



CITY OF VANCOUVER

Street Litter Audits

2019 Results



November, 2019 – 19-1393

November 12, 2019



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Street Litter Audits – 2019 Results

Dear Dave:

Dillon Consulting Limited is pleased to present the City of Vancouver with the 2019 street litter audit results. This report summarizes the information collected during the street litter audits that took place September 16-19, 2019. Through this report, we believe that we have efficiently provided an overview of the current accumulation and composition of litter at the City of Vancouver's 110 pre-selected litter site locations. These results have been compared to the baseline audits completed in 2015 and follow-up audits that occurred in 2017 and 2018.

Thank you for the opportunity to assist you once again with this important assignment. We look forward to discussing this report with you and supporting your ongoing litter and waste management initiatives.

Sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in black ink, appearing to read "Klaryssa Lawrie".

Klaryssa Lawrie, B.Sc, EPt
Project Manager

KL:js
Our file: 19-1393

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Executive Summary

The City of Vancouver (City) retained Dillon Consulting Limited to conduct the City's fourth round of street litter audits at 110 pre-selected locations within Vancouver. Of the sites audited, 108 were identical to those audited in the baseline (2015), 2017 and 2018 audits. Two additional sites were added in 2019 as it was recognized that there were no sites in the Marpole neighbourhood of the City. These sites were added into the overall analysis to provide a better representation of street litter in Vancouver.

The audits took place from September 16-19, 2019. The 110 sites were audited with the purpose of providing a 'snapshot' assessment of the composition and amount of accumulated litter present on the streets of Vancouver. Two types of litter were assessed:

- Large litter - any litter that is equal to or larger than four square inches; and
- Small litter - any litter that is smaller than four square inches.

Within each site, a site survey and assessments on large litter and small litter were completed. An additional assessment, referred to as a 'supersite' evaluation, was completed at 19 of the pre-selected sites (approximately 1 out of 6). A supersite evaluation refers to a more thorough assessment of small litter within the site. It should be noted that during the baseline audit, two sites were unable to be audited because they were inaccessible. These sites were therefore not audited in the follow-up audits that occurred in 2017, 2018 or in the 2019 street litter audits. Four sites in 2019 were situated immediately adjacent to active construction. In the analysis, these four sites were removed and analyzed separately.

The key findings of the large litter assessment were:

- The average number of large litter items per site was 10.7 pieces for sites with no construction; this remained the same if the sites with construction were included in the overall analysis.
- The most common categories for large litter observed were 'other miscellaneous' (26%), paper/fibre materials (19%) and cups (12%).
- The total large litter audited in 2019 was 1,179 pieces for both non-construction (1,135) and construction sites (44).

The key findings of the small litter assessment were:

- The average number of small litter items per site was 7.5 pieces for sites with no construction and 7.3 if the sites with construction were included in the overall analysis.
- The most common categories of small litter observed were chewing gum (25%) and cigarette butts/debris (21%).

The total small litter audited in 2019 was 803 pieces for both non-construction (793) and construction sites (10).

Supersite audits were completed within 19 sites. The key findings of the supersite assessments were:

- The average number of small litter items per site was 247.2 pieces of small litter.
- The most common categories of small litter observed in the supersites were chewing gum (52%) and cigarette butts/debris (27%).
- The total small litter audited in the 2019 supersites was 4,697 pieces.

1.0

Introduction

The City of Vancouver (City) is home to over 630,000 residents across an area of 114 km. A bold initiative of Vancouver is to be recognized as the *Greenest City* in the world by the year 2020; effective management of waste is an integral part of achieving this initiative. The City's *Greenest City Action Plan* 2015-2020 (GCAP) was approved by City Council in 2011 along with high priority actions to work towards achieving the 10 goals and targets outlined in the GCAP. Of relevance to the street litter audit, *Goal 4: Zero Waste* of the GCAP aims to reduce solid waste going to landfill and incinerator by 50% from 2008 levels. More specifically, the litter audit is an important step towards achieving Action 4.3 of the GCAP which targets the reduction of street litter and abandoned garbage in public spaces. This includes illegal dumping, and increased diversion of these materials through implementation of a comprehensive litter management strategy. Specifically, the City would like to target commonly disposed and difficult to recycle materials which would be identified as a part of the street litter audits.

More recently, Vancouver's Single-Use Item (SUI) Reduction Strategy has been developed as a priority action within the City's Zero Waste 2040 Plan. The Strategy was created through consultation and input of over 8,000 people from October 2016 to April 2018, with actions to 2025. The objective of the Strategy is to reduce the use of plastic and paper bags, expanded polystyrene foam take-out containers and cups, disposable hot and cold drink cups, take-out food containers, and single-use straws and utensils. Many of these SUIs are identified in this and previous litter audits. The Strategy includes bans, requirements for businesses, and actions that (among other priorities) are intended to minimize litter and garbage resulting from single-use items. Ongoing street litter audit are a valuable means to monitoring progress towards this goal.

The City retained Dillon Consulting Limited (Dillon) to conduct street litter audits at 110 pre-selected locations within the public realm across the City. The audits took place from September 16-19, 2019. This is the fourth round of audits completed for the City. In the previous three audits, 108 sites were assessed for street litter. In 2019, two new sites were added as it was observed that no litter sites were in the Marpole neighbourhood. Two new large litter sub-categories were added to the "Take out Extras" category in 2019. These sub-categories included straws and stir sticks. These additions will be information utilized to inform action implemented as a result of the SUI Reduction Strategy.

A baseline assessment was completed in the fall of 2015. The 108 sites were audited with the purpose of providing a 'snapshot' assessment of the composition of the accumulated litter present on the streets of Vancouver. Types of litter were classified into two categories:

- Large litter - equal to or larger than 4 square inches; and
- Small litter - smaller than 4 square inches.

Within each site, a site survey (relevant information about the litter site and the surrounding vicinity), a large litter assessment and a small litter assessment were completed. Within 19 of the pre-selected sites a supersite audit was also completed. It should be noted that in 2015 two sites were unable to be assessed due to lack of access (Site 29 and Site 99). These sites were subsequently not included in any of the follow-up audits. The site distribution map is provided in **Appendix A**.

The main objectives of the street litter audits included:

- A detailed analysis of large litter items within the survey area;
- A detailed analysis of small litter items that fell within three small subsections of each survey area;
- A detailed analysis of small litter items in ‘supersites’ found within 19 of the survey areas;
- Analysis and reporting of results with a focus on a comparison to the 2015 baseline results and other municipalities, and
- Analysis and reporting of results with a focus on a comparison to the follow-up results from 2017 and 2018.

Dillon staff were asked to note if any sites had construction occurring immediately adjacent the pre-selected site. There were four sites noted (Sites 28, 68, 74 and 103). In the analysis, these four sites were removed and analyzed separately.

