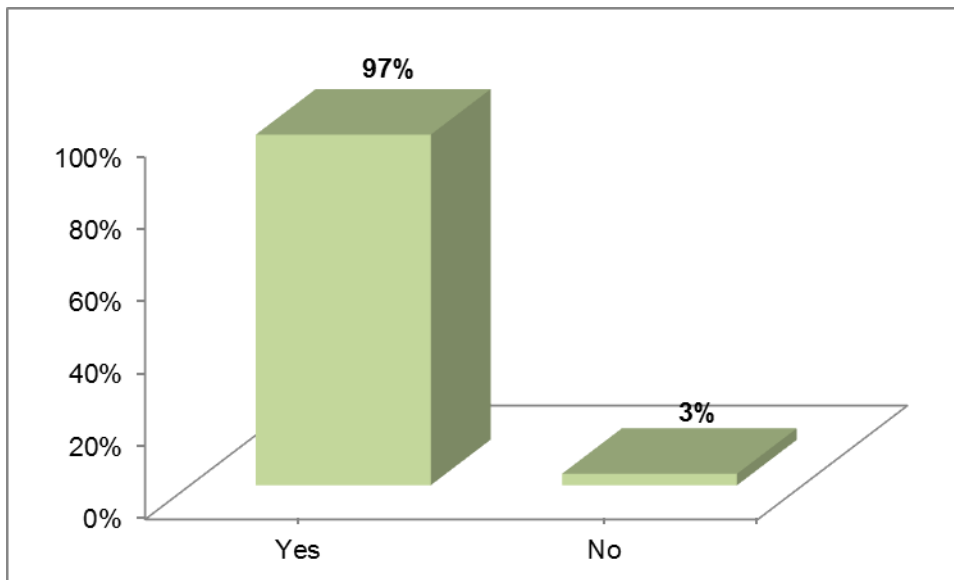


Figure 4.7 Satisfaction with garbage day

Comments by respondents are summarized:

- A few respondents prefer different day than their current collection day as garbage day is inconvenient because some people travel during long weekends and miss garbage pickup and it also signals that there is no one in the house.
- A few respondents would like to be part of the pilot program.
- A few mentioned that collection time should be consistent.
- Same garbage day all year is less confusing.
- Changing garbage day is easily confusing.
- Limit garbage to two cans per week and have blue box recycling

Question 6: Should garbage day be rotated?

- ☐ No
- ☐ Yes, once a year
- ☐ Yes, after each long weekend

The purpose of Question 6 is to see how often residents want their garbage day to be rotated or if they want it to stay the same.

According to Figure 4.8, ninety four percent (94%) of the survey respondents in the non-pilot areas want their garbage day to stay the same and two percent (2%) want once a year rotation and three percent (3%) want garbage day rotation after each long weekend.

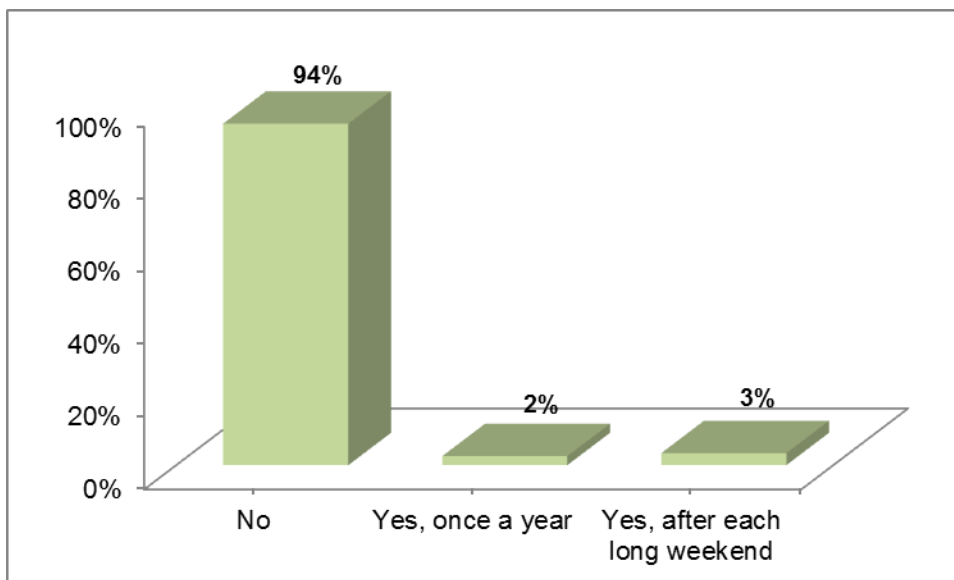


Figure 4.8 Rotation of garbage day

Question 7: Where is your garbage collected?

- ☐ Front Street
- ☐ Back Alley
- ☐ Dumpster
- ☐ Hauled to Transfer Station

The purpose of Question 7 is to see if there are differences in opinion based on where / how garbage is collected.

As illustrated in Figure 4.9, approximately ninety percent (90%) of the respondent's garbage is picked up from front street and eight percent (8%) from back alley.

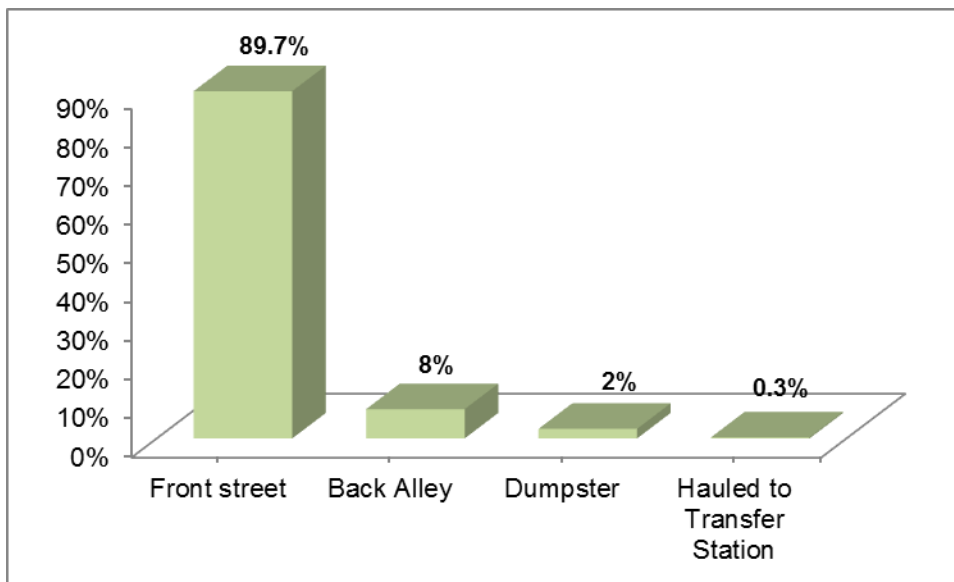


Figure 4.9 Place of garbage collection

Question 8: Which do you typically use?

- ☐ Cans
- ☐ Bags
- ☐ Both

The purpose of Question 8 is to see what residents are using to store their garbage.

As shown in Figure 4.10, forty six percent (46%) of the respondents use both cans and bags to store their garbage and forty one percent (41%) use only bags.

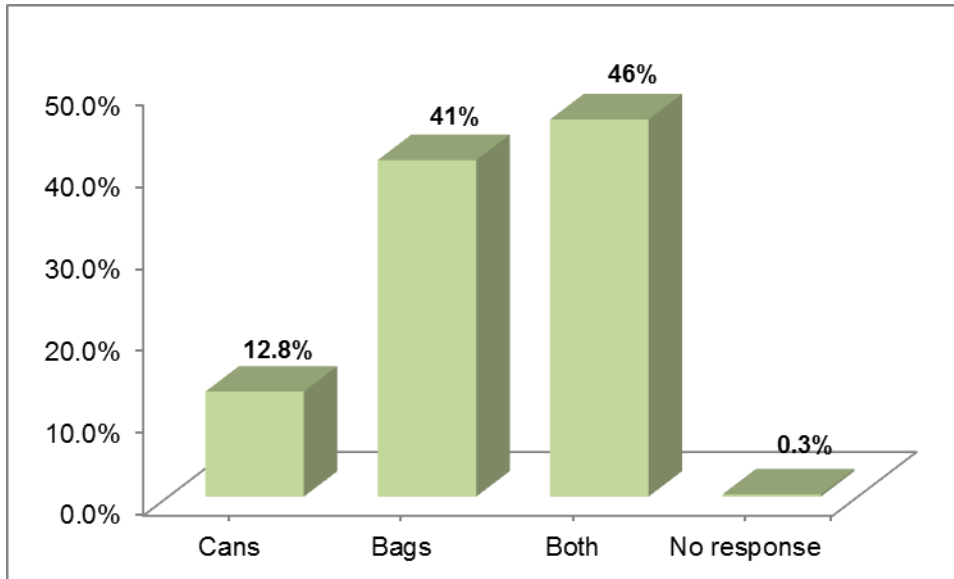


Figure 4.10 Garbage storage

Approximately sixty percent (60%) of the respondents use cans to store their waste (garbage and/or recyclables).

Question 9: Would you have any concerns about using carts?

- ☐ Unsure / No Opinion
- ☐ Concerns about storage or cart placement
- ☐ Concerns about ease of use
- ☐ Would prefer carts to cans or bags
- ☐ Other _____

The purpose of Question 9 is to see if residents would have any concerns using carts to store their waste should the pilot program goes City wide.

Based on the following figure (Fig. 4.11), fifty eight percent (58%) of the respondents have either concerns regarding cart storage or ease of cart use while twenty six percent

(26%) prefer to have carts. Fifteen percent (15%) of the survey respondents are either unsure or have no opinion.

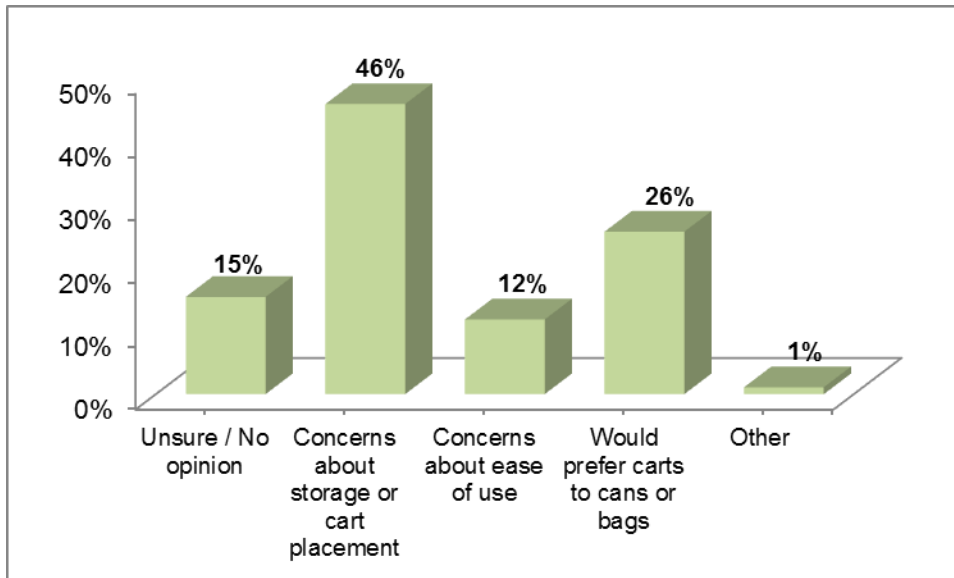


Figure 4.11 Concerns about using carts

More than half of the survey respondents (58%) seem concerned about cart storage or placement or ease of use.

Comments by residents:

- Some mentioned that they would love to have carts and some said they don't want carts at all.
- Most commented on issues such as storage, size, placement in winter.
- A few would like to have parking by-law during collection day and suggested that carts should be set out only on collection day.
- A few don't mind the cart system as long as collection is from the back alley.
- Big carts encourage more waste.
- Big carts encourage throwing out good reusable items.
- Carts should have reflectors as they are dangerous if left out at night and in school zones.
- Inconvenient for seniors.
- Some would like choice of cart sizes.
- Two carts are enough.
- Impossible to have carts in duplex area due to cars on street.
- Carts can potentially blow away on windy days.

- Carts on busy roads may potentially be hit by cars e.g. Main Street.

Question 10: How much waste do you typically generate per week? (1 bag = 75L standard bag; 1 can = 2 bags)

	Garbage	Recycle
None	<input type="checkbox"/>	<input type="checkbox"/>
Less than 1 bag	<input type="checkbox"/>	<input type="checkbox"/>
1 to 2 bags	<input type="checkbox"/>	<input type="checkbox"/>
3 to 4 bags	<input type="checkbox"/>	<input type="checkbox"/>
5 bags or more	<input type="checkbox"/>	<input type="checkbox"/>

The purpose of Question 10 is to assist the City in sizing carts and collection frequency should the pilot program goes City wide.

As illustrated in Figure 4.12, majority of the respondents, sixty three percent (63%) and sixty six percent (66%) indicated that they generate 1-2 bags of garbage and recyclables per week respectively. **The findings of the survey are consistent with observed measurements.**

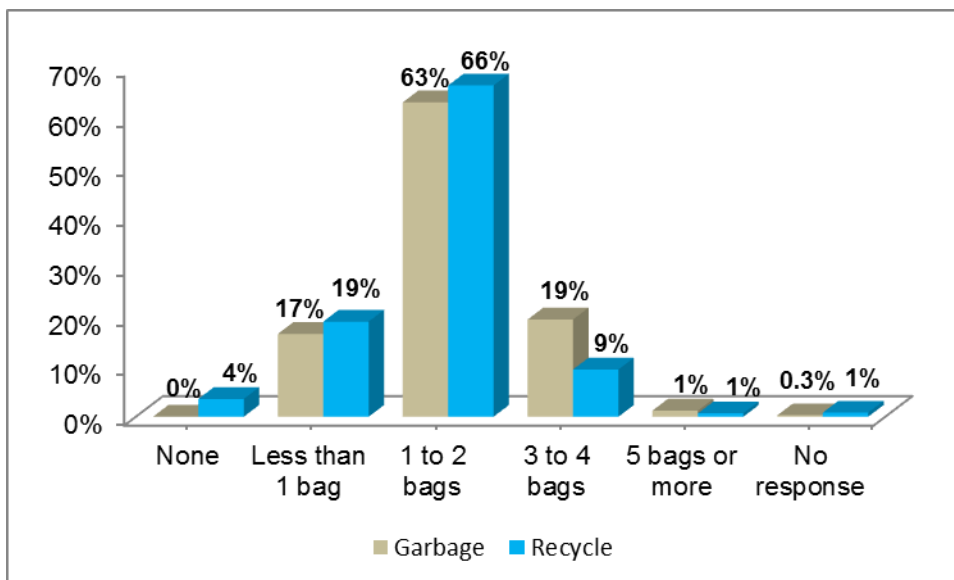


Figure 4.12 Amount of garbage and recyclables generated per week

Question 11: How do you typically manage Yard Waste?

- ☐ Compost at Home
- ☐ Haul to Transfer Station
- ☐ Dispose with Garbage
- ☐ N/A (e.g. no yard)
- ☐ Other _____

The purpose of Question 11 is to find out how residents manage their yard waste.

As shown in Figure 4.13, fifty two percent (52%) of the survey respondents haul their yard waste to the Transfer Station, sixteen percent (16%) compost at home and twenty eight percent (28%) dispose their yard waste with garbage. **This shows that majority of the respondents (68%) divert their yard waste from the landfill. These findings are consistent with the findings of the waste sort, which found lower than expected volumes of yard waste in the non-pilot areas compared to pilot areas.**

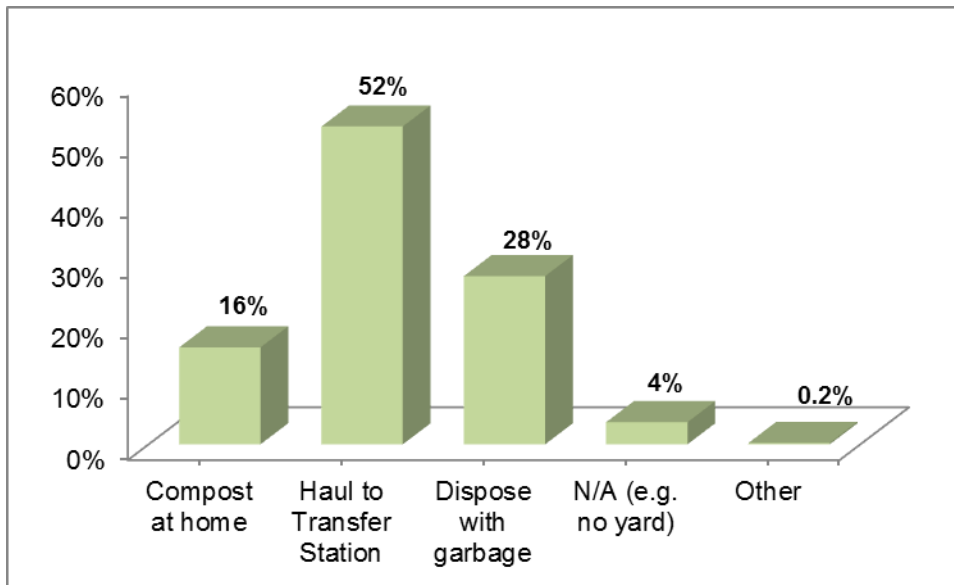


Figure 4.13 Yard waste management

Respondents that chose 'Other' mentioned the following:

- Would like curbside organics pickup
- Would like to start composting

Question 12: How do you typically manage Food Waste?

- ☐ Compost at Home
- ☐ Dispose with Garbage
- ☐ Other _____

The purpose of Question 12 is to see how residents in the non-pilot area manage their food waste.

The following figure (Figure 4.14) shows that eighty two percent (82%) of the survey respondents dispose their food waste with garbage whereas thirteen percent (13%) compost their food waste at home. Also four percent (4%) of the respondents that chose 'other' stated that they use garburator to dispose of food waste.

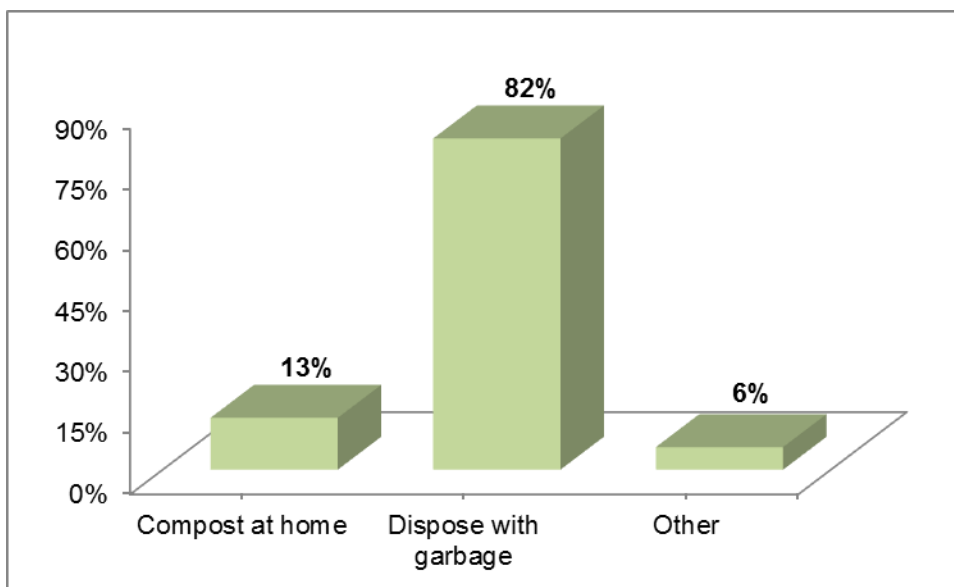


Figure 4.14 Food waste management

Survey respondents that chose 'Other' stated the following:

- Would prefer to have it separate and included in pickup
- Interested in learning more about composting. This is something the city could provide education on to reduce the number of carts needed and reduce garbage produced/collected.

Question 13: In general, how often should the City collect waste?

	Weekly	Every 2 weeks	Other
Garbage	<input type="checkbox"/>	<input type="checkbox"/>	_____
Recycling	<input type="checkbox"/>	<input type="checkbox"/>	_____

The purpose of Question 13 is to see if residents would like the current weekly garbage and recyclables collection to stay the same or if every two weeks collection is tolerable. This will assist the City to determine how often waste should be collected.

As illustrated in Figure 4.15, ninety three percent (93%) and sixty nine percent (69%) of the survey respondents want weekly garbage and recyclables collection respectively however six percent (6%) and twenty four percent (24%) want every two weeks garbage and recyclables collection respectively.

Some of the respondents indicated that garbage could be collected every two weeks in the winter and weekly in the summer.