2.0

Methodology

Dillon staff completed litter assessments on the same 108 sites that were selected for the baseline street litter audits in 2015, and audited again in 2017 and 2018. Two additional litter sites were added in 2019 (sites 111 and 112). As noted, these were added to ensure representative litter sites were included for the neighbourhood of Marpole. This section of the report provides a brief overview of the street litter audit methodology. The detailed methodology is provided in **Appendix B**.

2.1

Conducting the Litter Audit

Dillon staff followed the same standard litter audit methodology used in the 2015, 2017 and 2018 audits. Areas were measured to be 200 feet x 18 feet, whenever possible. When an audit area was full sized (i.e., 200 feet x 18 feet), it was termed a “fixed site”. The site width may have been less than 18 feet in certain cases. This included scenarios such as when residential property lines exist or when a commercial storefront was less than the prescribed distance. In these cases, each site was 200 feet in length by the available width. These sites are termed “variable sites”.

From the beginning of the pre-selected site, the team used a measuring device to measure 50 feet ahead of the start of the site. Using a temporary marking method (e.g., pylons), a mark was made on the pavement to denote the starting point of the pre-selected audit site. From this point the team used a measuring device to measure 100 feet, marking the roadway with another temporary identifier to show the mid-point of the site. A final measurement of an additional 100 feet denoted the end of the audit site.

The width measurements were taken at the start, midpoint and end of the site. The width of the site was measured 1.5 feet from inside the curb or the start of the pavement, towards the outer edge of the site. The maximum width was 18 feet and marked to indicate the boundary.

2.1.1

Site Survey

Before any litter audits were initiated, a site survey was completed. During the site survey Dillon staff recorded relevant information about the litter site and the surrounding vicinity. Information collected on these forms included:

- Date and time;
- Audit team;
- Site identification;
- Audit area size;
- Characteristics and type of adjacent road;
- General attributes of the area;
- If the site was immediately adjacent to construction; and

- Visual rating of the site.

This detailed information is provided in **Appendix C**.

2.1.2 Classification of Large Litter

To maintain consistency with the previous litter audits, large litter was defined as any litter that was greater than or equal to 4 square inches in size. In order to assist the team completing the audit, a template was created to illustrate what 4 square inches equated to in multiple shapes (**Appendix B**). Large litter audits took place throughout the entire site. A first and second pass was completed on the site and litter observed was recorded on a large litter data form (**Appendix D**). An average number of litter items for the first and second passes were used as the value for the amount of large litter observed on a site. There were a total of 122 large litter categories. These categories are provided in **Appendix D** with the large litter data form.

2.1.3 Classification of Small Litter

Small litter was defined as observed litter that was less than 4 square inches in size. The small litter audit involved examining three sections within the audit site. Dillon staff constructed a small litter frame using PVC plastic tubing measuring one foot wide and six feet long to serve as the template. Up to three consecutive “flips” of the template frame were completed to cross the 18 foot boundary of the site. The litter auditor observed and counted all of the small litter contained within the template at three locations within each site: at the start, midpoint and end of the site. All data was recorded on the small litter form provided in **Appendix D**. This form also describes the 26 small litter categories used in the litter audits.

2.1.4 Supersite

The supersite audits entailed having Dillon staff record **all** the small litter observed within the fixed or variable site for a more thorough assessment of small litter. This was accomplished by having one team member record data while the other is counting small litter within the site. Supersite audits were completed at the 19 pre-determined sites as selected by the City (same 19 sites as all previous audits). Supersite evaluation forms and categories are also provided in **Appendix D**.

2.1.5 Photographic Record of the Site

During the site survey, the litter audit team took photographs of the site from three points. The first photograph was taken from the beginning of the site looking towards the end of the site. The second photograph was taken from the mid-point of the site looking into the site (towards the boundary) and the final photograph was taken from the end of the site looking towards the start. **Photo 1 to Photo 4** provide an example of the photographs taken at each site.

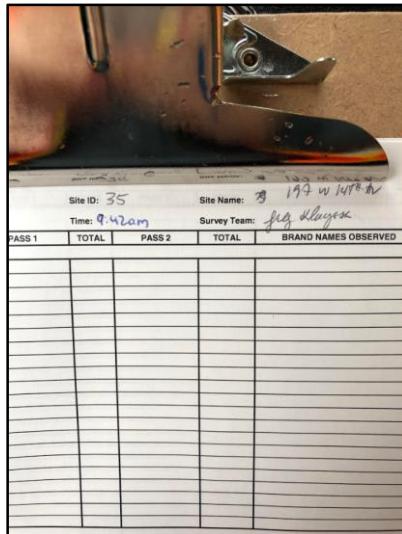


Photo 1: Site Location Photo



Photo 2: Beginning of Litter Site



Photo 3: Middle of Litter Site



Photo 4: End of Litter Site

3.0

Summary of Litter Results

This section of the report provides the detailed results of the 2019 litter audit results and a comparison to the baseline litter assessment completed in 2015 and all follow-up litter audits completed thereafter. This section of the report also assesses Vancouver results against other municipalities. Visual Assessments of litter sites are provided in **Section 3.1**. **Sections 3.2, 3.3 and 3.4** provide Large Litter Results, Small Litter and Supersite Results for the 106 sites without immediately adjacent construction occurring. Sites that were determined to be immediately adjacent to construction have results summarized in **Section 3.5**.

3.1

Visual Assessments of Litter Sites

As a part of the site survey, Dillon staff collected information about the area and adjacent roads of the audit sites. Dillon staff visually assessed the site and ranked it on a scale from 1 to 4. This was termed the visual litter index. In this index, 1 represented sites that were clean (less than five pieces of large litter visible) and 4 represented sites that were considered dirty (more than 20 pieces of large litter visible). **Figure 1** illustrates the results of this visual index for all 110 litter sites. Overall, 66% of sites were given the cleanest ranking of 1. An additional 21% were ranked as a 2, 8% were ranked as a 3 and only 5% were ranked as having a visual index of 4. **Table 1** provides a breakdown by site type and the average visual rating observed. The sites where construction was observed were given a ranking of 1 (sites 28, 74 and 103) and 3 (site 68).

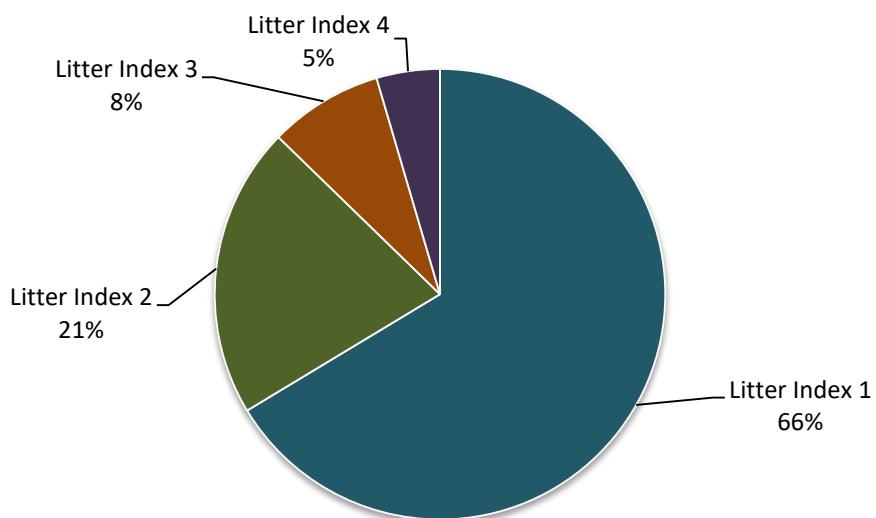


Figure 1: Visual Assessment Ranking of All Litter Sites

Table 1: Average Visual Ranking by Site Type

Site Type	Average Visual Rating
Commercial	1.5
Industrial	1.7
Institutional	1.0
Multi-Family	1.5
Single-Family	1.4
Mixed Use	2.3

3.2**Large Litter Results**

Large litter is any piece of litter that is equal or greater than 4 square inches. This section of the report provides results for large litter by material type, category and subcategory. In 2019, the average number of large litter items per site was 10.7 pieces. The most common sub-category of large litter observed was Miscellaneous Plastic which included pieces of plastic that were not identifiable in any other category. Miscellaneous Plastic represented 10% of all litter surveyed in 2019. **Table 2** illustrates the 20 most common large litter items observed (by sub-category) in the 2019 street litter audits. These 20 item types accounted for 75% of the total large litter items observed. The complete list of items is provided in **Appendix E**.

Table 2: Top 20 Large Litter Items

Number	Large Litter Item	Number Observed	% of Total Large Litter Items Observed	Cumulative Total (%)
1	Misc. Plastic	107	10%	10%
2	Non-Brand Towels/Napkins	83.5	8%	17%
3	Cup Lids, Pieces	67.5	6%	23%
4	Misc. Paper	65.5	6%	29%
5	Receipts (business forms, bus tickets)	60	5%	35%
6	Printed Material	53.5	5%	40%
7	Snack Food Packaging	46	4%	44%
8	Home Articles	46	4%	48%
9	Straws	42	4%	52%
10	Plastic Bags -Consumable Packaging	35	3%	55%
11	Tobacco other	33.5	3%	58%
12	Candy Pouches	32	3%	61%
13	Plastic Packaging Other	30.5	3%	64%
14	Plastic Drink Cups	26	2%	66%
15	Condiment Packaging	23.5	2%	68%
16	Paper Cups (cold)	17.5	2%	70%
17	Zipper Bags/Sandwich Bags	16	1%	71%
18	Gum Wrappers	16	1%	73%
19	Paper Cups (hot)	15	1%	74%
20	Vehicle & Metal Road Debris	15	1%	75%
Total Top 20		831	75%	
Total All Litter		1,135	100%	

3.2.1**Large Litter by Material Type**

Items within the large litter categories were composed of different material types (paper, plastic, glass, metal, composite and other). These items were classified based on their known composition. **Figure 2** illustrates the breakdown by material type of all 1,135 pieces of large litter observed in 2019. The largest material type observed was plastic (46%), followed by paper (33%) and ‘other’ (19%). “Other” material types included rubber, electronics, pet waste, etc. Metal and glass materials each represented 1% of the materials observed and no composite materials were recorded in 2019.

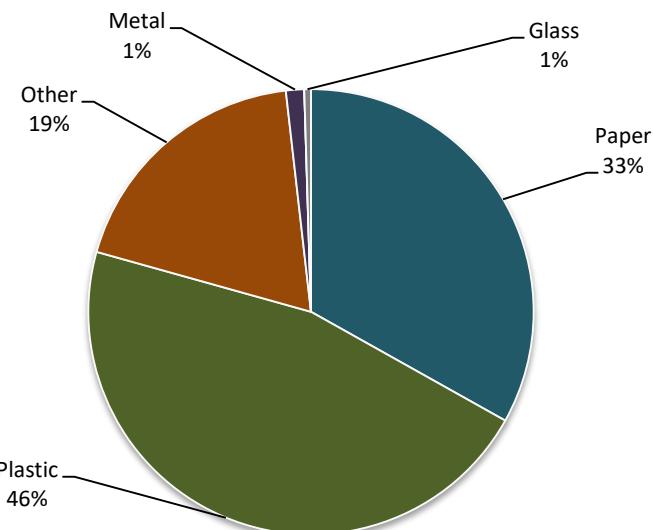


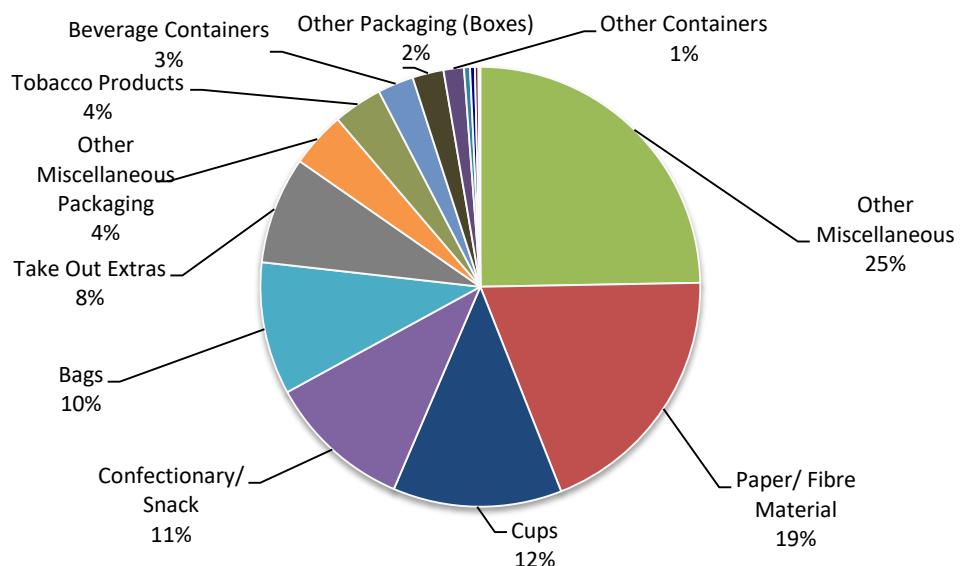
Figure 2: Large Litter by Material Type

3.2.2 Large Litter by Category

Each of the large litter items were classified into 15 categories and 122 sub-categories (two additional sub-categories were added in the “Take out Extras” category in 2019). **Table 3** provides a summary of the total amount of large litter observed for each of the 15 categories. The most common category of litter observed was ‘other miscellaneous’ (25%). Miscellaneous litter included items such as miscellaneous paper, plastic, as well as household items. Paper/fibre material (19%) and cups (12%) were the next most common categories of litter recorded in 2019. These results are illustrated in **Figure 3**.