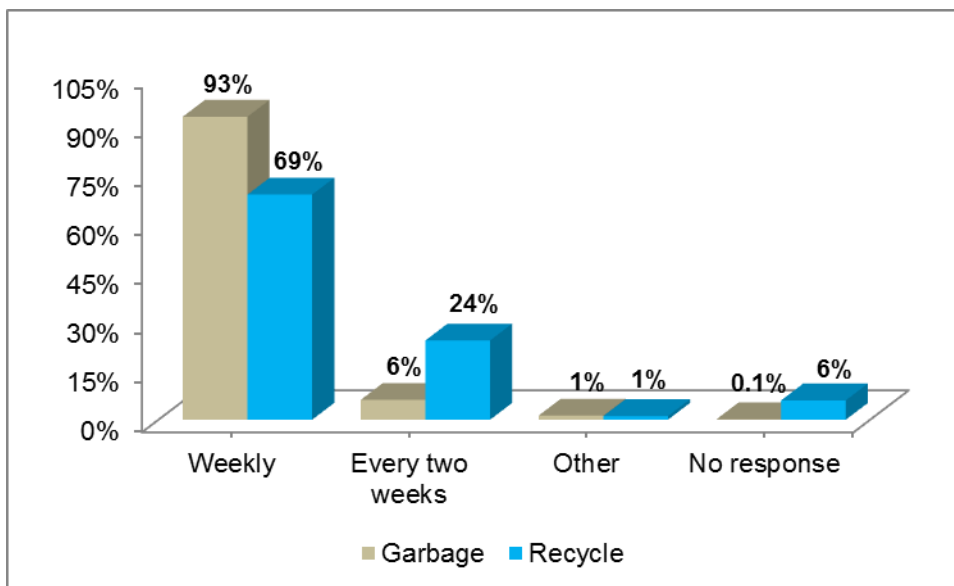


Figure 4.15 Frequency of garbage and recyclables collection

Comments by survey respondents:

- Garbage and recyclables can be collected on different (opposite) weeks
- If organics collection start, organics should be collected every week however garbage and recyclables can be collected every two weeks
- Recyclables can be collected once a month

It is not clear if support for weekly collection is based on desired service level, regardless of cost, or due to expectation/resistance to change. Further survey results suggest system costs outweigh convenience in terms of importance to residents.

Weekly garbage collection in non-pilot area is currently a necessity as yard and food waste are disposed of with garbage and lead to a higher quantities of waste especially in the summer. Implementation of organics collection will reduce the amount of waste disposed of as garbage and may increase support of bi-weekly collection.

Question 14: Would you use a service to collect yard and food waste separate from garbage?

☐ Yes

☐ No

☐ Unsure / No Opinion

The purpose of Question 14 is to see how many people would like a curbside organics collection service.

Forty three percent (43%) of the survey respondents would use yard and food waste collection service, thirty nine percent (39%) don't want this service while eighteen percent (18%) are either unsure or have no opinion (Figure 4.16).

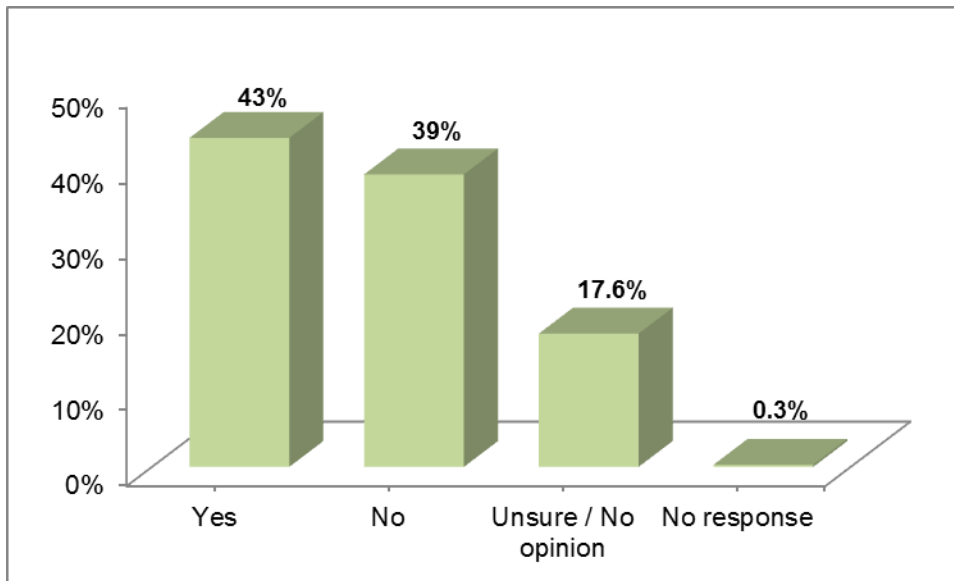


Figure 4.16 Curbside yard and food waste collection service

Question 15: Would you have concerns about separating organics? (Check all that apply)

- ☐ Unsure / No Opinion
- ☐ Concerns about odours or pests
- ☐ Concerns about effort to separate
- ☐ No concerns
- ☐ Other _____

The purpose of Question 15 is to find out what kind of concerns residents would have in separating organics from garbage.

As illustrated in Figure 4.17, fifty seven percent (57%) of the survey respondents indicated that they either would have concerns about odours or pests or concern about effort to separate. On the other hand, twenty seven percent (27%) stated that they have no concerns and nine percent (9%) are either unsure or have no opinion. The rest of the respondents (7%) indicated other concerns summarized below.

- Concern regarding storage space, the size of the containers, how precise one should be when separating organics, frequency of pickup, have no time to separate, it will add cost, containers used in the pilot area are unsightly, don't generate enough organics to separate, mold build up in the bins, compost bins

- freeze in winter and hence difficult to empty, need well sealed containers so that odour would not be an issue.
- Need more education regarding the use of diverting organics from landfill and how it should be done.
 - Organics are good for rejuvenating landfills.

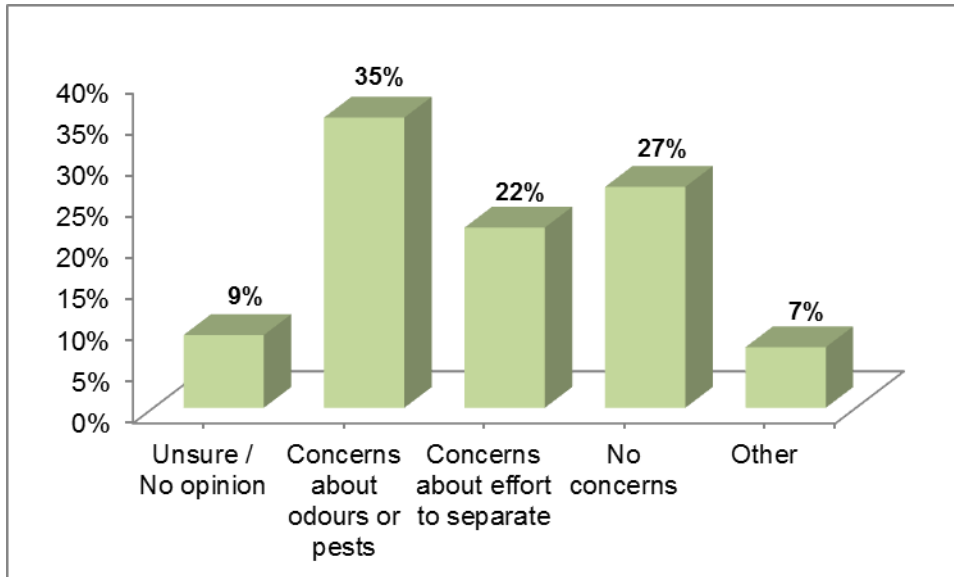


Figure 4.17 Concerns about separating organics

Many of the concerns can be addressed through education and communication efforts.

The purpose of Question 16 and 17 is to measure the public support to reduce waste sent to landfill using different methods.

Question 16: Would you support.....

	Yes	No
Garbage Limits	<input type="checkbox"/>	<input type="checkbox"/>
Fees based on amount of garbage	<input type="checkbox"/>	<input type="checkbox"/>
User fees for optional services	<input type="checkbox"/>	<input type="checkbox"/>

According to Figure 4.18, forty one percent (41%) of the survey respondents support garbage limit while fifty six percent (56%) don't. Thirty three percent (33%) of the respondents support fees based on amount of garbage while sixty three percent (63%) don't. Forty two percent (42%) support user fees for optional services while fifty percent (50%) don't.

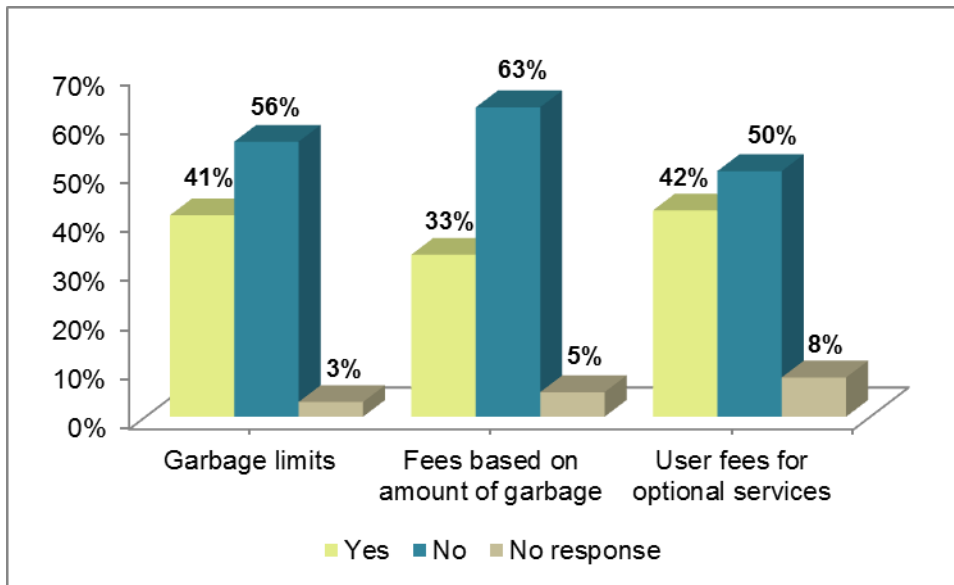


Figure 4.18 Support towards garbage reduction

Question 17: Should the City put more effort into reducing waste sent to the landfill?

☐ Yes ☐ No ☐ Unsure

As shown in Figure 4.19, fifty six percent (56%) of the survey respondents support that the City should put more effort into reducing waste sent to landfill, whereas fifteen percent (15%) don't, while twenty eight percent (28%) are unsure.

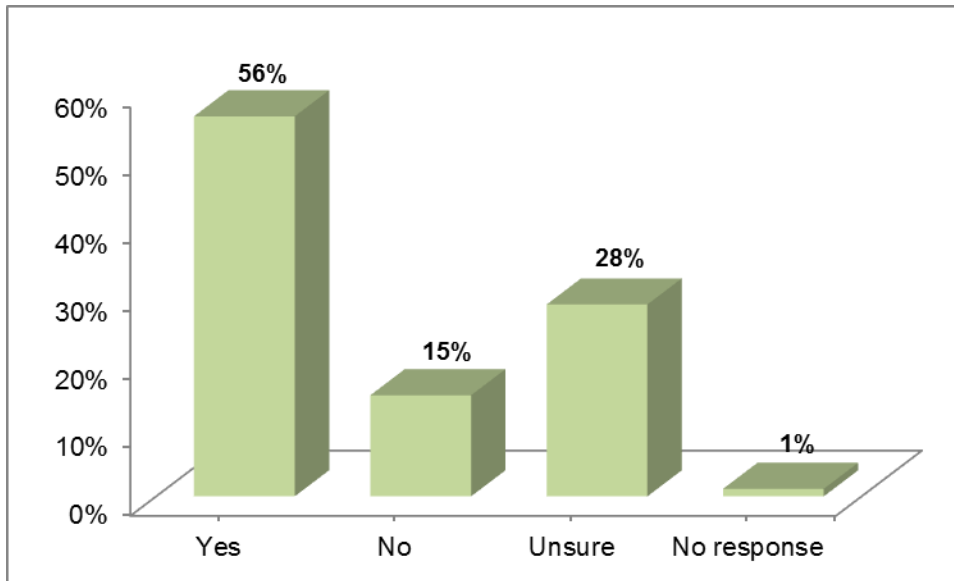


Figure 4.19 Effort to reduce waste sent to landfill

Question 18: Which factors are more important to you? (Rank)

- ___ Cost
- ___ Convenience
- ___ Waste Reduction

The purpose of Question 18 is to see what more important is to residents regarding waste management.

As shown in Figure 4.20, fifty one percent (51%) of the survey respondents ranked cost as the most important factor, forty three percent (43%) ranked convenience as the second important factor and forty nine percent (49%) ranked waste reduction as the third important factor regarding waste management.

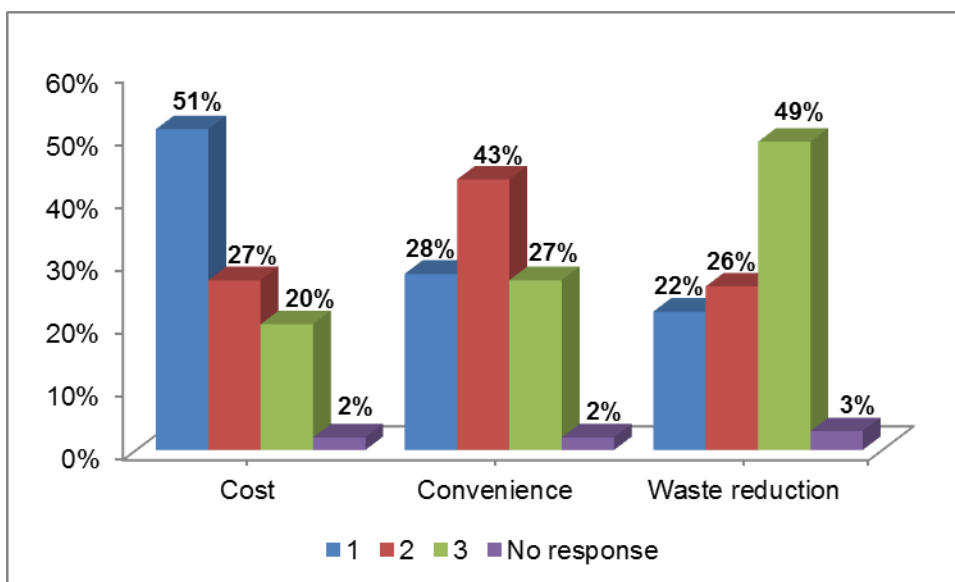


Figure 4.20 Cost, convenience and waste reduction importance ranking

Question 19: How often do you use services at the Transfer Station? (aka “recycle yard”, “the dump”, etc.)

	Frequently	Occasionally	Never
General Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yard Waste / Compost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Branches / Wood Chips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product Exchange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solid Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Paint/Oil/Electronics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The purpose of Question 19 is to assess the frequency of the Transfer Station usage as well as to inform the public of the current services provided at the Transfer Station and to identify services that are highly used and/or underutilized.

As illustrated in Figure 4.21, the most frequently used service at the Transfer Station is yard waste service (28%) followed by general recycling (13%) and branches/wood chips

(13%). The most occasionally used service is paint/oil/electronics service (76%) then general recycling (57%), branches/wood chips (50%), yard waste (47%) and solid waste (47%) and product exchange (38%).

In general, frequently or occasionally, eighty two percent (82%) of the survey respondents use paint/oil/electronics services, seventy five percent (75%) use yard waste service, seventy percent (70%) use general recycling service, sixty three percent (63%) use branches/wood chips service, fifty percent (50%) use solid waste service and forty two percent (42%) use product exchange service.

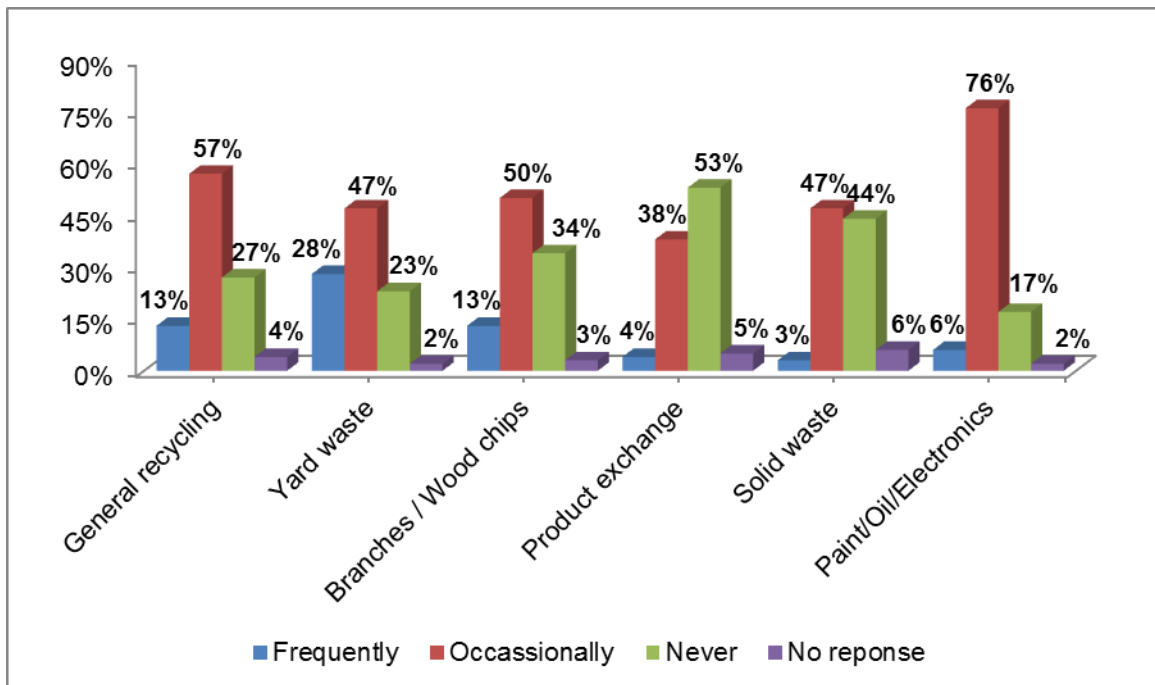


Figure 4.21 Fort Saskatchewan Transfer Station usages

In general respondents use the different services offered at the Transfer Station and this should be encouraged.

Question 20: When would you prefer the Transfer Station be open?

☐ 9am – 5pm

☐ 7am – 3pm

☐ 7am – 8pm

☐ 12pm – 8pm

The purpose of Question 20 is to assess the most convenient Transfer Station hours of operation.

Figure 4.22 shows that thirty eight percent (38%) of the respondents prefer the Transfer Station to open from 12pm-8pm; thirty one percent (31%) prefer 9am-5pm and twenty nine percent (29%) prefer 7am-8pm. This shows that **majority of the respondents (67%) want late operation hours (i.e. till 8pm).**

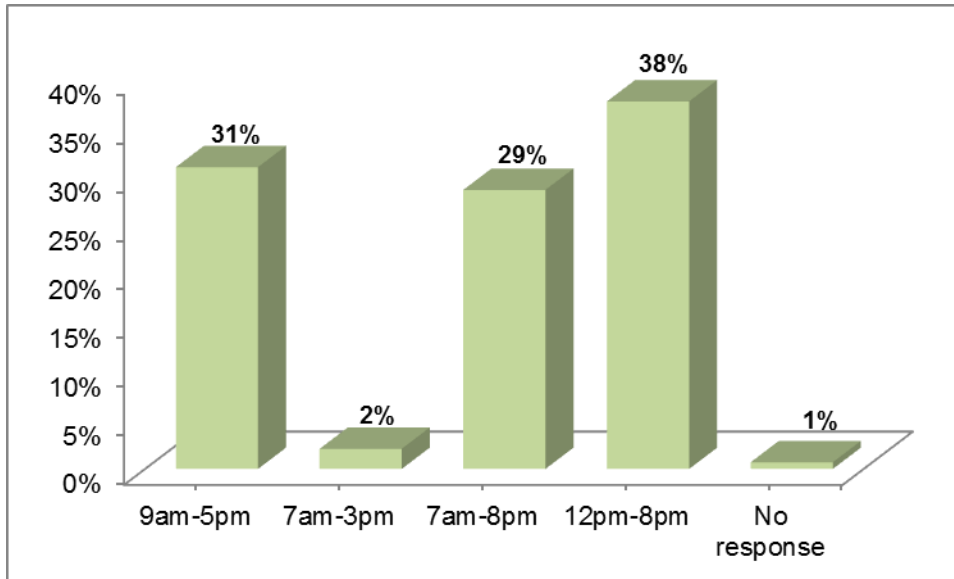


Figure 4.22 Preferred Transfer Station operation hours

Question 21: Do Large Item Collection and Toxic-Round-Up events meet your needs (e.g. time of year, frequency)?

☐ Yes ☐ No

Comments: _____

The purpose of Question 21 is to assist the City decide when and how often to hold Large Item Collection and Toxic-Round-Up events.

The following figure (Figure 4.23) illustrates that eighty one percent (81%) of the respondents are satisfied with Large Item Collection and Toxic-Round-Up events whereas nineteen percent (19%) are not. Out of the 19%, fourteen percent (14%) would

like to have the events twice a year or more often, four percent (4%) have never used these services and one percent (1%) suggested that they need to be communicated well as they forget or don't know when the events happen.

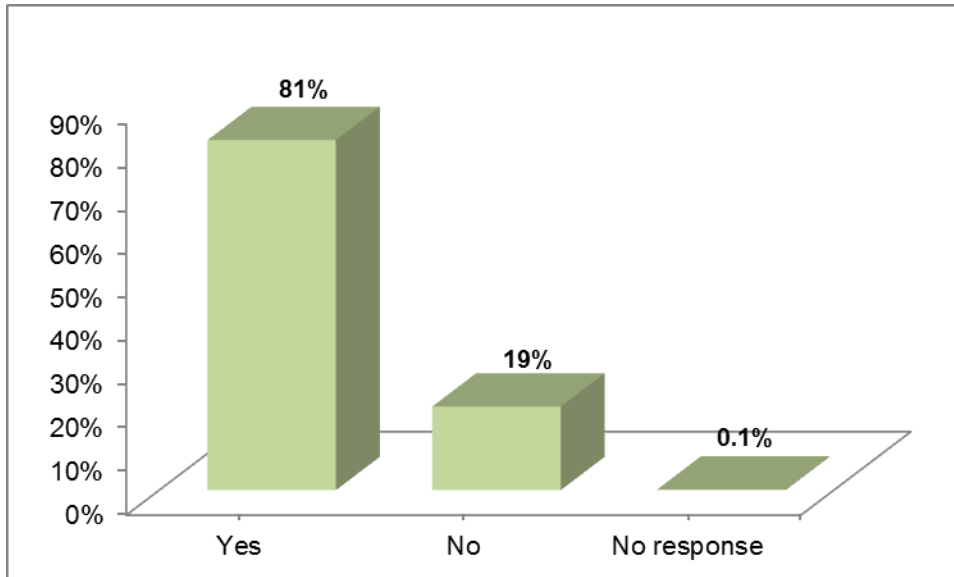


Figure 4.23 Large Item collection and Toxic-Round-Up

Comments by survey respondents are summarized below:

- Create by-law not to put large or toxic items on the curb except on Large Item Collection day.
- Prefer if event stays open until 8pm.
- Hold both events twice a year, one in spring and one in fall.
- Hold Toxic-Round-Up before winter as lots of painting occurs in summer time.
- Choose a different day for Toxic-Round-Up event as it falls on Family Fest day.
- Consider paper shredding service once or twice a year.
- Allow chemical drop-off at the Transfer Station throughout the year.
- Christmas tree pick up is too early, consider Ukrainian Christmas.
- Consider curbside toxic chemical pickup in a properly labeled box which would reduce the amount of chemicals that end up in landfill.