Table 3: Large Litter Result Totals by Category

Category	Observed Number of Items	Percentage of Large Litter Observed
Beverage Containers	30	3%
Other Packaging	5	0%
Cups	141	12%
Bags	110.5	10%
Other Packaging (Boxes)	26	2%
Other Containers	17	1%
Food Wraps/ Containers	4	0%
Take Out Extras	89.5	8%
Trays	3	0%
Confectionary/Snack	120.5	11%
Cloth	1.5	0%
Other Miscellaneous Packaging	46.5	4%
Paper/ Fibre Material	219	19%
Tobacco Products	41	4%
Other Miscellaneous	280.5	25%
Total	1,135	100%

**Figure 3: Large Litter Items by Category**

3.3

Large Litter Results by Sub-Category

There are several sub-categories within each of the 15 major categories. The breakdown of litter by each of the 122 sub-categories is provided in the sub-sections below.

Beverage Containers

Beverage containers accounted for 3% of all large litter observed in the 2019 audits. The largest sub-categories evaluated for beverage containers in 2019 were water (plastic) (27%), soft drink (cans) (20%), and wine/liquor (plastic/other) (10%). **Figure 4** illustrates the breakdown of the beverage container category. **Figure 5** compares the highest five sub-categories from 2019 to the 2015 baseline and subsequent follow-up audits.

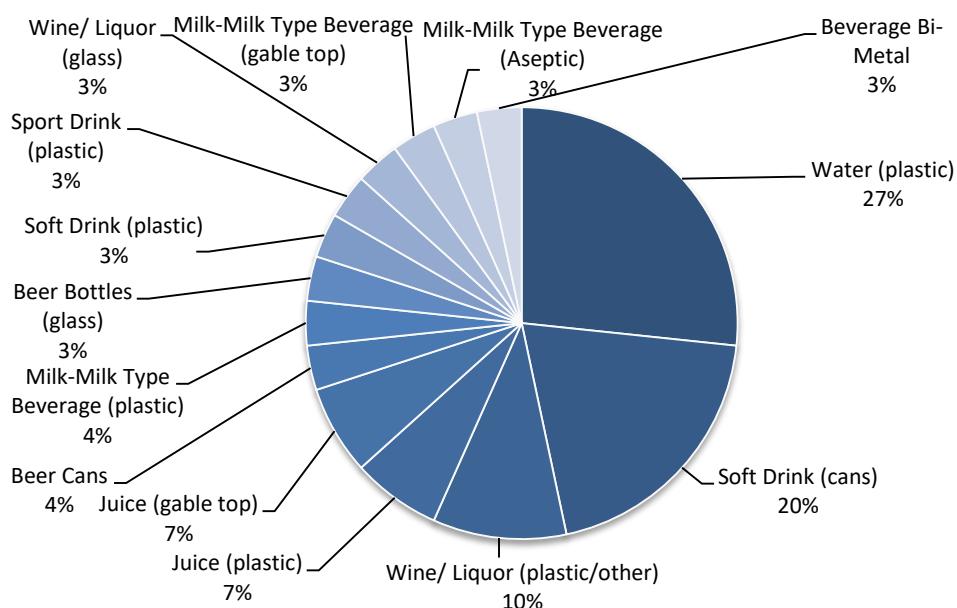


Figure 4: Beverage Containers Composition 2019

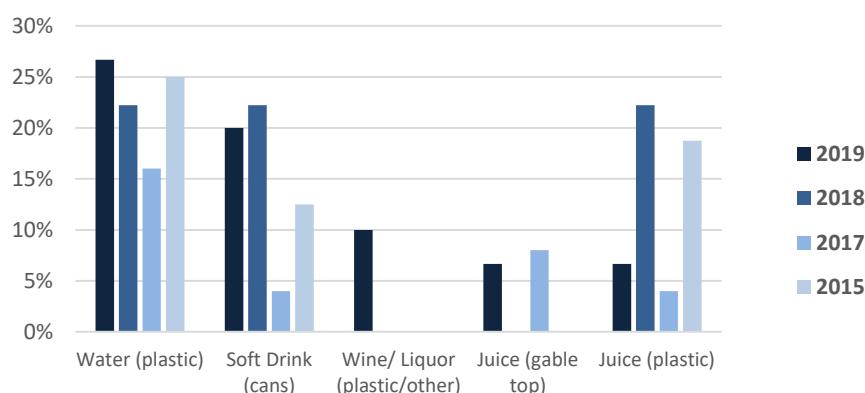


Figure 5: Beverage Containers 2019, 2018, 2017 and 2015 Comparison

Other Packaging

'Other packaging' accounted for less than 1% of the overall large litter observed for the City's 2019 audits. Six pack plastic rings (80%) and foil pouches (20%) comprised the 'other packaging' category, entirely. **Figure 6** illustrates the results of the other packaging category. **Figure 7** compares the highest four sub-categories from all litter audits completed to date.

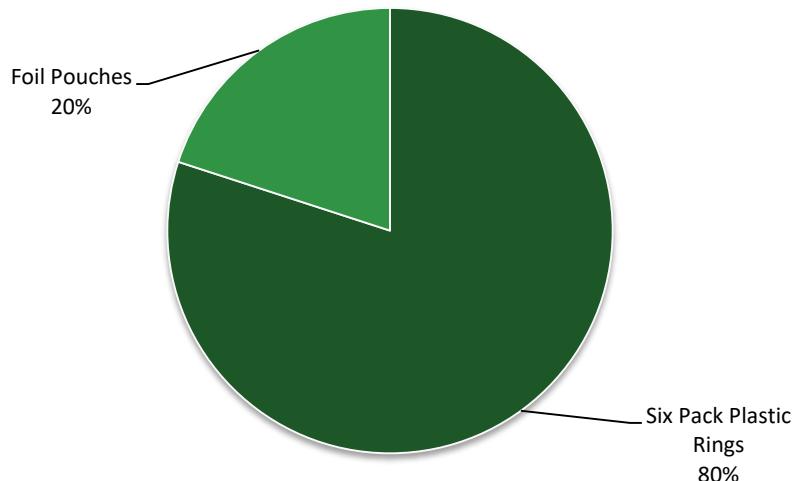


Figure 6: Other Packaging Composition 2019

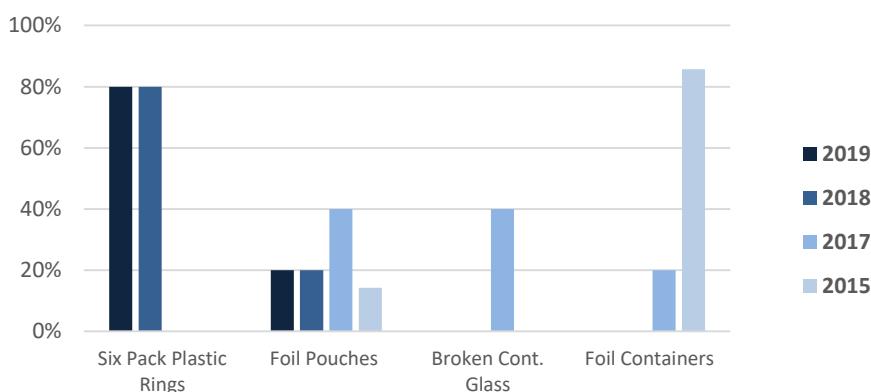


Figure 7: Other Packaging 2019, 2018, 2017 and 2015 Comparison

Cups

Cups were the third largest category observed in the 2019 street litter audits and represented 12% of all large litter observed. Cup lids and/or pieces were the largest subcategory (49%), followed by plastic drink cups (19%), and paper cups (cold) (13%). **Figure 8** illustrates the breakdown of the cups category while **Figure 9** compares the largest four sub-categories from the four completed litter audits.