Question 22: How should we communicate about waste programs? (Rank your Top 3)

- ___ In-Person
- ___ Phone
- ___ Mail
- ___ Brochures with Utility Bill
- ___ E-mail or Mobile Application
- ___ City Website
- ___ Radio (Specify channel) _____
- ___ Newspaper (Specify) _____
- ___ Social Media (Specify) _____

The purpose of Question 22 is to ask residents to indicate the best communication methods since public communications and education is integral to the success of any implemented waste management strategy.

Fifty nine percent (59%), forty six percent (46%) and forty five percent (45%) of the survey respondents ranked brochures with utility bills, mail and e-mail or mobile application respectively as the first best communication method. Social media (37%), newspaper (36%) and radio (34%) were ranked as the second best communication methods and phone (51%), in person (48%) and City website (47%) were ranked as the third best communication methods. Responses are graphically presented in Figure 4.24.

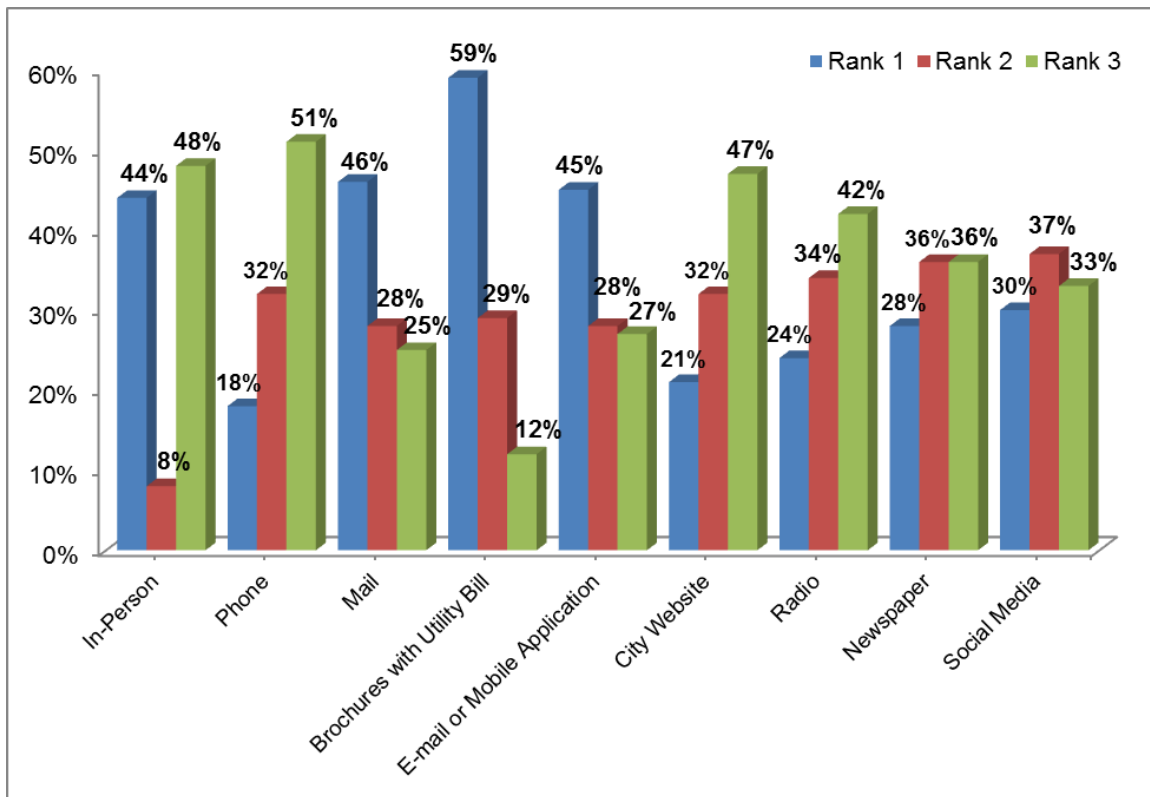


Figure 4.24 Best communication methods

Question 23: Other Comments or Suggestions

As illustrated in Figure 4.25, forty six percent (46%) of the survey respondents expressed their support for organics collection program (cart system), thirty eight percent (38%) indicated that they want the current system and sixteen percent (16%) wrote suggestions summarized below. Out of the 46% that support organics collection program, fifty five percent (55%) fully support organics collection (cart system), forty one percent (41%) support with concerns (summarized below) and four percent (4%) support organics collection but in green bags or compostable bags added to the current black bag (garbage) and blue bag (recyclables) curbside collection or banning yard waste curbside collection and residents take it to the Transfer Station.

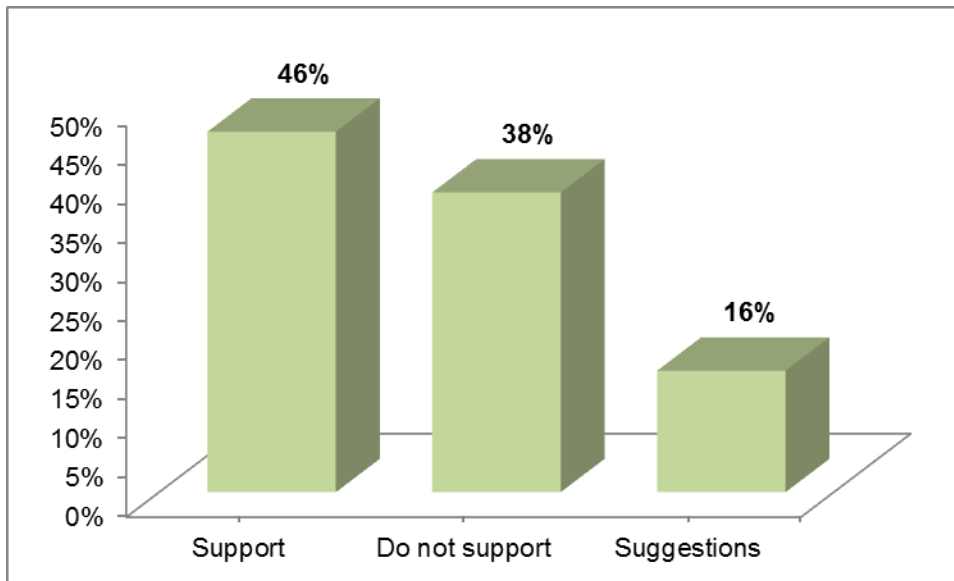


Figure 4.25 Support to start organics collection program

In general, there is support for an organic program.

Support with concerns:

- The carts in the pilot program are too big.
- Need smaller bins.
- Residents should be given option of bin sizes according to family size.
- Keep recycling (blue) bin the same size but make the garbage (black) and organics (green) bins smaller and allow extra green bags for yard waste.
- Pick garbage up from back alley if there is one.
- Support the carts system if not costly or if there is no additional cost.
- Have consistent collection time.
- Ban parking on the house side of the street on garbage day.
- Use standard can that can be hooked and raised by the trucks.
- Storage space will be an issue.
- Parking and snow windrows will be an issue on narrow streets and densely populated areas.
- Ensure snow removal happens to be able to put out the carts.
- Implement and enforce snow routes and parking bans for proper snow removal, and give the by-laws officers the right to tow offending vehicles.
- People should be billed according the amount of waste they generate (size of cart).

- Carts are not friendly for curb appeal.
- Seniors cannot handle those carts.
- Smaller bin for recyclables.
- Difficult for school bus to navigate around carts and put children at risk because vehicles or buses cannot get into the curb or sidewalk.
- Smaller bins if garbage is picked up weekly.
- Carts system should be optional not enforced.

Reasons given for the current system to stay the same:

- Carts could cause accidents with narrowing the road ways.
- The current system is not broken, don't fix it.
- Carts don't fit enough garbage.
- The carts are too big and an eyesore.
- Take up too much space.
- Start 'tag-a-bag' system instead.
- Don't want to pay more.
- Carts are dangerous in schools zone.
- Some (e.g. seniors) do not produce enough garbage.
- Using colored bags are much better.
- Don't want to pull carts from back to front on collection day.
- Carts will cause parking issues especially in densely populated areas and small streets.
- Carts interfere with snow removal and street cleaning.
- The City is already doing a great job.
- Seniors cannot handle them.
- Cart system has higher cost.
- Small streets are difficult to contend with snow windrows in winter.
- Don't want garbage limit.
- Adding an extra (green) bag would be easy and affordable and once people have the hang of that then change to carts.
- Show residents the cost saving first.
- Organic waste disintegrates naturally.
- Don't want tax increase.
- If cost is a problem, collection could be every two weeks during daylight savings.
- Use the money instead on other things residents desperately need e.g. down town Fort Saskatchewan, by-law enforcement.
- Would rather take all waste to the Transfer Station.

Suggestions and message to the City:

- Have a good reusable program for household items.
- Encourage reduce, recycle, reuse! Key: 1. small cans, prevents injuries. 2. Self-composting 3. Lower costs 4. Recycle facility for large items and electronics for reuse.
- You have to coach residents how to recycle at home and the transfer station.
- The sanitation officers should have stat holidays off like everyone else.
- Having just moved to Fort Saskatchewan from St. Albert, perhaps their waste management system should be examined as it does run smoothly, although expensive.
- Please allow for recycle of styrofoam packaging. Publish guidelines on how and what to recycle and you may get more buy in. Also please create an area at the recycle station for mixed blue bags recycle. It is confusing knowing which item goes in which bin. Thanks for allowing us to have a say with this survey.
- City should look at maybe having a big composting center on the outside limits. Composting where a person can fill a 1/2 tonne of fertilizer for gardens in the spring time.
- Open transfer station 7 days a week since many taxpayers work rotating shifts. Expand Product Exchange area. If we have usable items and the gates are closed, we are forced to drop them off in the white metal area.
- More targeted twitter and facebook updates. Weekly waste reduction hints could replace when there is news.
- Post "No Dumping" signs along the green belts along the river banks to stop residents using the river bank to dump yard waste and tree/shrub branches.
- Have a set of carts for basement tenants as well.
- Residents who do not recycle (blue bag) they should pay higher fee.
- As tax payers we should not be charged for disposal of small amounts of solid waste (e.g. concrete) at the transfer station.
- Could consider a bottle collection in support of A SAFE Place or Families First Society (similar program in place in Edmonton, for the Winnifred Stewart House)
- More surveys.
- Better advertise the product exchange shack as many people don't know about it.
- There is not enough room on the street to accommodate the bins (townhouses). Maybe use something smaller and more portable to be emptied out at compact pickup sites.
- Would really like the transfer station to be open always.
- Promotion of compost supplies would be effective for residents to start composting.

- Send a representative down to Okotoks, AB to see the recycling centre they have built, it is one of the best and would love to see something similar or better be constructed here. Thank you and keep up the good work!
- The recent change to 7 days hours for transfer station seems unnecessary. Open 5 days a week, stay open on Saturday, start accepting plastic bags for recycling.
- If necessary we call the number listed 780 992 6248 and are very pleased with the information they give.
- Appreciate the opportunity to participate and be consulted re: survey. Will survey results be published?
- We live in Westland Park townhouses. We used to bring our garbage to 97 Ave but now we have to haul it over 100 yards to 98 Ave. quite inconvenient now.
- I was questioned for bringing in too much used antifreeze for recycling. It was just my family vehicles so I wonder what to do with it if I could not take it there? I think this could lead to people throwing it down the sewer system. Could the city get another antifreeze container to take in the amounts Fort Saskatchewan families may need to recycle it .Or tell us how much we can take there or what to do with it if not. Thanks.
- I would like for someone from City to get in touch with me. Maybe they don't know what a joke our garbage pickup is like on this street, Wisteria Lane. The amount I pay in City taxes and utility bills here are outrageous to have service like this. Thank you, Dean George, deanpgeorge@hotmail.com, 780-691-6406.
- Some do not use transfer station due to disposal charges. Shouldn't have to pay for services that should be included in regular garbage pickup. E.g. residential household waste or recycling especially due to household clean up or missing a garbage day or unforeseen additional waste. Transfer station is inconvenient due to hours of operation.
- Make the city utility bill available on epost, not everybody likes having money directly withdrawn from their bank account and this will also eliminate the need to mail out the paper bill.
- This is unrelated but who thought "gotta love it" was a good town slogan? It's basically a rip off of the McDonalds slogan. It's embarrassing.
- Thank you for asking for our input!
- Use the electronic sign on the highway by Dow Centre to communicate with residents.
- The city does an excellent job of reducing waste sent to landfill by having a great transfer station that is easy to access.

All comments and suggestions are listed in Appendix E.

4.4 Survey Results – Pilot Program Areas

Question 1: How many years have you lived in Fort Saskatchewan?

- ☐ Less than 1
- ☐ 1 to 5
- ☐ 6 to 10
- ☐ More than 10

The purpose of Question 1 is to see what percentage of the population has lived in Fort Saskatchewan for a long time versus relatively new settlers and to determine if there are differences in opinion between long-term residents and recent settlers.

As shown in Figure 4.26, sixty nine percent (69%) of the respondents indicated that they have lived more than ten years in Fort Saskatchewan whereas 14% have lived 1 to 5 years, 13% have lived 6 to 10 years and 3% have lived less than 1 year.

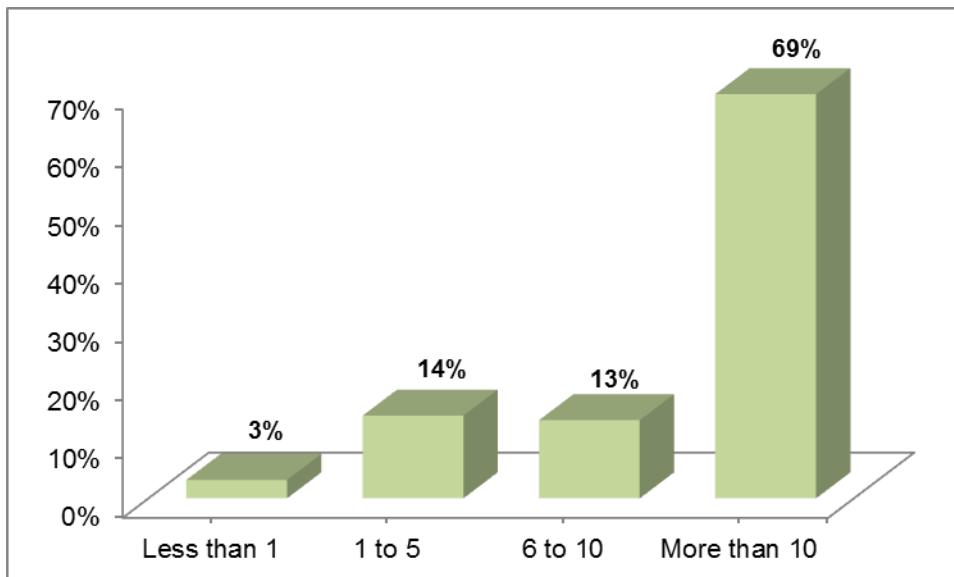


Figure 4.26 Number of years respondents lived in Fort Saskatchewan

Question 2: What type of dwelling do you live in?

- ☐ Detached House
- ☐ Duplex
- ☐ Townhouse (e.g. 4-plex)
- ☐ Multi-Level Apartment/Condo

The purpose of Question 2 is to confirm that the respondents are from a single family residence as the program does not currently apply to those livening in multi-family residences and also to determine differences in opinion between occupants of various housing types.

As illustrated in Figure 4.27, eighty seven percent (87%) of the respondents live in a single family detached house, eight percent (8%) live in duplex, four percent (4%) live in townhouses whereas one percent (1%) of the survey respondents live in multi-family houses.

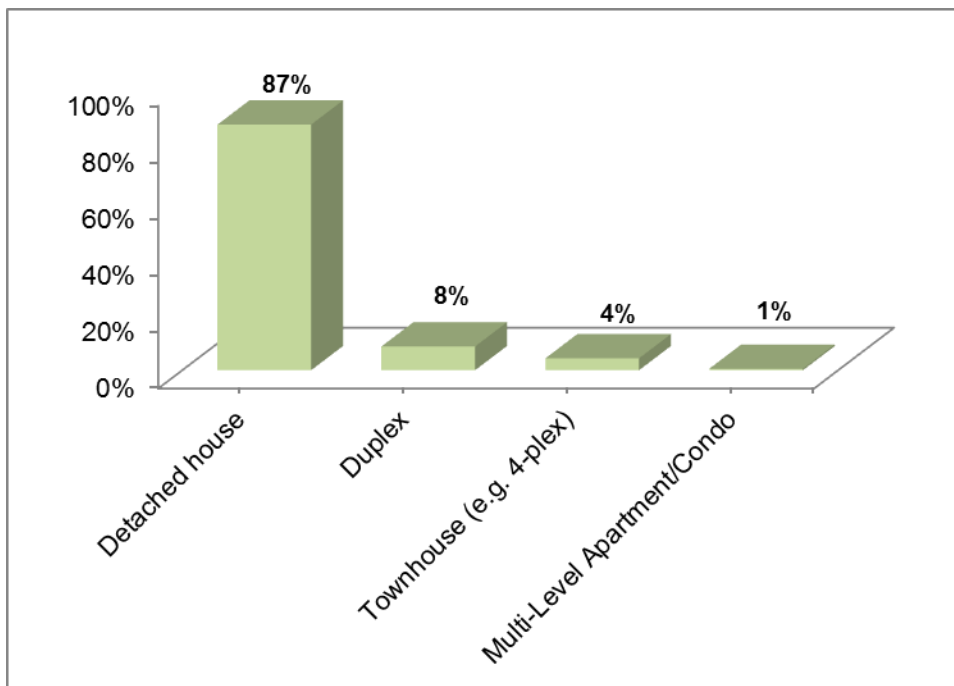


Figure 4.27 Type of dwelling

Question 3: Including yourself, how many people in each age group typically live in your household?

Age Group	Number of People
<input type="checkbox"/> Under 13	_____
<input type="checkbox"/> 13 – 17	_____
<input type="checkbox"/> 18 – 24	_____
<input type="checkbox"/> 25 – 34	_____
<input type="checkbox"/> 35 – 49	_____
<input type="checkbox"/> 50 – 64	_____
<input type="checkbox"/> 65 and Over	_____

The purpose of Question 3 is to see how many people and what age group are represented by one household.

According to Figure 4.28, fifty six percent (56%) of the households represented by the survey are comprised between the age of 25-64, while 11% are 65 and above, fifteen percent (15%) are children under the age 13, and six percent (6%) are in the age group 13-17. Based on 2011 Census, fifty six percent (56%) of the City's population are within the age group of 25-64 and ten percent (10%) are 65 and above. **This shows that the overall response rates are representative of the population.**

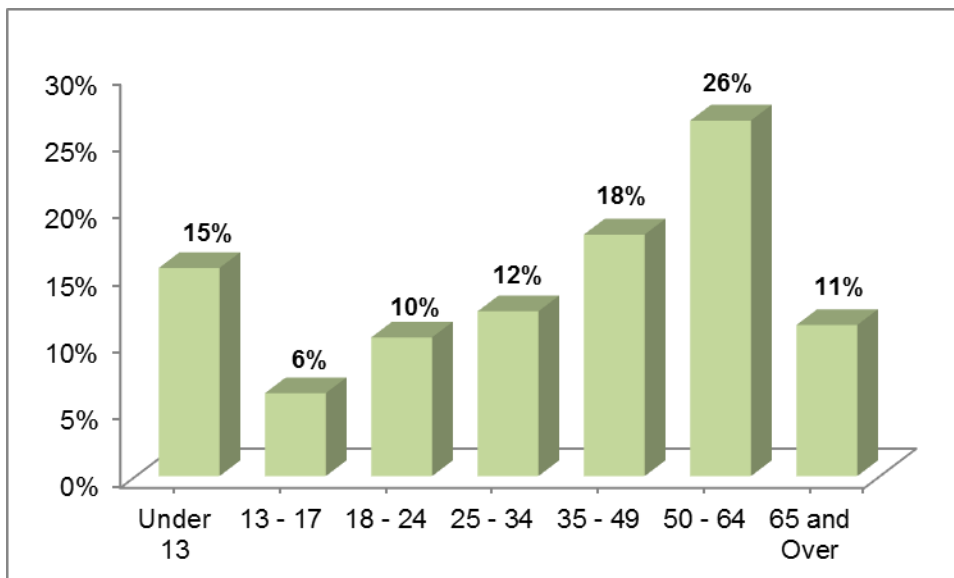


Figure 4.28 Age group responses

On the other hand, as shown in Figure 4.29, thirty nine percent (39%) of the households that participated in the survey are comprised of 2 people and forty four percent (44%) are comprised of 2 to 3 people. Only eight percent (8%) of the respondents have more than 4 people in a household and ten percent (10%) are comprised of one person.