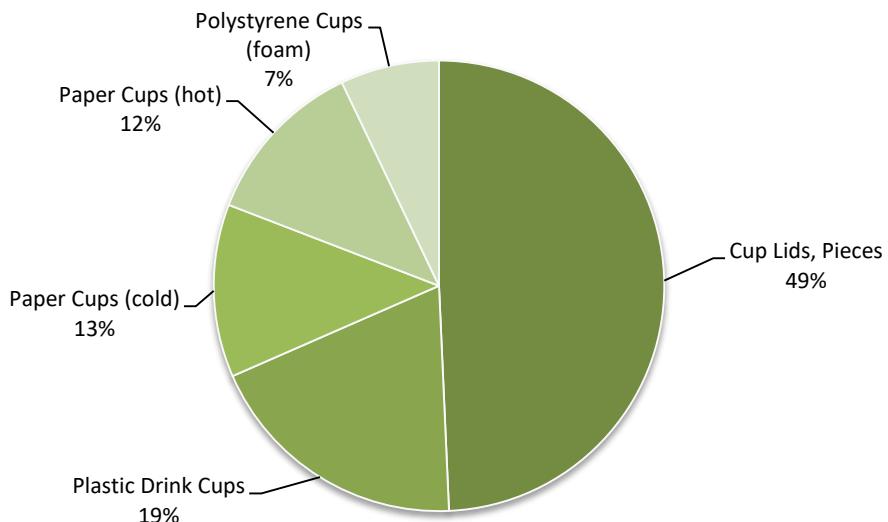


Figure 8: Cups Composition 2019

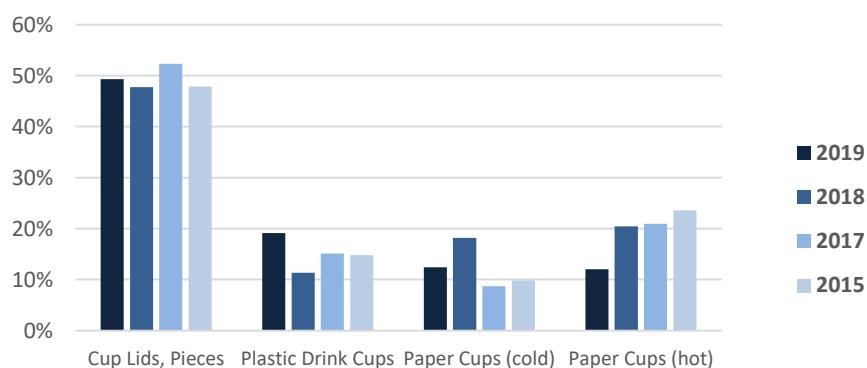


Figure 9: Cups 2019, 2018, 2017 and 2015 Comparison

Bags

Bags represented 10% of all large litter observed in 2019. This category predominantly consisted of plastic bags – consumables packaging (36%) and zipper bags/sandwich bags (14%). **Figure 10** illustrates the 2019 composition of the bags category while **Figure 11** compares the highest five sub-categories from all completed audits.

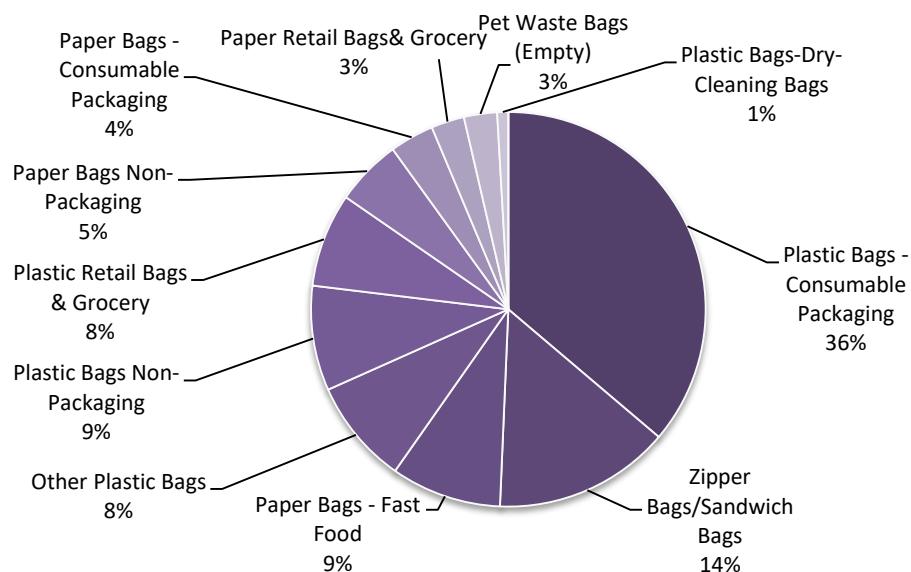


Figure 10: Bags Composition 2019

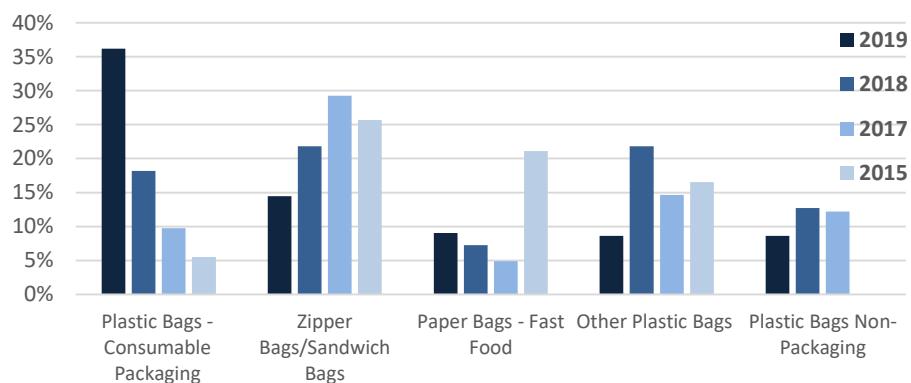


Figure 11: Bags 2019, 2018, 2017 and 2015 Comparison

Other Packaging (Boxes)

Other packaging (boxes) represented 2% of the accumulated large litter in the 2019 street litter audits. This category consisted mostly of cardboard boxes/box material (42%), as illustrated in **Figure 12**. The highest four sub-categories observed in 2019 are compared to the 2018, 2017 and 2015 results are illustrated in **Figure 13**.