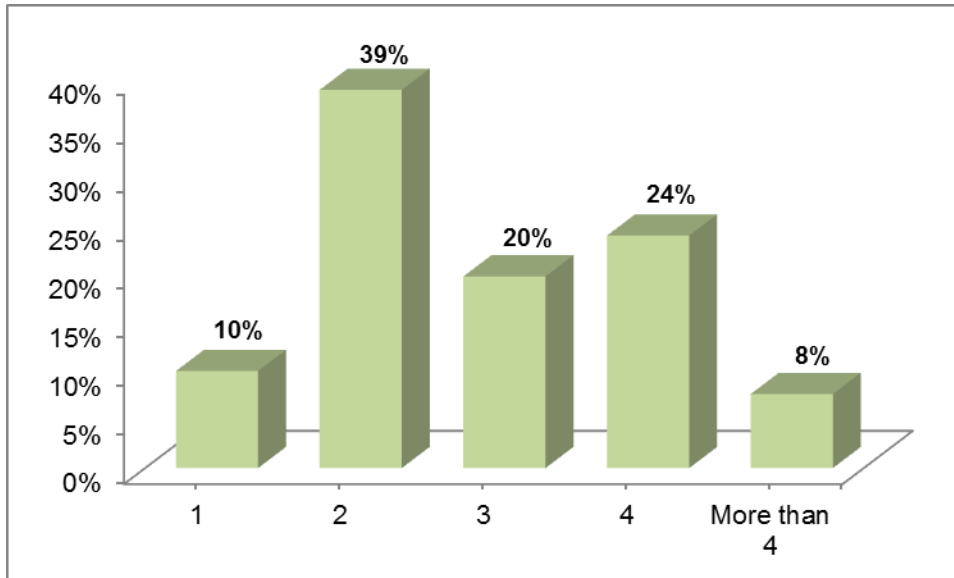


Figure 4.29 Number of people living in a survey respondent household

Question 4: When is your garbage day?

- | | |
|------------------------------------|---|
| <input type="checkbox"/> Monday | <input type="checkbox"/> Thursday |
| <input type="checkbox"/> Tuesday | <input type="checkbox"/> Friday |
| <input type="checkbox"/> Wednesday | <input type="checkbox"/> Friday (Clover Park) |

Question 5: Are you satisfied with your garbage day?

- ☐ Yes ☐ No

Comments: _____

The purpose of Questions 4 and 5 is to see if resident's garbage day works for them and to see if there are statistical differences between various areas of the City.

As shown in Figure 4.30 and 4.31, **all of the survey respondents know their garbage day and ninety eight percent (98%) of them are satisfied with their garbage day.** A

few survey respondents expressed their concerns regarding missing garbage pickup when they travel during long weekends or their carts staying outside the whole weekend which indicates that there is no one in the house.

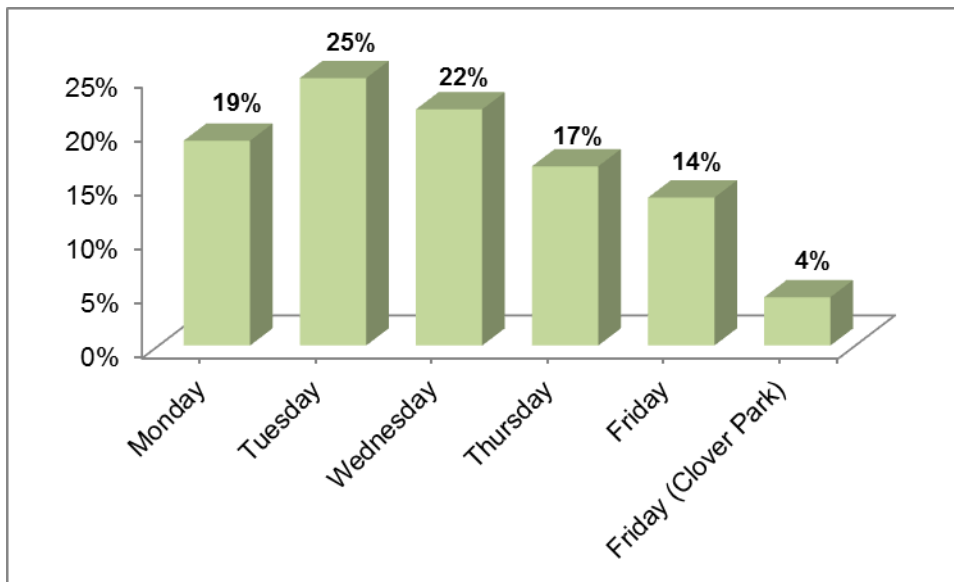


Figure 4.30 Garbage day

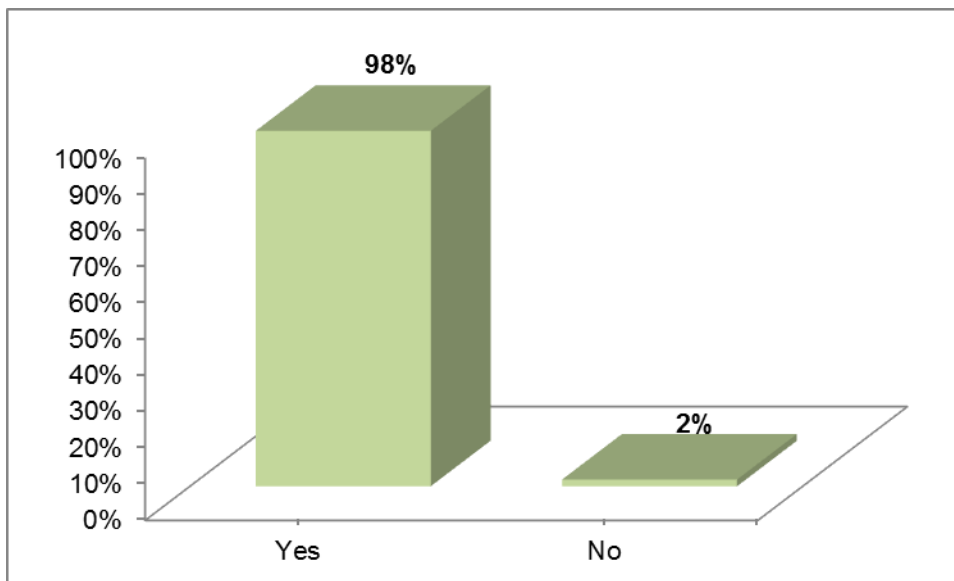


Figure 4.31 Satisfaction with garbage day

Comments stated by respondents:

- Often miss pickup on long weekends

- Friday pickups are difficult as during long weekends the bins make it obvious that there is no one at home all weekend

Question 6: Should garbage day be rotated?

- ☐ No
- ☐ Yes, once a year
- ☐ Yes, after each long weekend

The purpose of Question 6 is to see how often residents want their garbage day to be rotated or if they want it to stay the same.

According to Figure 4.32, ninety four percent (94%) of the survey respondents want their garbage day to stay the same; however two percent (2%) want garbage day to rotate once a year and three percent (3%) want garbage day to rotate after each long weekend.

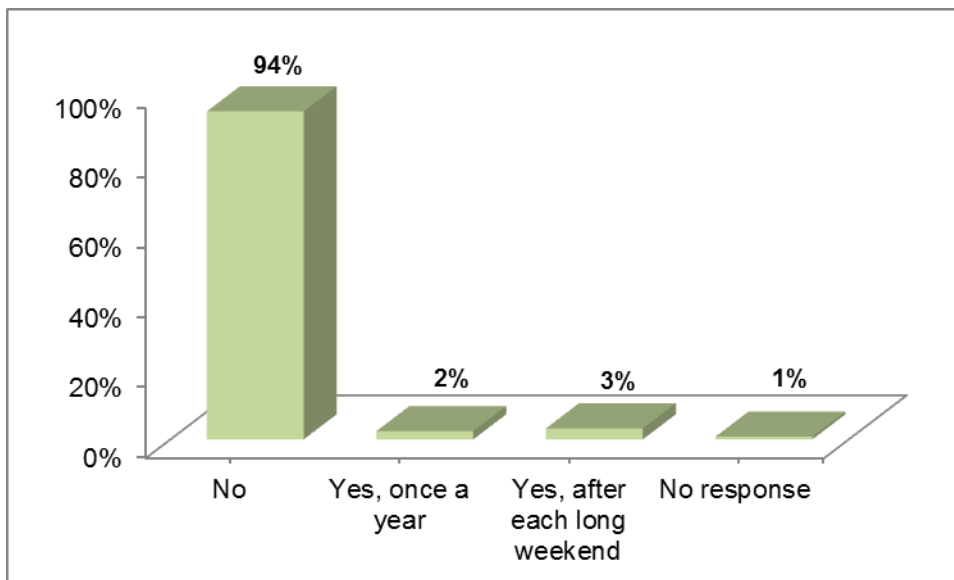


Figure 4.32 Garbage day rotations

Question 7: Where is your garbage collected?

☐ Front Street

☐ Back Alley

The purpose of Question 7 is to see if there are differences in opinion based on where / how garbage is collected.

As illustrated in Figure 4.33, eighty nine percent (89%) of the survey respondent's garbage is picked up from front street while eleven percent (11%) of the respondent's garbage is collected from back alley.

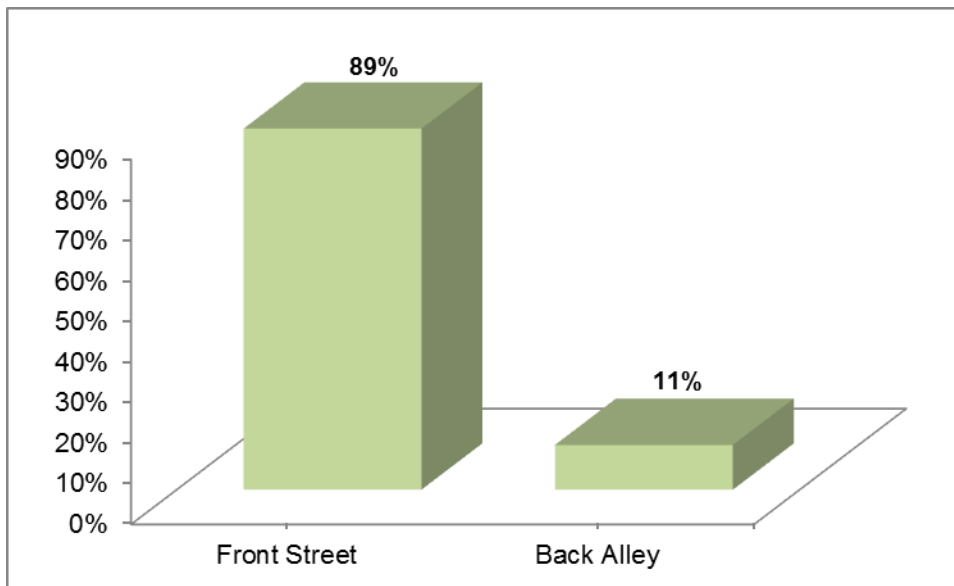


Figure 4.33 Place of garbage collection

Question 8: Prior to the Pilot Program.....

a) Which did you typically use?

☐ Cans

☐ Bags

☐ Both

b) Did you separate any waste?

☐ Recycle using Blue Bags

☐ Compost at home

☐ Bring recycling / yard waste to the Transfer Station

☐ None of the above

The purpose of Question 8 is to see what people were using to store their garbage before the pilot program and whether or not they used to separate their waste.

As shown in Figure 4.34, forty nine percent (49%) of the survey respondents were using both cans and bags to store their garbage, twenty eight percent (28%) were using only bags and twenty three percent (23%) were using only cans.

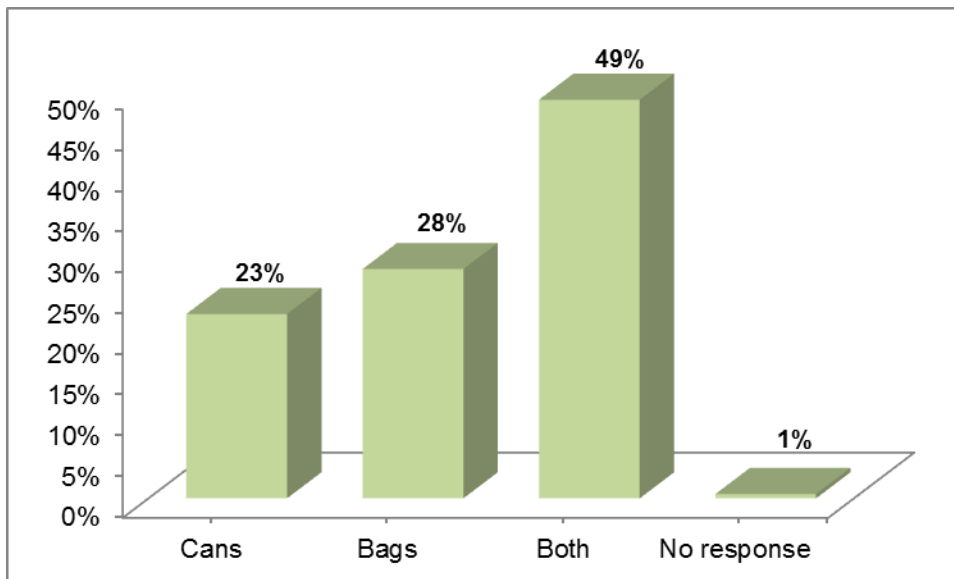


Figure 4.34 Garbage storage

According to Figure 4.35, approximately ninety four percent (94%) of the survey respondents separated their waste either using the blue bag program, taking recyclables and yard waste to the Transfer Station, composting organics at their home, or a combination of these before the pilot program.

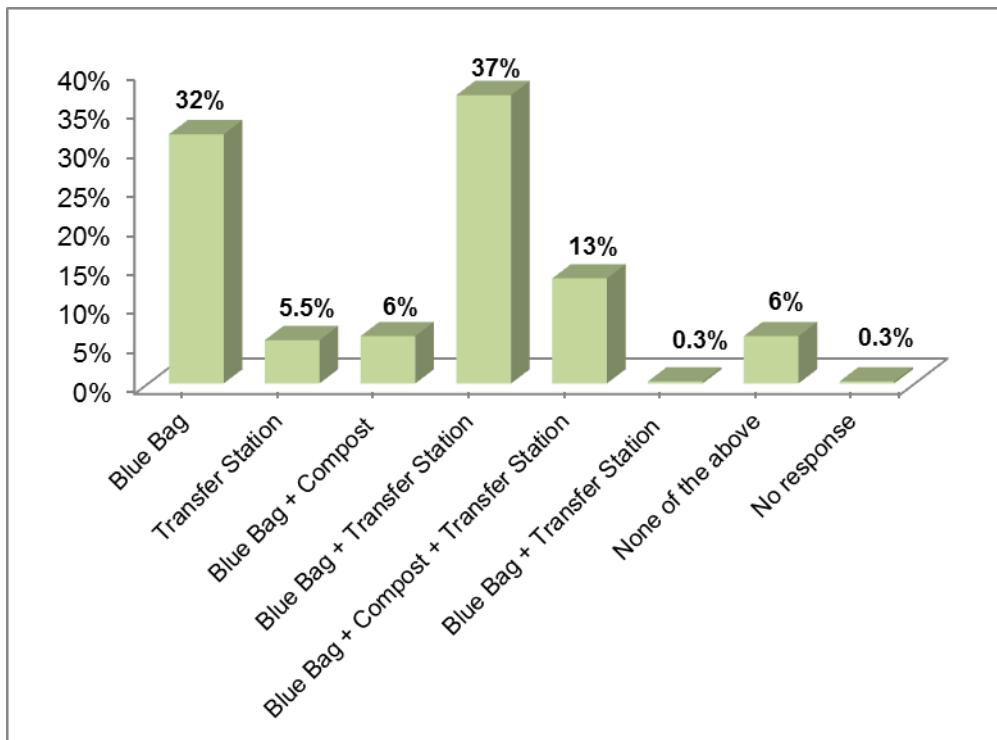


Figure 4.35 Waste separation before the pilot program

Question 9: How full are your carts in a typical week?

	Black (Garbage)	Blue (Recycle)	Green (Organics)
Don't Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
¼	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
½	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
¾	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Full	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overflowing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The purpose of Question 9 is to assist the City in sizing carts and collection frequency based on the amount of waste produced should the pilot program go City wide.

As illustrated in Figure 4.36, fifty four percent (54%) of the survey respondent's black carts for garbage are half or less full and thirty seven percent (37%) are more than $\frac{3}{4}$ full every week. Forty six percent (46%) of the respondent's blue carts for recyclables are half or less full while forty five percent (45%) are $\frac{3}{4}$ or full each week. Sixty eight percent (68%) of the survey respondent's green carts for organics are $\frac{1}{2}$ or less full every week.

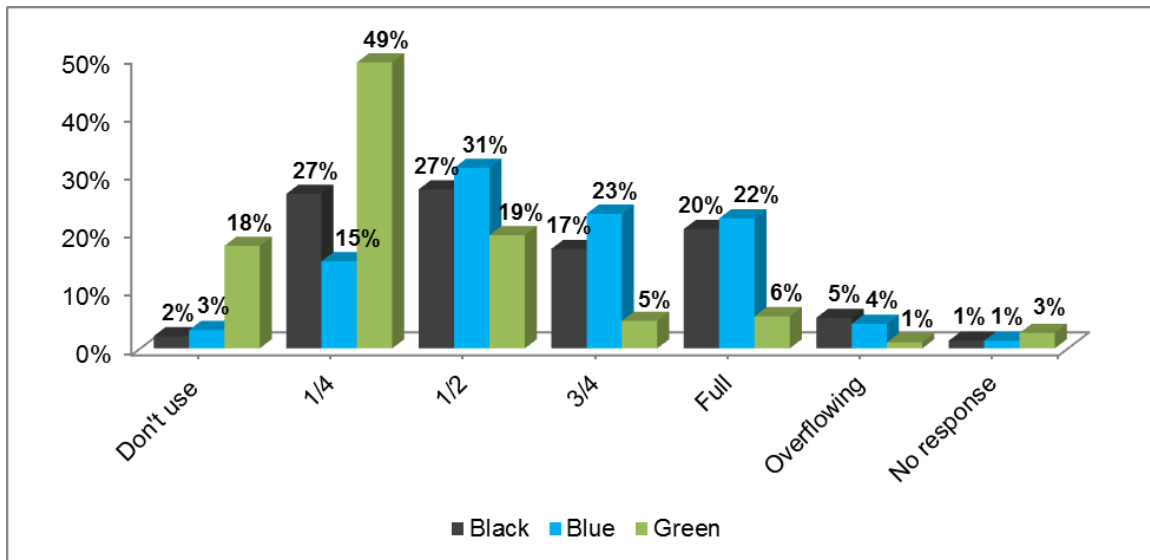


Figure 4.36 Amount of garbage and recyclables generated per week

Survey confirms cart volume evaluation data (Section 3.5.5) carried out by Advanced Enviro Engineering. **From the survey and from observed measurements, it appears that the carts currently used are generally capable of holding two weeks' worth garbage.**

Green carts will be less full due to timing of survey. Typically will be overflowing in Spring and early summer and again in September.

Question 10: Do you use the Green cart for? (Check all that apply)

- ☐ Yard Waste
- ☐ Food Waste
- ☐ Other Organics (e.g. pet waste, napkins, pizza box, etc.)
- ☐ Other: _____

The purpose of Question 10 is to see if residents are using their green carts efficiently.

As shown in Figure 4.37, forty nine percent (49%) of the survey respondents indicated that they use their green carts for yard, food and other compostable materials. A few of the respondents stated that they have returned the bins, some don't use it, some use it only in the summer and a few share with their neighbours.

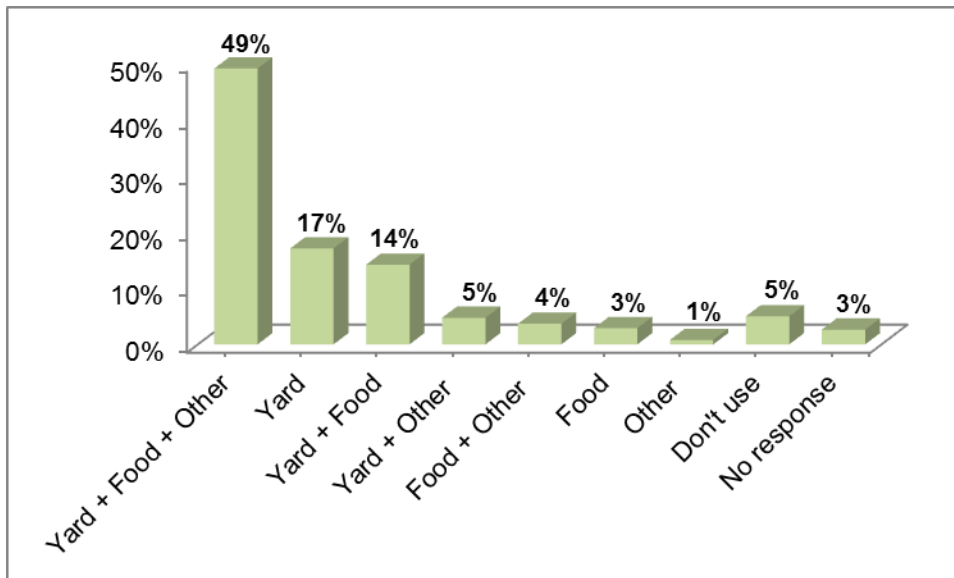


Figure 4.37 Green cart usages

Some of the survey respondents use the green cart for yard waste only. This was also noticed during the waste sort that many residents in the pilot area are not putting food waste in the organic carts. Findings of the waste sort suggest that fewer households are fully utilizing the green cart for food and organics waste than what the survey response would suggest.

Question 11: Where do you store your carts?

- ☐ Back Yard
 ☐ Front Yard
 ☐ Garage
☐ At the Curb
 ☐ Back Alley
 ☐ Shed
 Other: _____

The purpose of Question 11 is to have general idea as where residents are keeping their carts.