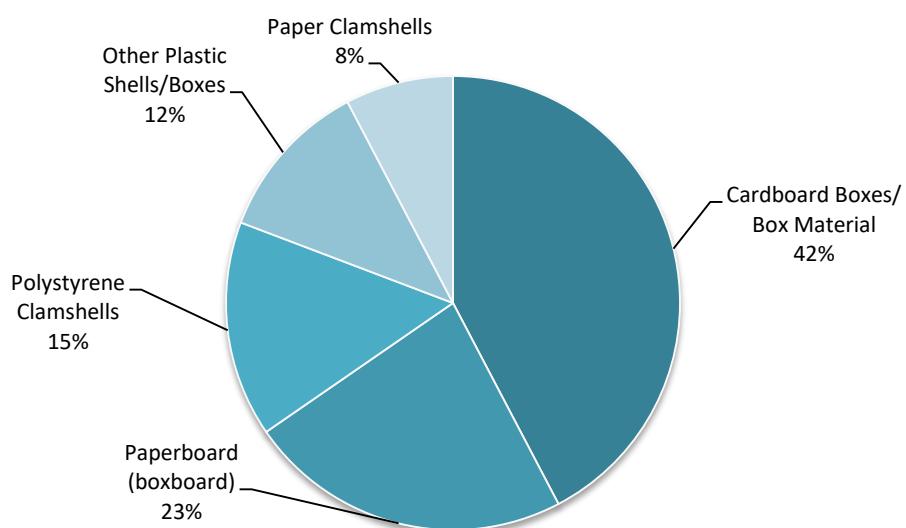


Figure 12: Other Packaging (Boxes) Composition 2019

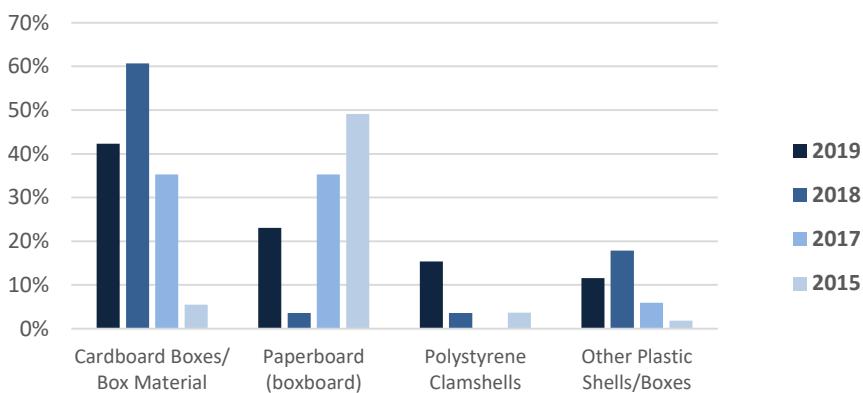


Figure 13: Other Packaging (Boxes) 2019, 2018, 2017 and 2015 Comparison

Other Containers

In the 2019 audits, other containers represented 1% of all large litter observed. The breakdown of this category was mostly plastic jars/bottles/lids (59%) followed by cans-aluminum (23%). The composition of other containers is illustrated in **Figure 14** while a comparison of the largest three sub-categories from 2019, 2018 to 2017 and 2015 results is illustrated in **Figure 15**.

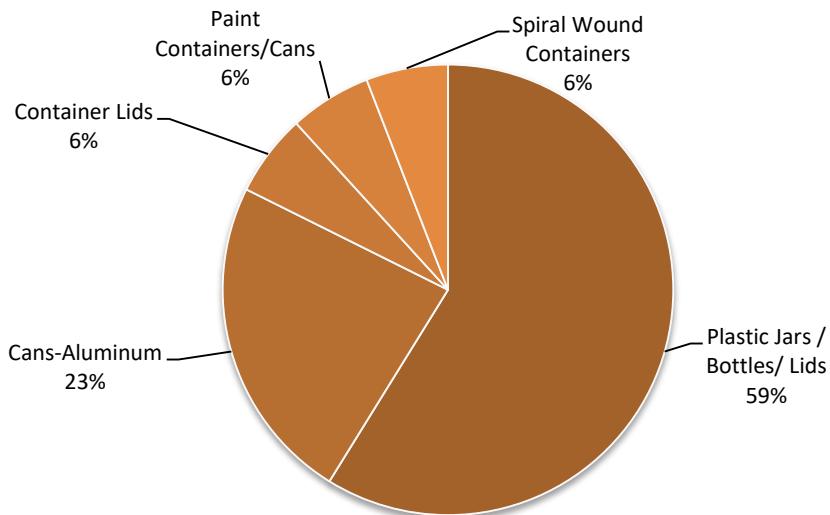


Figure 14: Other Containers Composition 2019

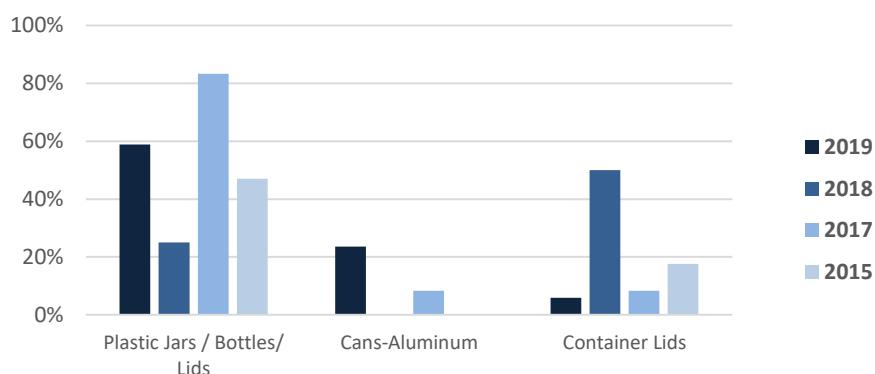


Figure 15: Other Containers 2019, 2018, 2017 and 2015 Comparison

Food Wraps/Containers

Food wraps/containers represented less than 1% of the litter observed in this audit. **Figure 16** illustrates the breakdown of this category. The two sub-categories that comprised food wraps/containers included paper food wrap and plastic wrap which equally represented 50% of the category. **Figure 17** compares all sub-categories from 2019 to the 2018, 2017 and 2015 results.