The following figure, Figure 4.38 shows that thirty nine percent (39%) store their green carts at their back yard, twenty one percent (21%) in their garage and eighteen percent (18%) at their front yard. The survey respondents that chose 'other' indicated that they store their carts at the side of their house or side of their garage, on their deck, or they don't use it or have returned it to the City.

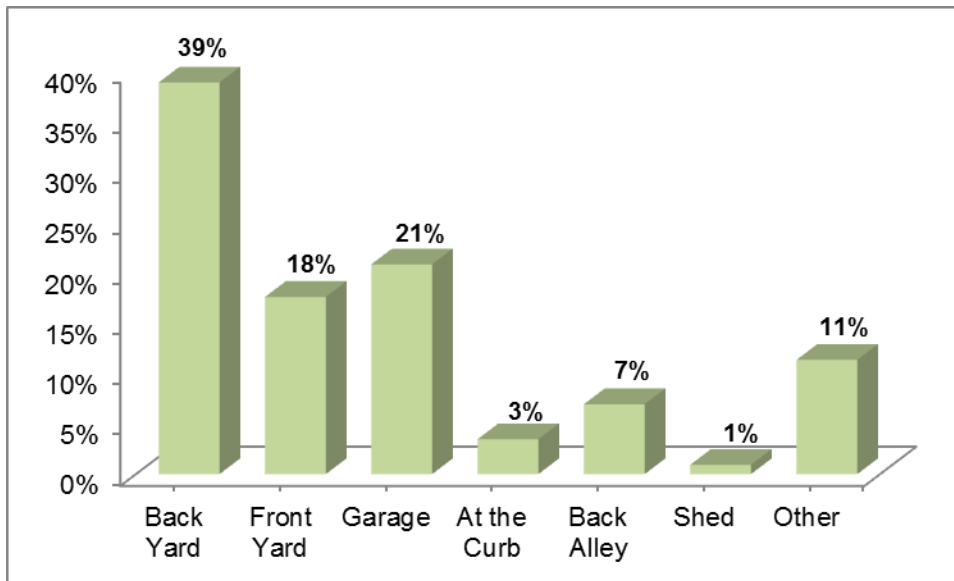


Figure 4.38 Carts storage

Question 12: How often do you set out each cart for collection?			
	Weekly	As needed	Never
Black	<input type="checkbox"/>	<input type="checkbox"/>	_____
Blue	<input type="checkbox"/>	<input type="checkbox"/>	_____
Green	<input type="checkbox"/>	<input type="checkbox"/>	_____

The purpose of Question 12 is to see how often residents set out their different carts for collection which will help the City decide frequency of curbside carts collection and size of carts should the pilot go City wide.

Sixty eight percent (68%) of the respondents indicated that they set out their black cart (garbage) weekly and thirty percent (30%) set out as needed. Fifty six percent (56%) of the survey respondents indicated that they set out their blue cart (recyclables) weekly and forty one percent (41%) set out as needed. On the other hand, sixty nine percent

(69%) of the respondents set out their green cart (organics) as needed and twenty percent (20%) set out weekly (Figure 4.39).

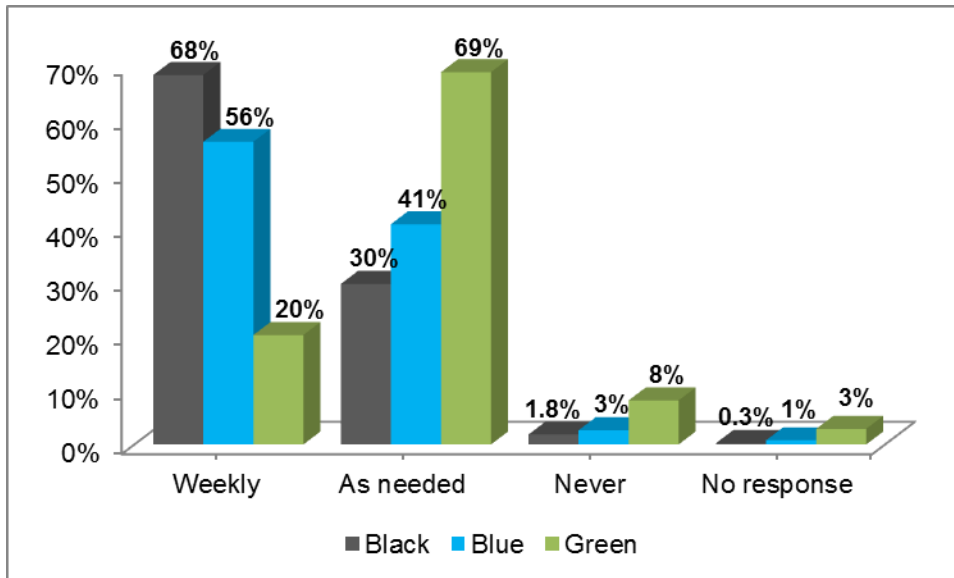


Figure 4.39 Frequency of carts set out for collection

Question 13: In general, how often should the City collect waste?			
	Weekly	Every 2 weeks	Other
Garbage	<input type="checkbox"/>	<input type="checkbox"/>	_____
Recycling	<input type="checkbox"/>	<input type="checkbox"/>	_____
Organics	<input type="checkbox"/>	<input type="checkbox"/>	_____

The purpose of Question 13 is to assist the City decide the frequency of curbside carts collection.

As illustrated in Figure 4.40, eighty percent (80%) of the respondents indicated that garbage (black cart) should be collected weekly and eighteen percent (18%) indicated that it should be collected every two weeks. Sixty seven percent (67%) of the survey respondents indicated that recyclables (blue cart) should be collected weekly and twenty seven percent (27%) indicated that it should be collected every two weeks. Forty seven

percent (47%) indicated that organics (green cart) should be collected weekly and thirty four percent (34%) indicated that it should be collected every two weeks.

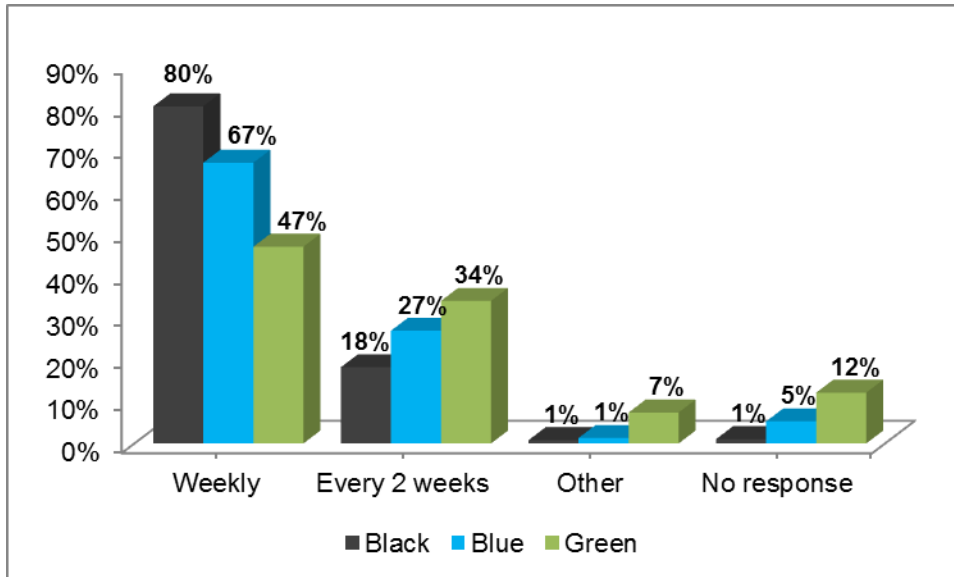


Figure 4.40 Frequency of waste collection

‘Other’ responses are summarized as follows:

- Organics should be collected weekly in spring, summer and fall but every two weeks or every month during winter.
- In some communities there are fines for not properly separating your waste.
- It's probably not feasible, but picking up garbage less frequently than recycling and organics would further encourage less garbage in the landfill.
- Garbage and organics could be collected every two weeks alternatively. Garbage and recycling one week, organics and recycling the next week.
- If this program were to be implemented City wide, and properly used, garbage and organics could probably be collected every 2 weeks.

It is not clear if support for weekly collection is based on desired service level, regardless of cost, or due to expectation/resistance to change. Further survey results suggest system costs outweigh convenience in terms of importance to residents.

The purpose of Question 14 and 15 is to see how valuable organics collection is for residents and if they have any concerns regarding separating organics.

Question 14: Is collection of organic waste a valuable service to you?

☐ Yes ☐ No ☐ Unsure / No Opinion

As shown in Figure 4.41, **sixty nine percent (69%)** of the respondents indicated that **organic waste collection is a valuable service to them.**

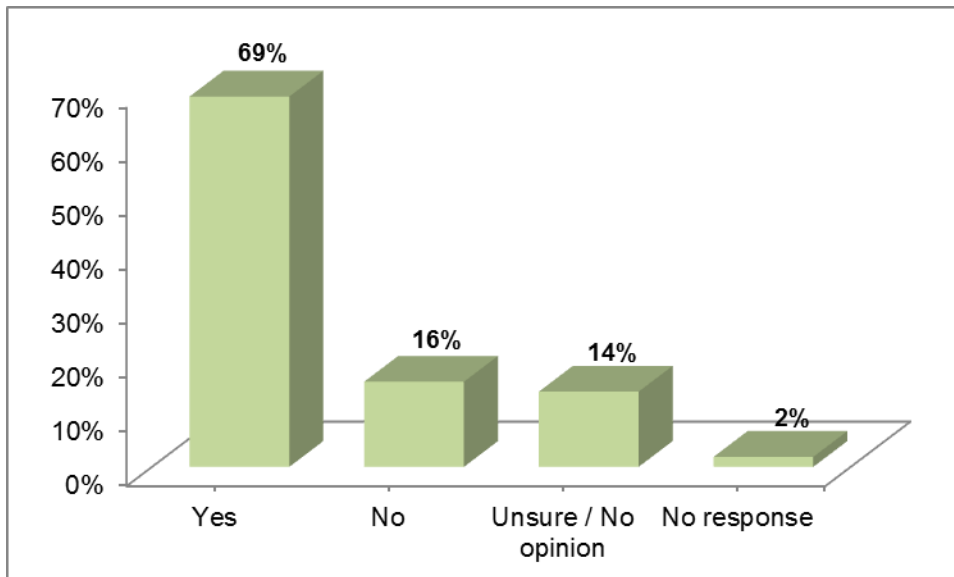


Figure 4.41 Valuability of organic waste collection

Question 15: Do you have concerns about separating organics? (Check all that apply)

- ☐ Unsure / No Opinion
- ☐ Concerns about odours or pests
- ☐ Concerns about effort to separate
- ☐ No concerns
- ☐ Other _____

According to Figure 4.42, majority of the survey respondents **(54%) have no concerns about separating organics** whereas twenty eight percent (28%) have either concerns about odours or pests or effort to separate.

It is interesting to note that residents who participated in the pilot had significantly less concerns with organics separation than persons who had not tried it.

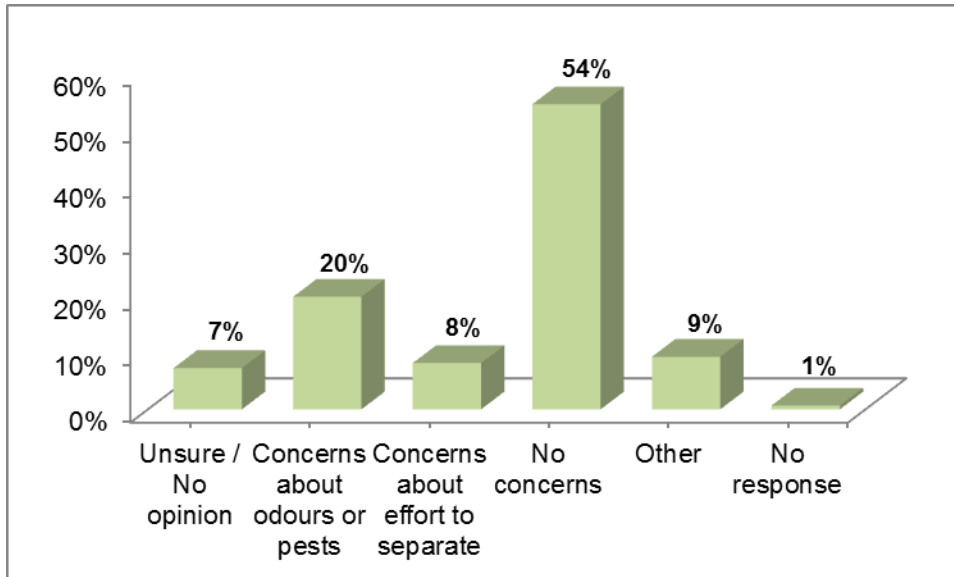


Figure 4.42 Concerns about separating organics

Responses stated under 'Other' are summarized below:

- The size of the cart makes it difficult to keep clean.
- Wastes a lot of time.
- Tried and the smell was too bad especially in the summer.
- Too many big bins.
- The compostable bags create mold in the little garbage can in the house.
- It's a Nuisance, not worthwhile for minimal waste.
- Had many concerns/opinions before the program but using it was much easier and less stinky than I expected.
- Limited space to keep organics inside, concerns about close neighbours and concern with the organics odour by the front door.
- Freeze to bottom and don't get emptied.
- Having to buy biodegradable bags.
- The instructions that accompanied the program were very useful and still are.

Question 16: Please rate the Kitchen Can and Compost Bags supplied.

	Good	Needs Improvement	Didn't Use
Kitchen Can	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compost Bags	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: _____			

The purpose of Question 16 is to see how useful the kitchen can and compost bags supplied to residents are and if improvements are needed.

As shown in Figure 4.43, **approximately fifty percent (50%) of the survey respondents have rated both the kitchen can and compost bags supplied as good**, approximately ¼ of the respondents indicated that both need improvements, and approximately ⅓ of the respondents indicated that they did not use them.

It has been learned from other programs that if garbage collection is reduced, the use of kitchen cans and compost bags will increase.

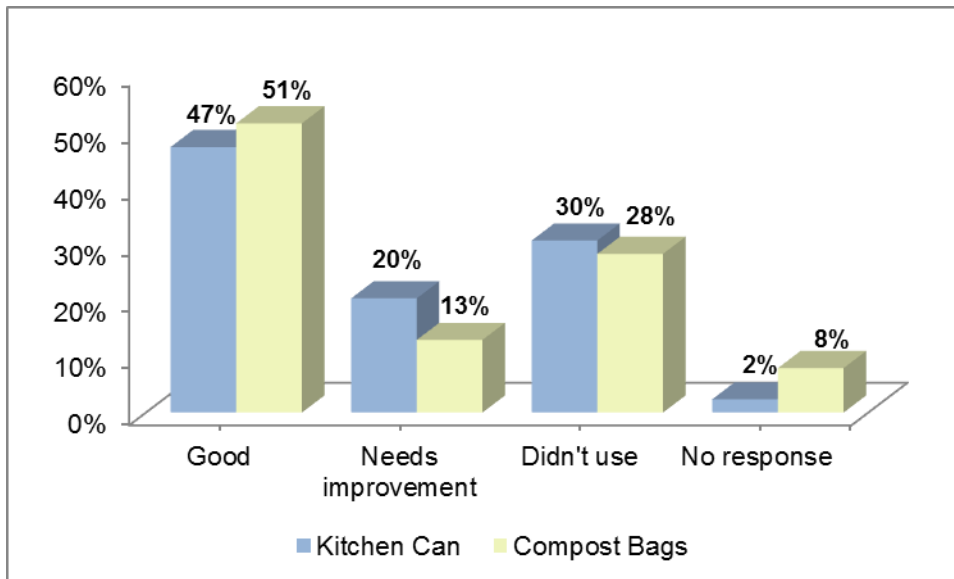


Figure 4.43 Kitchen can and compost bags rating

Comments by survey respondents are summarized below:

- Not sure what was supplied or did not know.

- Kitchen can is too small.
- Compost bags are too small and thin and hard to find.
- Lid doesn't stay on, causes odour.
- Compost bags are too expensive.
- Use it for pet waste.
- Need education on proper organics recycling
- Cheaper compost bags are available at dollar stores
- Line kitchen can with newspaper

The purpose of Question 17 and 18 is to hear from residents what kind of concerns they have about the carts and what changes they would consider. This will help the City accommodate the concerns as much as possible.

Question 17: Do you have concerns with the carts? (Check all that apply)

- ☐ No
- ☐ Storage
- ☐ Problems with collection / Cart placement on road
- ☐ Difficult to move
- ☐ Other _____

As illustrated in Figure 4.44, majority of the survey respondents (50%) have either storage issue, problems with collection/carts placement on road or difficulty to move and forty percent (40%) have no concerns with the carts.

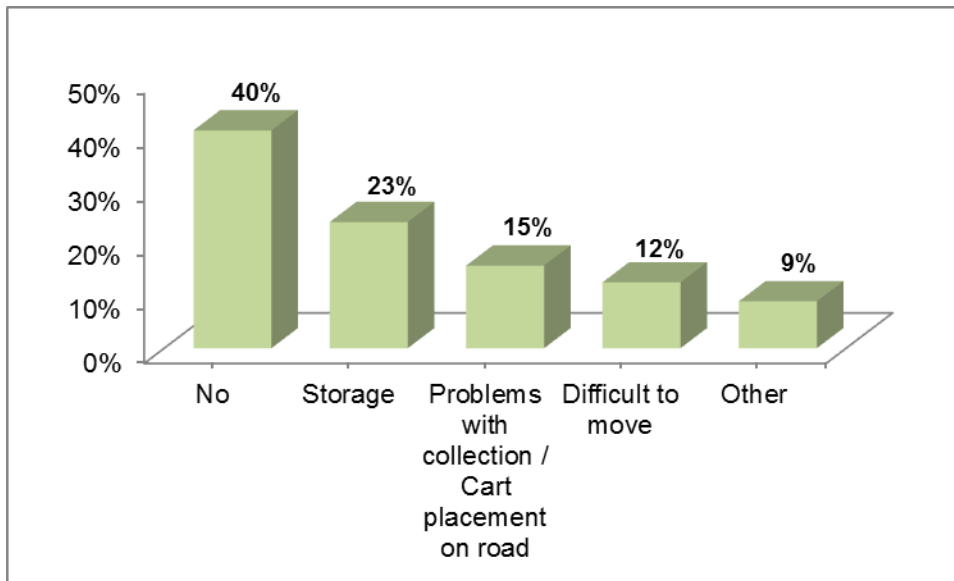


Figure 4.44 Concerns with carts provided

Summary of responses for 'other':

- No problem as long as pickup is from back alley.
- Blue and green carts are too big.
- Black cart is too small.
- Restricts parking/ parking issue during the winter.
- Don't use.
- Get damaged during collection.
- Smaller black bin

Question 18: What changes to the 'cart system' would you consider? (Check all that apply)

- ☐ No change
- ☐ Choice of size
- ☐ Less carts/Allow bags
- ☐ Collect garbage on different day than recycle/organics
- ☐ Collect garbage on different week than recycle/organics
- ☐ Share carts with neighbours/community bin
- ☐ Other _____

Figure 4.45 shows that thirty three percent (33%) of the survey respondents do not want any change to the pilot program. On the other hand, thirty seven percent (37%) indicated they want to be given choice of carts sizes, seventeen percent (17%) want less number of carts and bags, and eight percent (8%) want to share carts with their neighbours or use community bin.

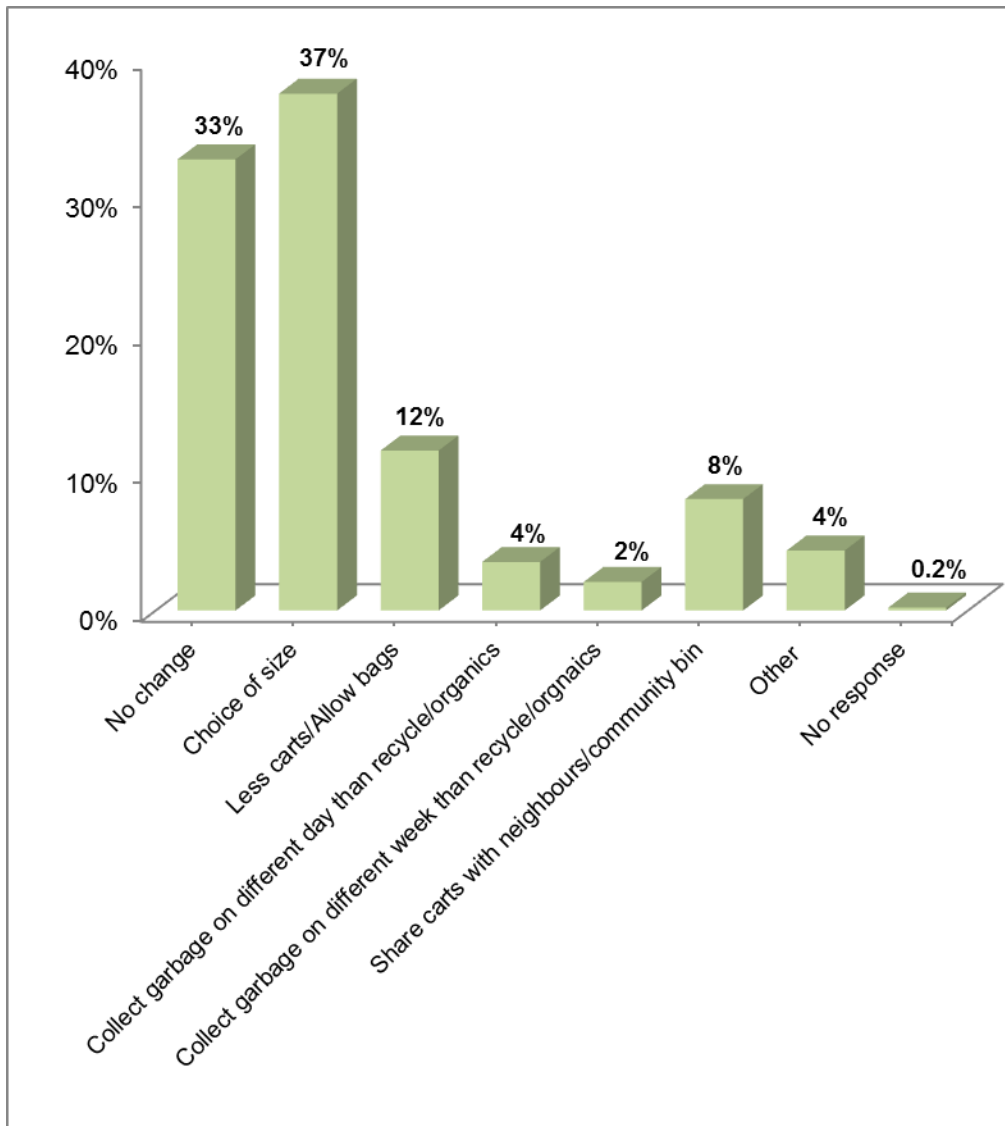


Figure 4.45 Changes to 'cart system'

Respondents stated the following under 'Other':

- Allow different size of carts so that residents can choose according to their needs.
- A community bin would be worth further consideration.
- Keep one day for pickup for all three carts.
- Free options for disposing of garbage that did not fit in bin.
- Return to blue bags and regular garbage and keep the organic green bins.
- Either larger carts or more carts for larger families.
- Make the green cart small and allow bags for grass clippings.
- Inform users that the carts don't always have to make it to the curb if not full.
- Bags with no containers should not be allowed.
- Parking ban to allow room to place bins.
- Use bags for recyclables and carts for garbage and organics.
- Different choice for people who live in tight neighborhoods so that they can and are better able to participate in the program.
- Alternate weeks for recycle/organics and garbage weekly.
- Use proper truck to lift bins. Ground metal bar on bin.

Question 19: If these changes were in place, which system would be more comfortable for you to work with?

☐ Carts

☐ Bags/Cans

☐ No Preference

The purpose of Question 19 is to see what residents are more comfortable to work with regarding their waste.

As illustrated in Figure 4.46, **seventy percent (70%) of the survey respondents prefer to use carts** while fifteen percent (15%) want to use bags or cans. From the consultant's experience, this response is consistent with all other Canadians who are using carts.

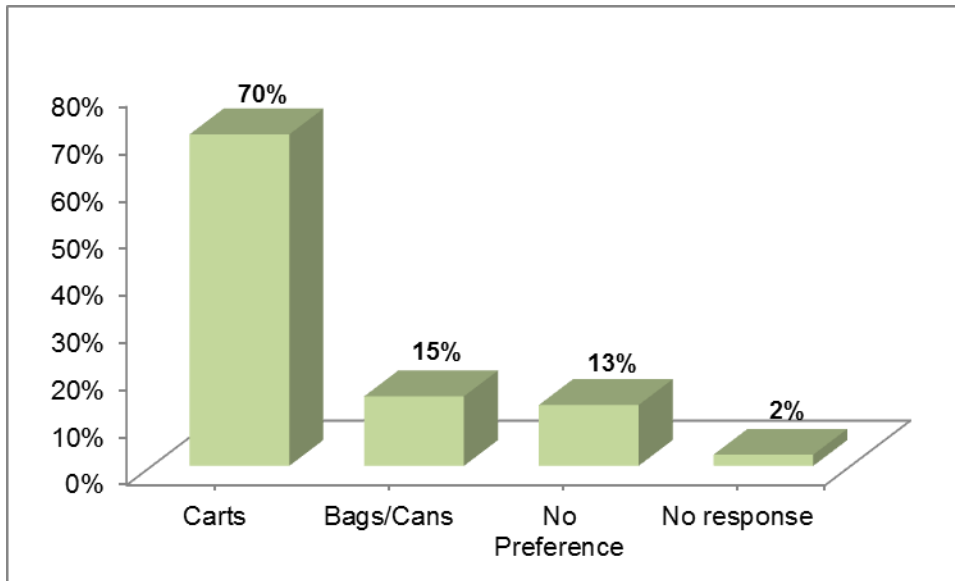


Figure 4.46 Preference of waste collection system

The purpose of Question 20 and 21 is to measure the public support to reduce waste sent to landfill using different methods.

Question 20: Would you support.....		
	Yes	No
Garbage Limits	<input type="checkbox"/>	<input type="checkbox"/>
Fees based on amount of garbage	<input type="checkbox"/>	<input type="checkbox"/>
User fees for optional services	<input type="checkbox"/>	<input type="checkbox"/>

As shown in Figure 4.47, thirty six percent (36%) of the survey respondents support garbage limit while sixty percent (60%) don't. Twenty nine percent (29%) of the respondents support fees based on amount of garbage while sixty six percent (66%) don't. Thirty one percent (31%) support user fees for optional services while sixty percent (60%) don't. Further survey results find that a majority of residents believe the City should put more effort toward waste reduction, however, it is clear that there is strong resistance to change when it comes to placing restriction or fees on garbage.

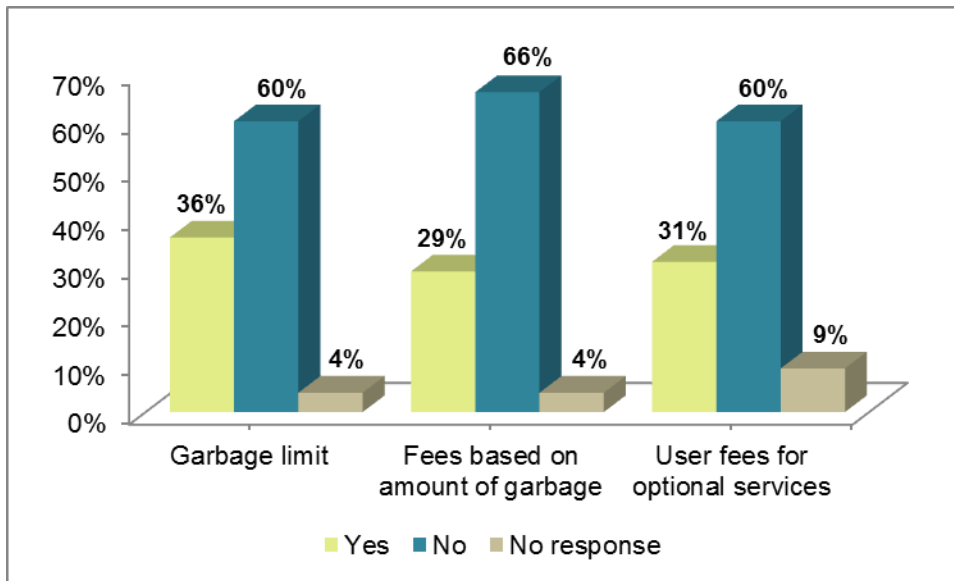


Figure 4.47 Support towards garbage reduction

Question 21: Should the City put more effort into reducing waste sent to the landfill?

☐ Yes ☐ No ☐ Unsure

As illustrated in Figure 4.48, fifty five percent (55%) of the survey respondents support that the City should put more effort into reducing waste sent to landfill whereas ten percent (10%) don't. At the same time, thirty three percent (33%) are unsure.

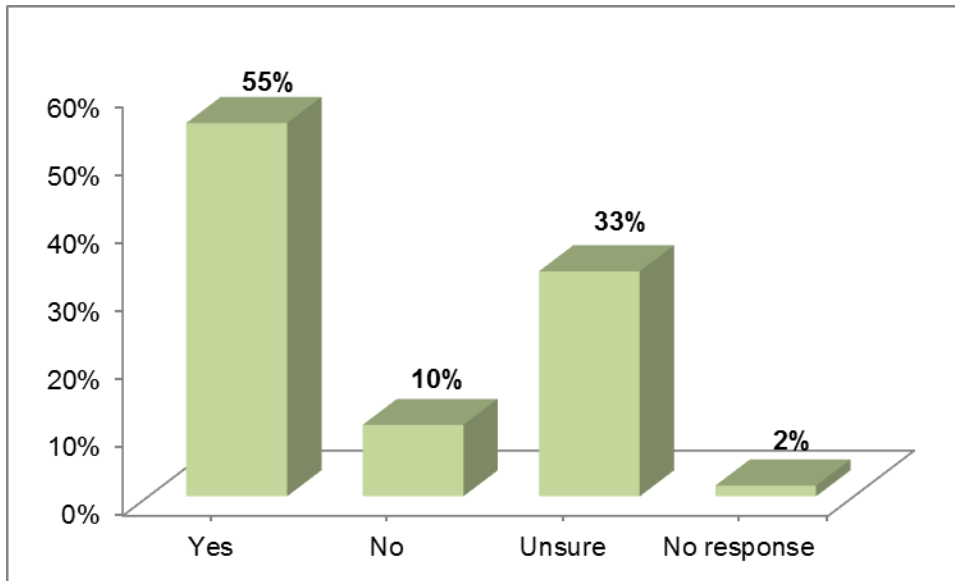


Figure 4.48 Effort to reduce waste sent to landfill

Question 22: Please RANK how important each factor is to you?

- ___ Cost
- ___ Convenience
- ___ Waste Reduction

The purpose of Question 22 is to see what is more important to residents regarding waste management.

As shown in Figure 4.49, forty six percent (46%) of the survey respondents ranked cost as the most important factor, forty four percent (44%) ranked convenience as the second important factor and forty three percent (43%) ranked waste reduction as the third important factor regarding waste management.

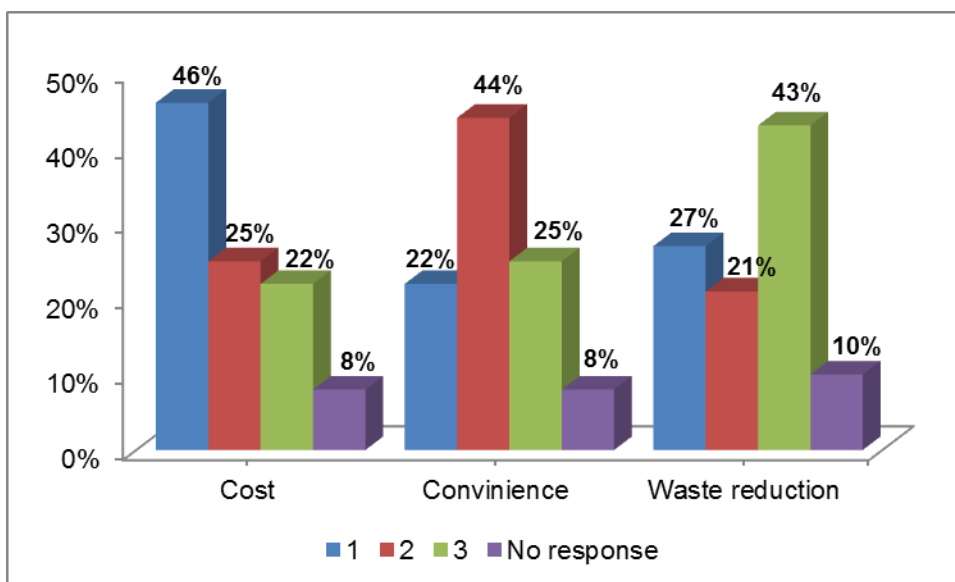


Figure 4.49 Cost, convenience and waste reduction importance ranking

Question 23: How often do you use services at the Transfer Station? (aka “recycle yard”, “the dump”, etc.)

	Frequently	Occasionally	Never
Garbage Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yard Waste / Compost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Branches / Wood Chips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product Exchange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Solid Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The purpose of Question 23 is to assess the Transfer Station usage frequency as well as to inform the public of the current services provided at the Fort Saskatchewan Transfer Station and to identify services that are highly used and/or underutilized.

As illustrated in Figure 4.50, the most frequently used service at the Transfer Station is yard waste service (14%) followed by general recycling (10%) and branches/wood chips (9%). The most occasionally used service is branches/wood chips (67%) then yard

waste/compost (59%), general recycling (56%), solid waste (52%), and product exchange (47%).

In general, frequently or occasionally, seventy six percent (76%) of the survey respondents use branches/wood chips service, seventy three percent (73%) use yard waste service, sixty six percent (66%) use general recycling service, fifty five percent (55%) use solid waste service and fifty percent (50%) use product exchange service.

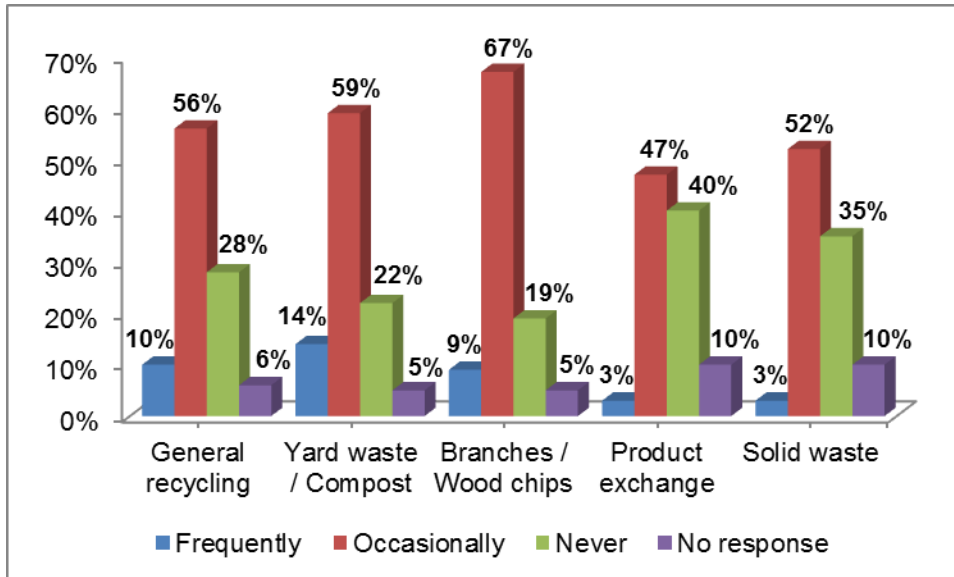


Figure 4.50 Transfer Station usages

Generally respondents use the different services offered at the Transfer Station occasionally and this confirms the usefulness of the Transfer Station.

Question 24: When would you prefer the Transfer Station be open?

- | | |
|------------------------------------|-------------------------------------|
| <input type="checkbox"/> 9am – 5pm | <input type="checkbox"/> 7am – 3pm |
| <input type="checkbox"/> 7am – 8pm | <input type="checkbox"/> 12pm – 8pm |

The purpose of Question 24 is to assess the most convenient Transfer Station hours of operation.

Figure 4.51 shows that thirty five percent (35%) of the respondents prefer the Transfer Station to open from 12pm-8pm; thirty one percent (31%) prefer 7am-8pm and twenty

nine percent (29%) prefer 9am-5m. This shows that **majority of the respondents (66%) want late operation hours (i.e. till 8pm).**

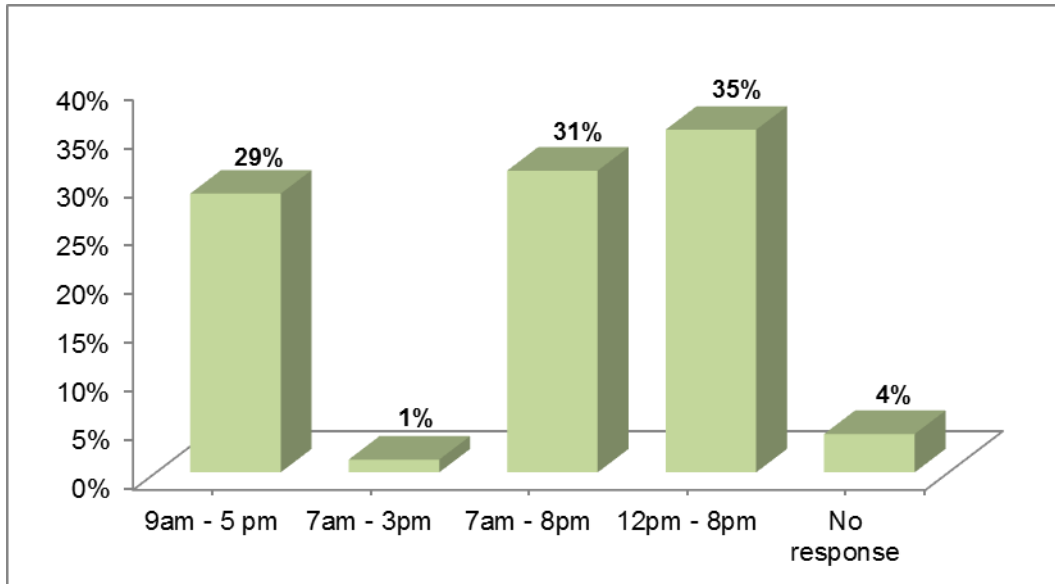


Figure 4.51 Preferred Transfer Station operation hours

Question 25: Do Large Item Collection and Toxic-Round-Up events meet your needs (e.g. time of year, frequency)?

☐ Yes ☐ No

Comments: _____

The purpose of Question 25 is to assist the City decide when and how often to hold Large Item Collection and Toxic-Round-Up events.

The following figure (Figure 4.52) illustrates that seventy two percent (72%) of the respondents are satisfied with the Large Item Collection and Toxic-Round-Up events whereas twenty four percent (24%) are not. Out of the 24% who responded no, fifteen percent (15%) would like to have the events twice a year or more often, two percent (2%) have never used these services and one percent (1%) suggested that they need more communication and advertisement before the event.

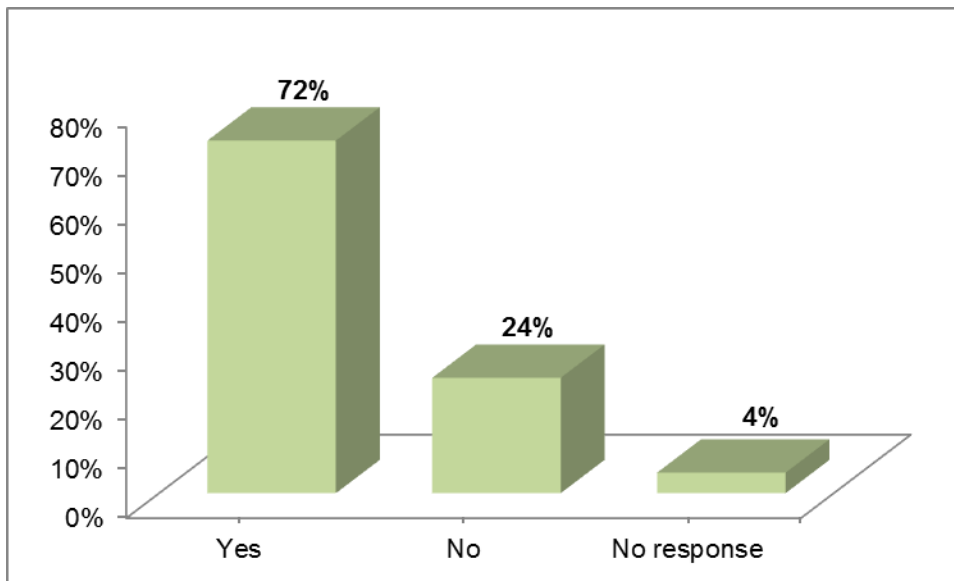


Figure 4.52 Special waste collection events

Comments by survey respondents:

- Toxic round up would be better in April before people are away during summer weekends.
- Toxic round up should have extended hours for shift workers.
- Both events should be held twice a year, in spring and fall.
- Too early in the year.
- Give each household a quota for the year they can use when they want.
- Need more advertising.
- Better advertising for the events e.g. on Dow Center sign or neighbourhood road signs. Residents often miss them.
- Scrap the large collection, move your own waste to the Transfer Station or hire truck to take it.

Question 26: How should we communicate about waste programs? (Rank your Top 3)

- ☐ In-Person
- ☐ Phone
- ☐ Mail
- ☐ Brochures with Utility Bill
- ☐ E-mail or Mobile Application
- ☐ City Website
- ☐ Radio (Specify channel) _____
- ☐ Newspaper (Specify) _____
- ☐ Social Media (Specify) _____

The purpose of Question 26 is to ask residents to indicate the best communication methods since public communications and education is integral to the success of any implemented waste management strategy.

It is recommended that the City communicate with residents by:

- **Brochures with utility bill**
- **Mail**
- **Newspaper and E-mail or Mobile Application**

Results are graphically illustrated in Figure 4.53.