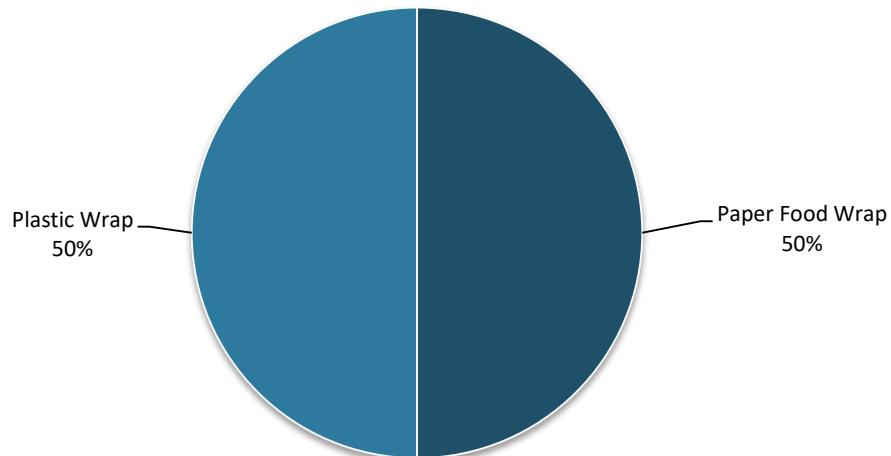


Figure 16: Food Wraps/Containers Composition 2019

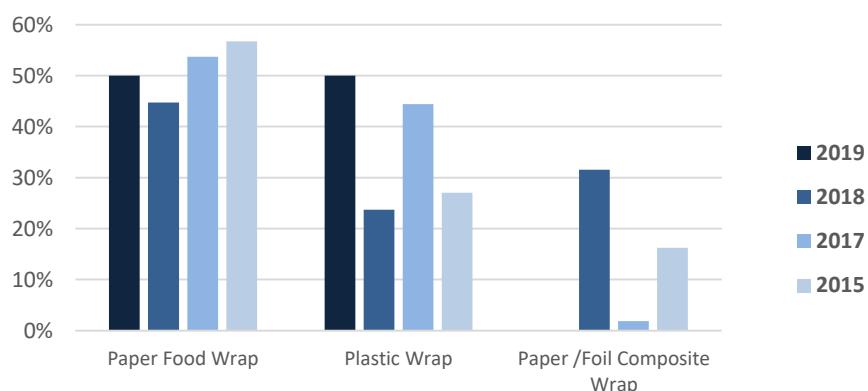


Figure 17: Food Wraps/Containers 2019, 2018, 2017 and 2015 Comparison

Take out Extras

Take out extras accounted for 8% of the large litter observed. In 2019, two new sub-categories were added to this category. This included straws and stir sticks. Take out extras was largely comprised of straws (48%) and condiment packaging (26%). **Figure 18** illustrates the breakdown of this category while **Figure 19** compares the highest four sub-categories from 2019, 2018, 2017 and 2015.

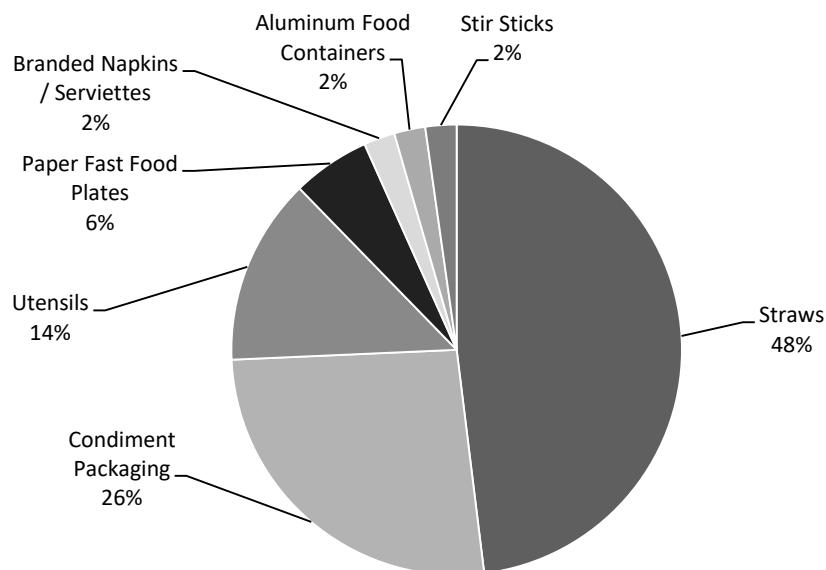


Figure 18: Take Out Extras Composition 2019

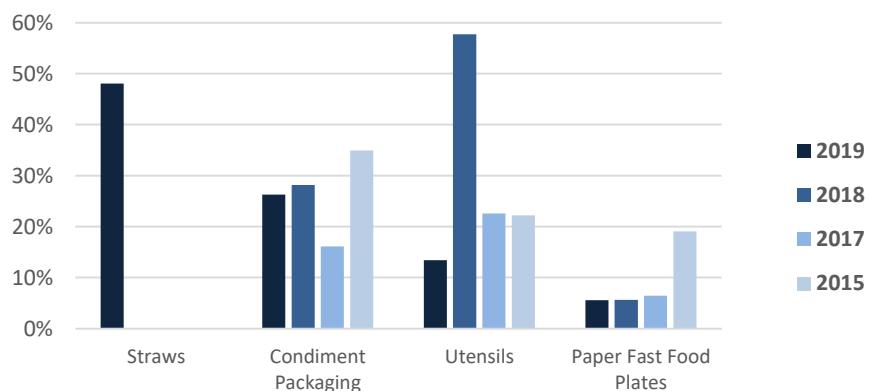


Figure 19: Take Out Extras 2019, 2018, 2017 and 2015 Comparison

Trays

Trays represented less than 1% of all litter observed (67% other material trays and 33% polystyrene trays) (**Figure 20**). **Figure 21** compares sub-categories from all previous City of Vancouver Litter Audits.