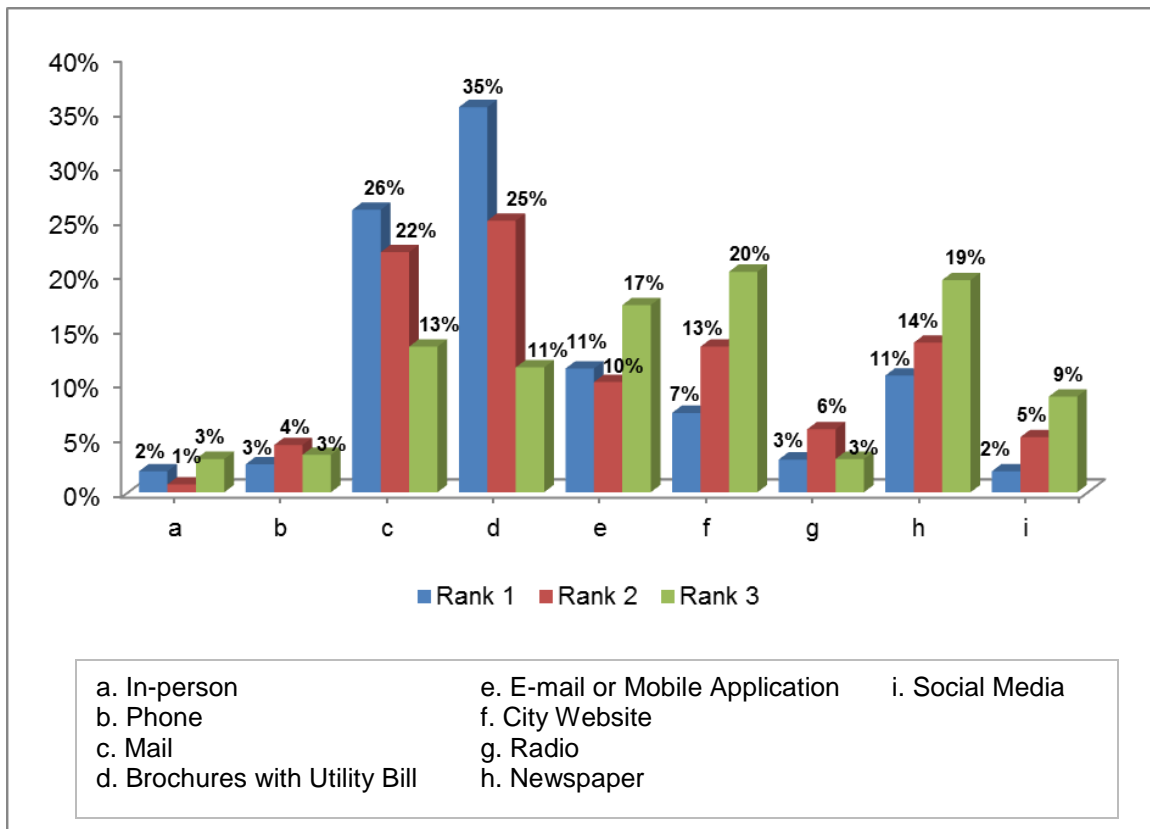


Figure 4.53 Best communication methods

Question 27: Other Comments or Suggestions

As illustrated in Figure 4.54, majority (87%) of the residents who participated in the survey indicated that they support the cart system. Out of the eighty seven percent (87%) who support the cart system, fifty percent (50%) support the program but with suggestions summarized below. The rest thirteen percent (13%) do not support the cart system for the reason mentioned below. Also some of the respondents that support the cart system mentioned advantages of the cart system listed below.

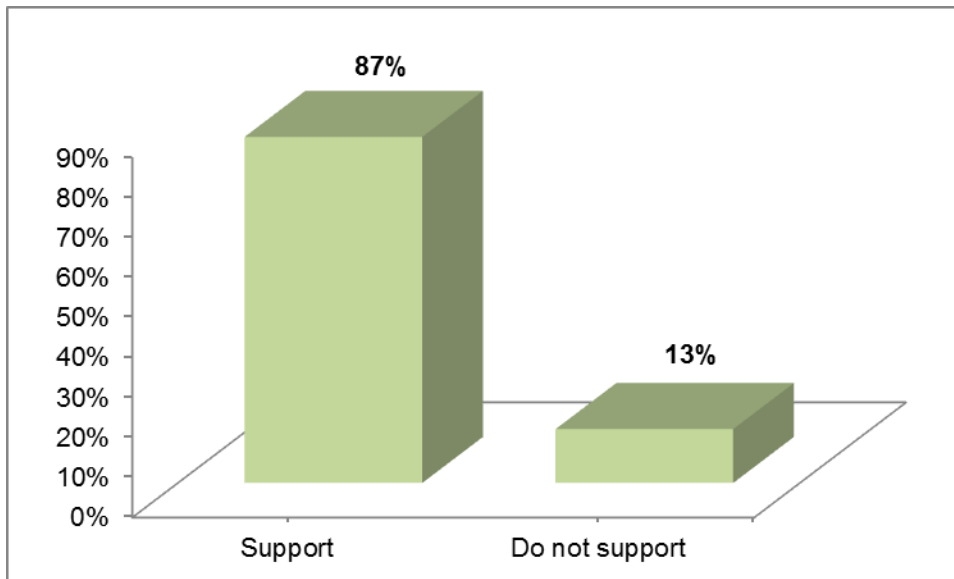


Figure 4.54 Support for the cart system (pilot program)

In general, there is support for the cart system (waste separation at source).

Suggestions from respondents that support the cart system (pilot program):

- Carts are difficult to store, move and clean.
- Send out flyer or a more cohesive manual concerning exactly what constitutes organic waste or list of compostable items as specific as possible and also to let everyone know what things don't get recycled. Preferably visual list.
- Carts pose parking and traffic issue on collection days. No parking in front of bins on garbage day. Guideline on carts storage.
- There must be an option for carts sizes.
- Carts are big and bulky.
- Organic carts are too big during the winter time but good size during summer, community grass bins may be more convenient.
- Organic bin freezes in the winter.
- Need only green cart for summer. Bin only for organics would be sufficient.
- Fees at the Transfer station are too high, reduce or have a couple of free days during the summer.
- Snow windrows need to be removed as cars on both sides narrow the street. More snow removal in back alleys.
- Need better snow clearing to put out carts

- Large vehicles such as travel trailers, ski doo trailers, boats, etc. should not be allowed to park on street which would help with road congestion.
- Every two weeks pickup will lower cost.
- Sell bags for extra waste.
- Storage is a problem and hazardous on the road.
- Storage problem in crowded and densely populated areas.
- Indicate cost if program is fully adopted. Would like to see the fees (cost) on utility bill.
- Bin placement problems would be solved with using truck that lift bin with metal bar.
- Enforce people to remove carts from curbside except garbage day.
- Do not increase fees as this service should be cost effective and City can sell compost soil.
- Collection trucks travel down a back alley with excessive speed.
- Pickup garbage from back alley.
- Using bags for grass and yard clippings was more difficult for seniors
- 'Kitchen catcher' needs to be bigger.
- If the lid of the 'kitchen catcher' is left open it does not smell or mold.
- Bins maybe too bulky for some yards, streets, etc.

Questions:

- Who covers cost of a bin if it breaks or is damaged?
- How long do the carts last and what happens if they get damaged or broken?

Advantages of the cart system:

- It avoids manual pickup and less ergonomic strain on body. More effective.
- Allows residents to more easily sort and manage waste products.
- Much more convenient, easy to move and better for the environment.
- Neater and nicer looking than bags.
- Compost cart is an excellent way to reduce the overall waste going to the landfill.
- Bins reduce unsightly garbage storage prior to pick up.
- Smell is not a factor.
- Carts are not so difficult to move in winter, they skid along well enough.
- Carts are big enough to need collecting only every two weeks which helps save money.
- Reduced the use of black and blue bags by directly putting the waste in the bins.

- Much easier to wheel the carts than carry several bags on collection day.
- Keeps the neighbourhood clean as animals and wind are not scattering litter around everywhere.
- Convenient for seniors to put grass and yard clippings than in bags.

Reasons respondents do not support the cart system (pilot program):

- Carts affect the curb appeal of the neighbourhood, they are unsightly.
- No place to put them.
- Very hard to move in winter.
- Not handy for older people.
- Start user-pay per garbage generated.
- Carts are too big and no room available on the streets and alley.
- It should be a choice on whether or not one would like to participate.
- Restricts parking.
- Choice to opt out of program and not be charged when not using the system.
- Next time consult with residents before starting this kind of project.
- Clover Park is so close to the recycling station, bin project is unnecessary for this area.
- There are five waste trucks every Friday with a dust back alley, it will be problematic.

All comments and suggestions are listed in Appendix F.

5.0 EQUIPMENT EVALUATION

Advance Enviro Engineering Ltd. (AE) conducted an initial review of the equipment currently used by the City of Fort Saskatchewan for the Pilot Project. Advantages and disadvantages of different collection options are provided.

AE staff performed a direct observation of the carts and equipment efficiency in the field and video recorded the collection trucks during operation.

Specifically AE staff evaluated other potential equipment suitable for the Fort Saskatchewan specific situation assessing advantages/disadvantages of Heil, Labrie, Curotto Can, Rotopac, McNeilus and others including input from an international cart and equipment expert.

5.1 Waste Collection Options

Program options for waste collection include:

1. Fully-automated Collection
2. Semi-automated Collection
3. User Pay Systems/Volume Limits
4. Radio Frequency Identification Device (RFID) Tracking System

A description of each option as well as the associated advantages and disadvantages of each are provided below.

5.1.1 Automated Collection

Automated collection is based on a cart system. Wheeled carts with lids are provided to residents. Residents place carts at curbside for collection according to set specification (usually 1 m distance from other carts or other objects, etc.) on their collection day. In a fully automated system, the collection truck driver operates a mechanical arm from inside the cab of the truck, which reaches out and grasps the cart, empties the cart into the truck, then mechanically places the cart back at the curb without the operator having to exit the truck.

Over 30% of municipalities across Canada have implemented a cart system with this number steadily increasing. The automated cart system appears to be the future model for waste collection.

Advantages

Advantages of Automated Collection:

- Operational cost efficiencies:
 - One man operation lowers labour costs.
 - Elimination of lifting reduces injuries and Workers Compensation claims.
 - Reduced collection time per household reduces labour and fuel costs, and may require fewer trucks (collection time estimated at ~ 10-15 seconds/household).
- Although, operational cost efficiencies of an automated system accrue to the service provider when collection is contracted out, these efficiencies allow the City to attract competitive pricing from private service providers. Depending on the amount of garbage collected (generally more than 200 kg/person/year) hand-bombing or manual collection prices are higher than automated collection.
- Expandable to waste/organics/recyclables.
- Fewer trucks and reduced collection time reduces greenhouse gas emissions.
- Reduced labour requirements help to address missed pick up due to labour shortages.

Advantages of Cart System:

- Cart design (ventilation, lids, and holding capacity) allows year round collection of organics (food and yard waste) and varied collection frequencies.
- Cart design allows garbage collection every two weeks (if coupled with other diversion programs such as organics collection) in a clean efficient way.
- Acceptable volumes of waste are easier to establish with a cart than with bags if a volume limit is imposed i.e. 1 cart/household (volume limits are required to achieve higher diversion rate).
- Radio Frequency Identification Device (RFID) technology is available in some carts.
- Funding may be available for municipalities to purchase carts.
- Carts generally have a 10-year warranty with a unit cost of approximately \$60-80 (landed). Carts can be financed. Over 10 years, cost of carts is at least 50% cheaper than bags purchased over the same time frame.
- Less plastic waste compared to manual collection.
- Reduces problems with animals and rodents.
- Visually attractive – neater than bags and uniform system.
- No breakage from overfilling or from animals if waste is put out overnight.
- Comes in various container sizes.
- Easy to maneuver (on wheels).

- It has been accepted by over 30% of Canadian households and continues to be implemented.

Disadvantages

- Capital investment required at outset if municipality is purchasing. A container must be purchased for each household and homeowners may object to paying for any increase in cost (carts can be financed).
- The costs of implementing and maintaining a containerized system compared to bags could be prohibitive unless the cost can be spread out over time.
- If carts are owned by the City, additional administration is required to manage carts – if residents move, carts are lost, etc. Cart maintenance can be contracted out.
- Difficult to monitor contamination (oil containers in garbage, etc.) as operator does not leave truck.
- Might be inconvenient for some residents because of the room needed to store the carts and to put them out properly on the curb on collection day.
- Trucks may have difficulties to collect the carts in specific areas such as cul-de-sacs.
- In order to allow back lane collection with overhead lines, additional retrofit to collection truck may be required.
- Cost to retrofit collection trucks for fully automated system is estimated to be \$40,000 to \$50,000.

5.1.2 Semi-Automated Collection

Semi-automated collection is also based on a cart system. Carts are manually rolled to the collection truck by an operator, attached to a “tipper” or mechanical arm which is then automatically lifted and emptied into the truck. In Alberta, most semi-automated trucks are either side load or rear load.

Advantages

- Semi-automated trucks are able to get into more restricted spaces which could allow back lane pickup to continue if required (1 m distance restriction is eliminated).
- Operational cost efficiencies is the same as in fully-automated collection, however semi-automated collection time is longer (estimated at ~ 30 seconds/household rather than 15 seconds for fully automated trucks).
- Retrofits for semi-automated collection are simple and relatively inexpensive (~ \$7,000 or less per truck), although most collection service providers in Alberta have automated collection capabilities.

- Provides opportunity for public education through operator inspections (i.e. if organics collection program is in place, operator can check load before or after it is emptied for contamination and apply sticker, etc. according to the program) without any significant impact to collection time.
- Semi-automated system can be implemented and easily scaled up to fully-automated system.

Disadvantages

- In long term, collection is expected to go to full-automation. If semi-automated collection is selected to maintain back lane collection, this essentially postpones the change to front lane collection.
- Collection trucks can damage back lane roadways that are not designed for heavy vehicle traffic, thus significantly increasing costs.

Advantages and disadvantages of carts are the same for both fully- automated and semi-automated systems.

5.1.3 User Pay Systems/Volume Limits

The amount of garbage that can be put out for collection is limited according to specified container (bag or cart). Residents must pay additional amount for over-limit waste. Some communities have implemented volume limits for the commercial sector as well. Weights by household systems are beginning to be implemented in the United States. In Canada, approval of weight systems for waste is still under review by Measurement Canada.

Advantages

- Establishes incentive to reduce waste and to use recycling and compost systems.
- Focus on waste disposal leads to decreased waste generation on its own as public think more about their waste generation and habits.
- Financially more attractive in long run as landfill costs rise.
- Volume limit can help achieve significantly higher levels of waste reduction and cost savings which can be applied to enhanced diversion programs.
- Volume limit can be reduced over time to achieve increasingly higher levels of waste reduction.
- Residents are made aware of the volumes of waste they generate.

- Without waste reduction, overall waste management program becomes too expensive as both waste and recycling costs remain high (decrease in waste costs offset costs of recycling and composting infrastructure).

Disadvantages

- Can be inconvenient for residents who generate large quantities of waste each week.
- Equity of limits is sometimes challenged (should a large family be limited to same amount as a single person).
- Incidents of illegal dumping can rise if effective awareness and enforcement mechanisms are not established. (Generally, if illegal dumping occurs it is in the first 6 months. Illegal dumping has not been an issue in Alberta communities that have implemented two-bag/1 cart limits).

5.1.4 RFID Tracking Systems

Radio Frequency Identification Device (RFID is a small electronic devices that consists of a small chip and an antenna. Carts with RFID emit radio signals that enable an electronic reader to collect key data on the cart's use. The RFID serves the same purpose as a bar code; it provides a unique identifier for that object but unlike traditional barcode, the RFID tags can be read from a distance. RFID technology is now available with carts (Strathcona County, Devon, St. Albert and Medicine Hat's carts have RFID chips). Coupled with proper software and hardware, RFID cart systems allow for improved scheduling, billing, routing efficiencies, maintenance and inventory tracking. Municipalities can subscribe to a web-based program (at a certain fee/cart), which collects the data from the RFID. Municipalities can log on to the website and obtain real-time data. This is currently being used in the City of Medicine Hat. As the supplier collects data from municipalities across North America, knowledge and information on system efficiencies and data use is pooled and shared.

Advantages

- Provides real-time service verification
 - RFID software can record when and from which container garbage is picked-up and disposal took place and can record what actually is being collected and transported.
- Increases accountability of haulers.
- Residents can receive faster customer service data.
- Provides option to implement incentive program if RFID technology on organics and/or recycling carts (e.g. coupons).

- Allows more effective cart maintenance – cart history is tracked and can provide prompts for maintenance or replacement.
- Provides a range of tracking options, for example:
 - To track routes, data can be linked to a GPS system, which shows where collection has occurred and the ones remaining.

Disadvantages

- The technology is relatively new to the waste sector.
- Currently only one proven system in Canada (have supplied RFID carts to Strathcona County, Devon and Medicine Hat). Supplier is looking for pilot community in Alberta.
- Requires technical know-how to make the most use of data provided. Subscription to web-based program assists with this.
- Durability of chip.
- Software to track RFID data costs \$10,000 to \$20,000.

5.2 Fort Saskatchewan's Current System

The street cart and equipment evaluation for the pilot program carried out by Advanced Enviro Engineering Ltd. (AE) shows some issues with the current vehicle being used and some challenging features in the communities' street collection and street lay out (*videos related to the current collection system in Fort Saskatchewan and related issues are provided in the attached CD*).

- **Rear Lane**

The first issue observed is the back lane which is a cramped driving space, has limited area for carts set out and is more challenging to manipulate the lifting arm of the truck.

Some of the residents interviewed in the pilot project areas were frustrated by the lack of room and that the footprints of the carts take up too much space. A major problem seems to be setting out the carts in a location where the drivers could access them without getting out of the vehicles.

When these inconveniences become the norm they reduce program participation.

The automated collection truck loses its efficiency, as getting out of the vehicle defeats the design of the fully automated collection truck.

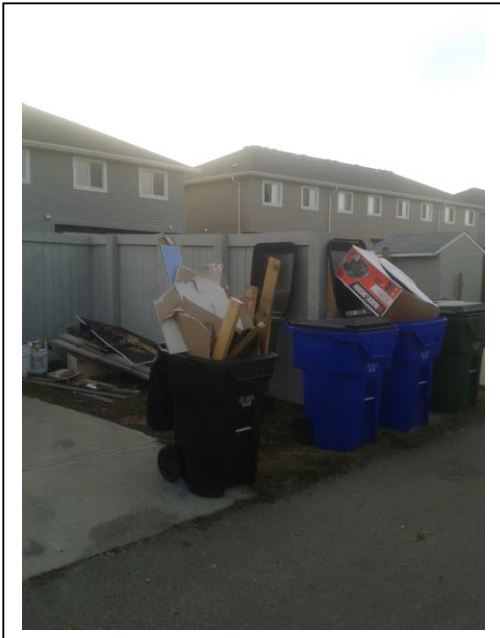


Figure 5.1 Carts set out in a rear lane

Possible solutions:

1. different cart sizes and models
2. different truck designs
3. collections on different days

- **Cul-de-sac**

The ability for a collection vehicle to travel around the streets and collect and empty carts in an efficient manner is essential to route optimization. A truck that is unable to get into a position to pick up and empty a cart must manoeuvre further to accomplish its tasks.

1. This may require backing up, a dangerous manoeuvre on a public street. It also increases stop time.
According to the statistic 50% of accidents happen when a truck is backing up.
2. Extending the lifting arm to maximum and finessing the cart into a position where it can be emptied.
This reduces the efficiency of the collection by increasing the time at each stop.

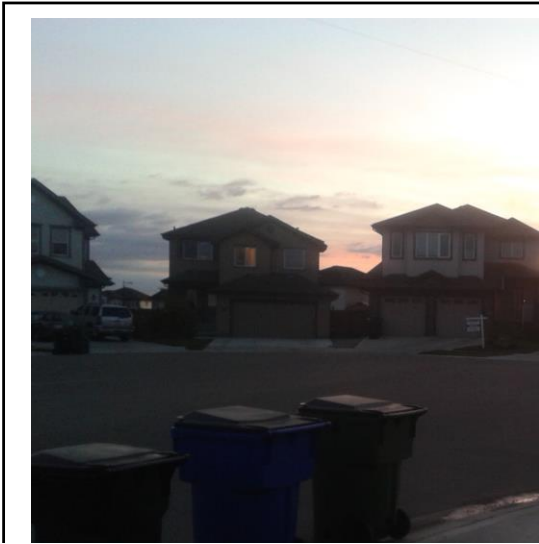


Figure 5.2 Carts set out on a cul-de-sac

Interviews with residents showed that setting out the carts for collection is most of the time challenging as no room is left when cars are parked on the road.

Possible solutions:

1. different truck designs
2. collections of different streams on different days

5.3 Truck and Cart Technology

There has recently been a great deal of work in the design of carts and trucks.

One of the main objectives of the pilot project study was the development of comprehensive diversion programs to collect garbage, recyclables and organics. These streams create some of their own unique challenges such as matching up needs with the best technology available.

The following analysis is a preliminary evaluation of different side loader trucks currently available on the market that might improve the performance of the current collection programs in Fort Saskatchewan.

In general best cost is achieved by reducing stop time and increasing density on the truck.

Some of the trucks analysed would improve collection of one of the three streams more than the others, or would add an advantage to the quality of the program.

The most important benefits are related to fuel consumption, safety and route efficiency.

Videos of all the different truck systems are provided in the attached CD.

1. HEIL

The City of Fort Saskatchewan currently uses a Heil Payton automated arm (contractor owned) for the automated collections in the pilot program areas.

Characteristics:

- 8 second lift cycle (declared by Heil but Advanced Enviro staff calculated around 10-11 seconds)
- 9-foot reach.

Other Heil options:

a. HEIL ODYSSEY Automated Front Loader (AFL) with integrated CUROTTO-CAN

The Curotto-Can automated carry can has three main design innovations:

1. the arm is in front of the steer axle
2. it utilizes the front loader platform
3. it has a low lifting arm

The key factor in residential waste collection efficiency is how long a truck is stopped in front of a house for a service. The longer the loading cycle, the lower the efficiency. With a front loader equipped with a Curotto-Can automated carry can, stop time (measured from wheel stop to wheel go) is 5 seconds as compared to 12-18 seconds for the other automated side loaders (ASL).

Comparison by Heil:

- ASL does 10 services @ 10 seconds = **100 seconds**

- Curotto-Can does 10 services @ 5 seconds + 20 second arm/fork cycle = **70 seconds**

AE staff calculated (through direct observation) a lift cycle of 7-8 sec + fork cycle

Advantages:

- ✓ Very fast
- ✓ Design allows manual collection when necessary
- ✓ A front loader offers a large hopper which allows pick up of a wide range of materials, including bulky items like furniture and appliances. Front loaders also have far greater packing pressure and a larger packing blade than an automated side loader, thus more material can be more densely packed into the body.
- ✓ Organic liquids are contained better both when emptied in front loader platform and cycled into the truck's hopper.

Downside:

- ✓ Shorter arm compared to other models (around 6-foot reach)
- ✓ Very long cabin with the front loader platform
- ✓ Possible debris dispersion during arm/fork cycle.



Figure 5.3 Heil Odyssey AFL with integrated Curotto-Can

This vehicle has an ability to reach tighter corners during collection and allows the driver to have direct visibility to the cart he is approaching. Drivers can see contamination in the front loader platform and can remove it before it is off-loaded into the truck.

Truck can also be used for multi-unit and commercial collection.

There are many trucks in service in the USA and a smaller number in Ontario.

Note: the use of this design needs to be checked with Alberta weight restrictions.

See video: "Heil Odyssey AFL with integrated Curotto-Can - GoPro Garbage Pickup!" in the attached CD.

b. HEIL'S STARR SYSTEM

Heil's STARR System is patented as the industry's only semi-trailer refuse and recycling collection system. The STARR consists of an automated arm mounted on a truck tractor, and a detachable semitrailer packer body. This design allows the STARR to circlearound other "straight frame" trucks, go around cul-de-sacs with ease, and in and out of tight spots with less potentially dangerous backup.

The STARR System uses Heil's Rapid Rail body design. The automated arm has an 8-foot reach, 1,600 lb. lift capacity, and 8-second cycle time.



Figure 5.4 Heil's STARR

Advantages:

- ✓ Very fast (8-10 second cycle time)
- ✓ Go easily around cul-de-sacs

Downside:

- ✓ Manual collection is not possible
- ✓ Shorter arm compared to other Heil models (around 8-foot reach),
- ✓ Very long overall length

2. ROTOPAC BY GINOVE

Auger type automated side loader.

This fully automated vehicle is the first auger compacted vehicle in North America. It has a compaction ability that is 30% above the industry norm allowing a shorter wheel base for tighter corners (more precise cart collection and a 12 foot reach).

The truck's hopper is better sealed and hence organic collection is cleaner. Furthermore organic materials are shredded reducing the work at the processing site.

Currently used in Quebec by Matrec.



Figure 5.5 Rotopac by Ginove

Advantages:

- ✓ Long arm, 12-foot reach, very efficient in cul-de-sacs.
- ✓ High compaction in the truck's body

Downside:

- ✓ Slower than other bodies: 10-11 second lift cycle
- ✓ Possible issues with auger efficiency and maintenance costs

See video: "Rotopac by Ginove" in the attached CD.

3. LABRIE - Expert Dual Helping-Hand - Side Loader

The Expert Helping Hand is a drop frame, side loading unit adapted for manual or fully automated waste collection operations on both sides. In the case of one way streets, the operator will always be in the same direction as the traffic.

Advantages:

- Has fully automated designs with dual arms
- Allows collection on both sides of lanes and one way streets
- Drop frame allows some access to check for contamination and manual collection if needed
- Saves time on route and fuel costs
- Lift cycle: 9-10sec

Downside:

- Grabs roller carts within less than a foot (30 cm) and at a maximum distance of 6 feet (1.83 m) from the vehicle



Figure 5.6 Expert Dual Helping-Hand

The Expert Helping Hand is currently in use in Spokane, WA and City of Milwaukee, WI. Other fully automated designs are used in the City of Calgary.

See video: "New Expert Dual Helping Hand Video" in the attached CD.

4. McNEILUS

The McNeilus automated side loader is similar to Heil Payton automated arm (8-foot reach feet) but with a slower lift cycle (14-15sec).



Figure 5.7 McNeilus auto reach automated side loader

See video: “WM McNeilus Garbage Trucks” in the attached CD.

5.4 Cart Options

There are many new designs of carts for the multiple streams currently collected by the City of Fort Saskatchewan.

Different carts can overcome some collection challenges for the different materials collected such as:

- Carts better suited for winter collection (less sticking of frozen materials) and easier to clean (number one complaint of residents in compost collection)
- Thinner cart width (saves storage space)
- Quiet lids and wheels (makes collection time less annoying).

5.5 Findings from current system equipment evaluation

Back Lane

- Back lane is a cramped driving space which has limited area for carts set out and is more challenging to manipulate the lifting arm of the truck.
- Some of the residents interviewed in the pilot project areas were frustrated by the lack of room and that the footprints of the carts take up too much space. A major problem seems to be setting out the carts in a location where the drivers could access them without getting out of the vehicles. When these inconveniences become the norm they reduce program participation.
- The automated collection truck loses its efficiency, as getting out of the vehicle defeats the design of the fully automated collection truck.

Cul-de-sac

- For route optimization, a collection vehicle should be able to travel around the streets and collect and empty carts in an efficient manner.
- A truck that is unable to get into a position to pick up and empty a cart must further manoeuvre and require backing up which is dangerous on a public street. It also increases stop time.
- Based on statistics, 50% of accidents happen when a truck is backing up.
- Extending the lifting arm to maximum and finessing the cart into a position where it can be emptied reduces the efficiency of the collection by increasing the time at each stop.
- Interviews with residents showed that setting out the carts for collection is most of the time challenging as no room is left when cars are parked on the road.

The use of carts gives the following benefits:

- Cart design (ventilation, lids, and holding capacity) allows for year round collection of organics (food and yard waste) and varied collection frequencies.
- Carts allow every two week garbage collection (if coupled with other diversion programs such as organics collection).
- Acceptable volumes of waste are easier to establish with a cart than with bags if a volume limit is imposed – i.e. 1 cart/household.
- Reduces ripping of bags from animals and rodents.
- Uniform system.
- Come in various sizes.

Different cart types and configuration have other benefits. For example:

- **New round bottom carts do not freeze in winter and** negate the need for a grate allowing moisture to collect at the low point which allows the rest of the material to stay aerobic. Grates trap organic materials at the bottom of the cart which are smelly and hard to clean.
- **Thinner width carts** take up less space in storage area.

6.0 FINDINGS AND RECOMMENDATIONS

6.1 Findings

Findings from interviews include the following:

- Interviewee supported bi-weekly (every two weeks) organics collection during the winter.
- Interviewee suggested using blue bags instead of blue carts for recyclables. This reduces the number of carts and the issue of fitting bulky cardboards in the cart.
- Interviewee suggested different collection day for the different waste streams so that residents have enough space to park their cars when carts are set out for collection. (This could be included in the updated bylaw).
- 80% overall diversion rate is achievable mainly through organics program and with enhanced communication program.
- Interviewee suggested waste management system should be cost effective and efficient; residents appear to be willing to pay no more than \$26 - \$30 per month per household for a better service (currently \$24).

Findings from current solid waste and diversion data review include the following:

- The City of Fort Saskatchewan's current residential waste diversion rate (2013) is **18%**. Although per capita waste production is declining, diversion rate is also declining.

Findings from the waste sort in the non-pilot areas include the following:

- Organics comprise 57%, by weight, of the total garbage sorted. This is expected as there is no organics program in the non-pilot area.
- Twelve percent (12%) of the total garbage sorted was comprised of recyclables and 6% were items that could be taken to the Transfer Station.
- Recyclables sorted from the blue bags had 7.4% contamination.
- Organics comprise 44% of the total waste (garbage and recyclables) sorted.
- Based on volume evaluation, households in the non-pilot area generate approximately one (1) blue bag and two (2) garbage bags per household per week.

Findings from the waste sort in the pilot program areas include the following:

- Organics comprised 43%, recyclables 13%, Transfer Stations items 7% and potential donation items 3% of the total garbage sorted. This shows that residents are using their three carts (garbage, organics and recyclables) inefficiently as well as the service at the Transfer Station.
- Contamination in the blue carts for recyclables comprised 15% (9% garbage and 6% organics).
- The green cart seems the most effective cart as there was almost no contamination (0.5%).
- Yard waste comprised 89% of the organics sorted as study was conducted in September.
- Out of the total waste sorted (garbage, recyclables and organics), organics comprised 75%, recyclables 12%, garbage 10%, Transfer Station items 2% and potential donation items 1%.
- Based on the volume evaluation in the pilot program area, on average, **black carts for garbage are ½ full, blue carts for recyclables are ⅓ full and green carts for organics are ¼ full.**

Findings from estimated annual garbage generation rate include the following:

- Based on the waste sort in the non-pilot and pilot program areas, a total of approximately 4,916 tonnes of garbage will be disposed in the 2014. The actual amount of garbage disposed in 2013 was 4,803 tonnes. This indicates that the results of the waste composition are reflective of the actual behavior and composition.
- Based on the data analyzed, the Transfer Station could be better used (6% of the garbage sorted in the non-pilot area and 7% of the garbage sorted in the pilot program area could be taken to the Transfer Station).

Non-Pilot Area

- City is not capturing about 1,935t of organics (58%) of the total garbage disposed of in the non-pilot area
- The blue bag program could capture additional 395t of recyclables (12%) through effective communication and education programs.

Pilot Program Area

- Results show that the green cart program is not capturing about 195t of kitchen waste (43%) of the total garbage disposed of.
- The blue cart program could capture additional 57t of recyclables (13%) through effective communication and education programs.

Findings from curbside diversion rate analysis (amount diverted from landfill) include the following:

- Non-pilot area has a diversion rate of **22%** from the blue bag program.
- Non-pilot area could divert additional 9% through blue bag program, 5% through Transfer Station and 45% through organics program. Yard waste brought to the Transfer Station has not been factored into the diversion rate, and as such it is

expected that the actual diversion rate is much higher. Further survey of material at the Transfer Station is recommended.

- **Pilot program area has 70% diversion rate through blue and green cart programs** (primarily from yard waste (64%)).
- Pilot program area could divert additional 20% through green cart (13%), blue cart (4%) and Transfer Station (2%).

Findings from curbside diversion capture rate (what is available to be captured from waste stream) include the following:

- Forty three percent (43%) of organics per year end up in landfill in non-pilot areas.
- In the non-pilot area, the blue bag program has 71% capture rate whereas in the pilot program area the blue cart has 73% and the green cart has 85% capture rate.

Common findings non-pilot and pilot program areas survey

- Response rates are overall representative of the population.
- Almost all respondents know their garbage day and are satisfied with the day.
- Ninety four percent (94%) of the respondents don't want garbage day to be rotated.
- In general respondents use the different services offered at the Transfer Station and this should be encouraged.
- Majority of the respondents (66% - 67%) want late operation hours (i.e. till 8pm) at the Transfer Station. From other municipal surveys conducted by the consultant, Mondays are consistently the least used day and can be closed to accommodate longer operating hours on other days.

Findings from non-pilot areas survey

- **In general there is support for organics program in the non-pilot area** (43% from survey support organics program and 18% are unsure).
- Approximately sixty percent (60%) of the respondents use cans to store their waste (garbage and/or recyclables).
- More than half of the survey respondents (58%) seem concerned about cart storage or placement or ease of use.
- Eighty percent (80%) of the respondents generate up to 2 bags of garbage per week and eighty-five percent (85%) generate up to 2 bags of recyclables per week.
- Majority of the respondents (68%) divert their yard waste from the landfill.
- Ninety three percent (93%) and 69% of the respondents want weekly garbage and recyclables collection respectively.
- There is resistance to change (garbage limit, fees based on amount of garbage and/or user fees for optional services) from residents; education of residents first before implementing changes will be needed.
- There is need for education regarding benefits of waste reduction (e.g. cost and other).

Findings from survey from the pilot program areas

- **In general, there is high support for the cart system (waste separation at source).**
- **Sixty nine percent (69%) of the respondents indicated that organic waste collection is a valuable service to them.**
- **Residents who participated in the pilot had significantly less concerns (54%) with organics separation than persons who had not tried it.**
- **Seventy percent (70%) of the survey respondents prefer to use carts than bags and/or cans.**

- Some of the survey respondents use the green cart for yard waste only. This was also noticed during the waste sort that many residents in the pilot area are not putting food waste in the organic carts.
- 30% of the respondents set out their garbage carts (black cart) less often than every week as well as almost 50% and 75% set out blue and green cart respectively less often than every week.
- Fifty four percent (54%) of the survey respondent's black carts for garbage are half or less full and thirty seven percent (37%) are more than $\frac{3}{4}$ full every week. Forty six percent (46%) of the respondent's blue carts for recyclables are half or less full while forty five percent (45%) are $\frac{3}{4}$ or full each week. Sixty eight percent (68%) of the survey respondent's green carts for organics are $\frac{1}{2}$ or less full every week.
- A high percentage of respondents (80% for garbage, 67% for recyclables and 47% for organics) selected that waste should be collected weekly. This is an indication that the cost implications of Cadillac service (garbage, recyclable, and organic collection weekly) has not been communicated to the residents. Residents clearly stated under 'comments or suggestions' section at the end of the survey that cost is important.
- Approximately fifty percent (50%) of the survey respondents have rated both the kitchen can and compost bags supplied as good. It has been learned from other programs that if garbage collection is reduced, the use of kitchen cans and compost bags will increase.
- More than 60% of the respondents do not support a garbage limit, fees based on amount of garbage and user fees for optional services.

Findings from current system equipment evaluation

Back Lane

- Back lane is a cramped driving space which has limited area for carts set out and is more challenging to manipulate the lifting arm of the truck.
- Some of the residents interviewed in the pilot project areas were frustrated by the lack of room and that the footprints of the carts take up too much space. A major problem seems to be setting out the carts in a location where the drivers could access them without getting out of the vehicles. When these inconveniences

become the norm they reduce program participation.

- The automated collection truck loses its efficiency, as getting out of the vehicle defeats the design of the fully automated collection truck.

Cul-de-sac

- For route optimization, a collection vehicle should be able to travel around the streets and collect and empty carts in an efficient manner.
- A truck that is unable to get into a position to pick up and empty a cart must further manoeuvre and require backing up which is dangerous on a public street. It also increases stop time.
- Based on statistics, 50% of accidents happen when a truck is backing up.
- Extending the lifting arm to maximum and finessing the cart into a position where it can be emptied reduces the efficiency of the collection by increasing the time at each stop.
- Interviews with residents showed that setting out the carts for collection is most of the time challenging as no room is left when cars are parked on the road.

6.2 Recommendations

Based on data analysis and results obtained in this study the following recommendations are provided for the City of Fort Saskatchewan to make an informed decision regarding its waste management system going forward:

1. **A clear waste diversion goal in terms of percent diversion desired and at what cost should be determined for Fort Saskatchewan.** This could be asked on a future survey. **A clear goal allows better program design. In lieu of a goal it would be reasonable to pick 60% diversion by the year 2020 if the full scale organics diversion program is implemented.**
2. **Expand organics collection citywide. Use a cart and automated collection system for the organics waste stream.** Based on the waste sort results, organics comprise 57% of the total garbage sorted in the non-pilot area. This is expected as there is no organics program in the non-pilot area. **Surveyed**

residents who participated in the pilot had significantly less concerns with organics separation than persons who had not tried it.

3. **Include options to expand the cart system for recyclables and garbage collection on the next waste collection tender.** Shifting to carts is acceptable as approximately 60% of the survey respondents in the non-pilot areas indicated that they use cans to store their garbage and/or recyclables. The benefits of carts include:
 - One man automated collection lowers labour costs.
 - Elimination of manual lifting reduces injuries and Workers Compensation claims.
 - Reduced collection time per household reduces labor, fuel costs and greenhouse gas emissions.
 - Reduces ripping of bags from animals and rodents.
 - Uniform system.
 - Come in various sizes.
4. **Implement bi-weekly (every two weeks) garbage collection.** Based on the volume observation, and confirmed by the survey, residents in the pilot program areas generate approximately ½ full black cart of garbage (equivalent to 2 garbage bags) per household per week. Residents in the non-pilot area also generate approximately 2 garbage bags per household per week. Current garbage cart (65 gal or 240L) holds 2 weeks of garbage (4 bags) enough to hold the garbage even after the reduction from the pilot. Bi-weekly collection will help the City save money. **This also helps alleviate storage and carts placement concerns raised by survey respondents.** The garbage cart in effect sets the limit on garbage.
5. **Implement bi-weekly (every two weeks) organics collection during the winter, weekly collection during the summer, and also switch to a smaller cart (360L to 240L). Allow biodegradable bags or paper bags for extra yard waste in the summer.** Based on the volume observation, residents in the pilot program areas generate approximately ¼ full organics carts (95 gal or 360L) per household per week. **This also alleviates cart storage and placement concerns survey respondents raised.**
6. **It is recommended to supply residents with a kitchen can for household organics** as approximately fifty percent (50%) of the pilot survey respondents said the kitchen can and compost bags supplied are good. It has been learned

- from other programs that **if garbage collection is reduced, the use of kitchen cans and compost bags will increase.**
7. **Maintain weekly collection of recyclables.** Based on the volume observation, residents in the pilot program areas generate 1/3 full recyclable cart (95 gal or 360L) per household per week. **Switch to a smaller cart (360L to 240L). This also alleviates cart storage and placement concerns raised by survey respondents.**
 8. **It is recommended to collect different waste streams on different days as the automated collection equipment currently used in Fort Saskatchewan shows some limitations especially in rear lanes and cul-de-sacs due to lack of space for carts on the roads. This also reduces the large footprint that the carts take and difficulties that residents face.**
 9. **It is recommended that residents have a choice of cart size. Size of garbage cart should not exceed the size of recyclables or organics cart. This will help accommodate storage and cart placement.**
 10. **Implement a stronger communication and education program. An effective program includes a strong social marketing technique.**
 - Based on the waste sort results in the pilot program areas, 43% of the garbage sorted was organics, 13% was recyclables and 7% were items that could be recycled through the Transfer Station. This shows that the three carts could be more effectively used. **Effective communication and educational programs can increase the City's overall diversion rate.**
 - The blue cart program in the pilot program area had approximately 15% contamination and 73% capture rate while the blue bags program in the non-pilot area had 7.4% contamination and 71% capture rate which suggests **a need for effective visual communication materials that show what items goes where.**
 - **It is recommended to educate residents on what goes in the green cart** to increase kitchen waste capture rate and organics diversion as most residents based on waste sort and survey use the green cart for yard waste only.

- Council and City staff interviews reinforced the need and desire for **public education programs as well as educational programs about recycling in schools.**
 - **It is recommended that the City should educate residents first before implementing program changes** as majority of the residents expressed resistance to change. Residents should be told that full 3 carts collection every week would be a large cost increase. **Residents noted cost effectiveness is a number one priority for Fort Saskatchewan residents.**
 - **It is recommended to educate residents regarding benefits of waste reduction** specifically by reducing the risk of more landfills, reducing greenhouse gas generation, increasing reuse and recycling of waste. (Canadians are top generators of waste in the world). Also it needs to be communicated that this can be done cost effectively with certain changes in level of service (i.e. garbage collection every two weeks and cart size setting a garbage limit).
11. **It is recommended to review the parking by-law for collection day, including a provision for collection day when carts are set out.**
12. **Update garbage by-law to clarify cart placement rules. This will minimize resident's concerns.**
13. **It is recommended to further evaluate the suitable cart TYPES and configurations** as many options are available on the market.
14. **It is recommended to open the Transfer Station until 8pm** as majority of the respondents (66%) requested this. From other municipal surveys conducted by the consultant, Monday is consistently the least used day and can be closed to accommodate longer operating hours on other days. Do a quick survey by Transfer Station operator of Transfer Station users to confirm which days of the week to close.
15. **It is recommended to evaluate alternative side loader trucks to reduce lifting arm manipulation challenge for the truck driver as well as dangerous backups on a public street.** Side loader trucks with longer lifting arms are available on the market (Rotopack) and/or semi-trailer refuse and recycling collection systems that allow the truck to run circles around cul-de-sacs (Heil's STARR). **"Less stops, more density, allows least cost service".**

16. **It is recommended to expand the variety of materials accepted at the Transfer Station to include aerosols, pesticides, etc. that are currently only accepted at the Toxic Round-Up to limit the risk of this material in the neighbourhood and to limit cost.**
17. **It is recommended that an incentive program be provided to persons who help reduce costs by managing their waste directly (e.g. home composting, bring material directly to Transfer Station / Recycle Depot). These activities reduce system costs and increase value of materials recovered.**
18. **It is recommended to conduct another waste sort to evaluate seasonal fluctuations.** Based on the waste sort, the total waste generated in the pilot program areas is composed of 75% organics because it was conducted in September, which reflects fall cleanup. Normal annual average is approximately 50%. Summer and winter volumes fluctuate.
19. **It is recommended to complete a waste sort and analysis of waste at the Transfer Station and from properties receiving front-load service.**
20. **It is recommended to conduct a waste sort every two years to monitor trends and evaluate the effectiveness of waste reduction and diversion programs.** This also helps to evaluate the contamination rate of the material collected and the success of the communication/education programs and to constantly evaluate the overall progress of the City's Solid Waste Management Strategy.
21. **Implement a 'tag' system for extra garbage bag or extra carts to accommodate occasional times when excess garbage cannot be avoided.** Residents could be allowed to purchase tags for extra bags of garbage or require to pay a higher fee for an extra cart.
22. **A full cost analysis is recommended.**
23. **It is recommended that the survey and full study results made publicly accessible.**

7.0 PROJECT LIMITATIONS

This project was completed to the best of the consultants' abilities and in accordance with the APEGA Code of Ethics. The report was based on the information and data reviewed to the extent that the information was available and to the extent considered reasonable within the allocated project time frame and project budget. Advanced Enviro Engineering Ltd. and the environmental consultants who prepared this report do not accept any liability for information that is not within the scope of the project and not identified in the final report.

The purpose of the report is to provide the client with further information in order to make a well-informed decision. This report is specifically for use by the client and for the purpose the consultant agreed to with the client. This report is a confidential document for the client and will only be distributed with the client's and the consultant's permission. One copy of the report will be maintained in the consultant's files as required by APEGA.