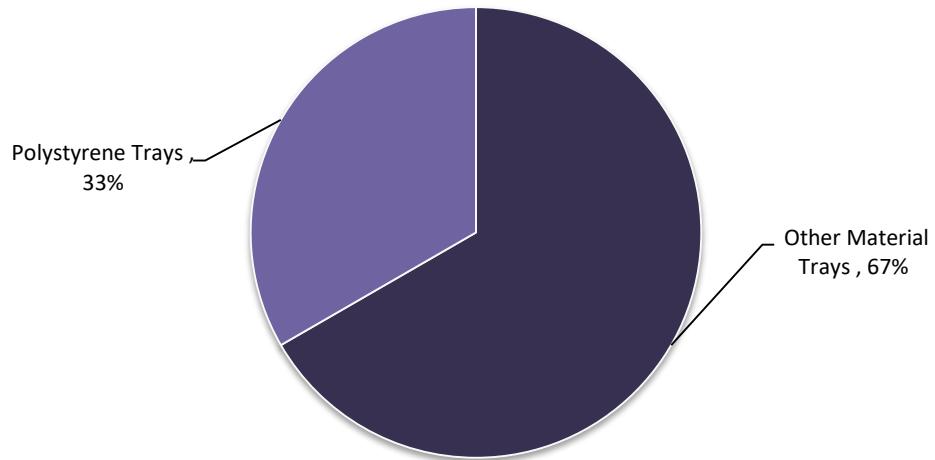


Figure 20: Trays Composition 2019

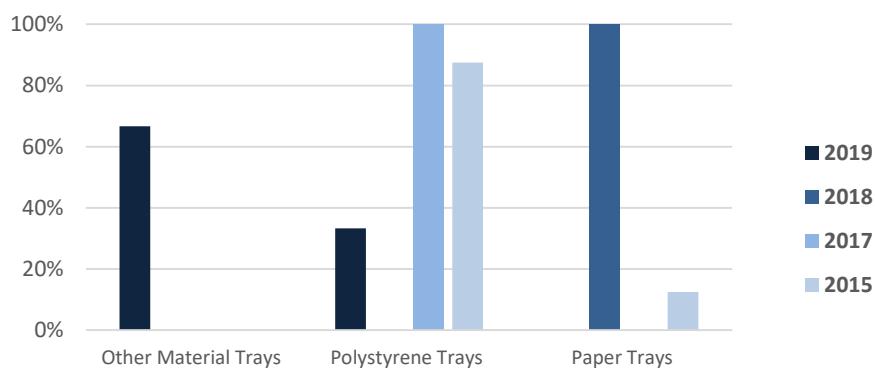


Figure 21: Trays 2019, 2018, 2017 and 2015 Comparison

Confectionary/Snacks

This category represented 11% of all large litter observed in 2019. The most frequently observed sub-categories for large litter were snack food packaging (38%) and candy pouches (27%).

Figure 22 illustrates the results of the confectionary/snacks category breakdown. **Figure 23** compares the highest four sub-categories from 2019 to the three previous litter audits.

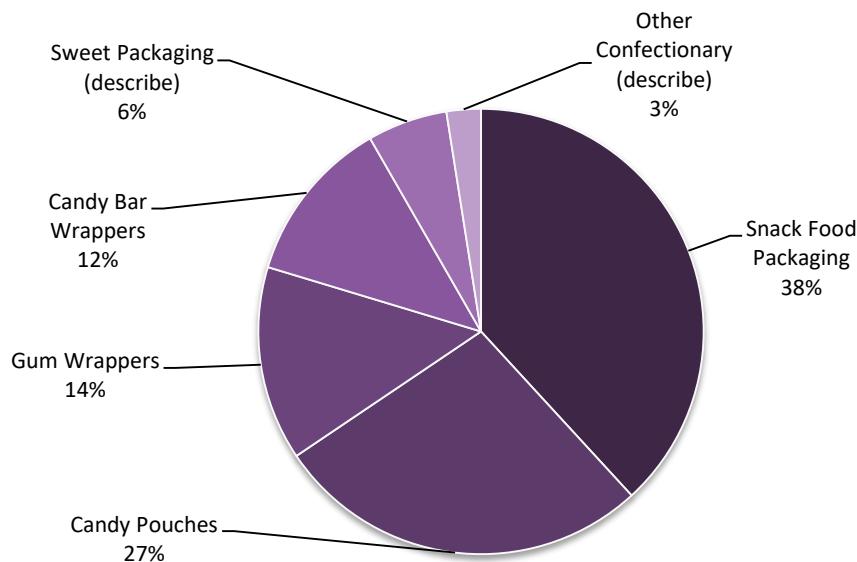


Figure 22: Confectionary/Snacks Composition 2019

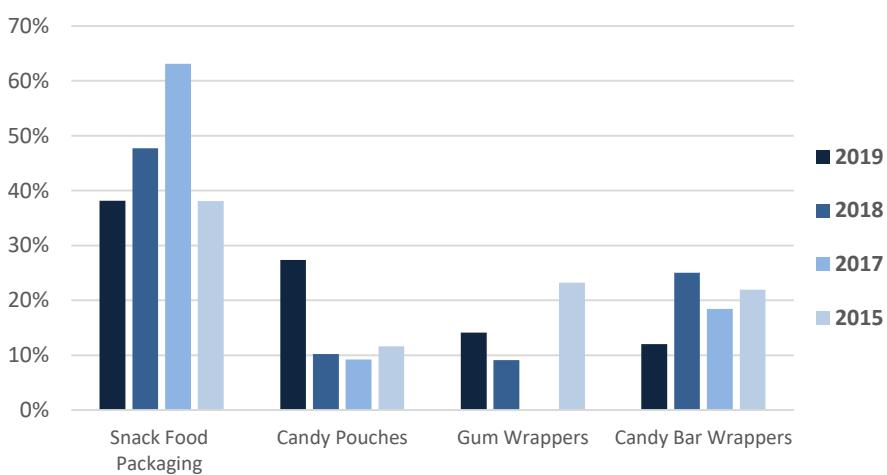


Figure 23: Confectionary/Snack 2019, 2018, 2017 and 2015 Comparison

Cloth

The cloth category was split 67% for clothing or clothing pieces and 33% for other cloth. Cloth represented less than 1% of all large litter observed in 2019. **Figure 24** compares the sub-categories observed in the most recent audit to the 2018, 2017 and 2015 audits.

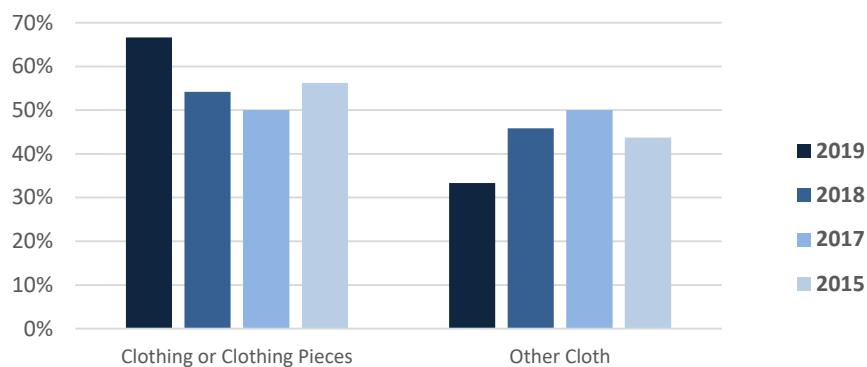


Figure 24: Cloth 2019, 2018, 2017 and 2015 Comparison

Other Miscellaneous Packaging

Other miscellaneous packaging represented 4% of the large litter observed in 2019. The majority of other miscellaneous packaging was plastic packaging other (67%) and foil materials/foil pieces (27%).

Figure 25 illustrates the breakdown of this category and **Figure 26** compares all four sub-categories observed in 2019 in comparison to all previous audits.

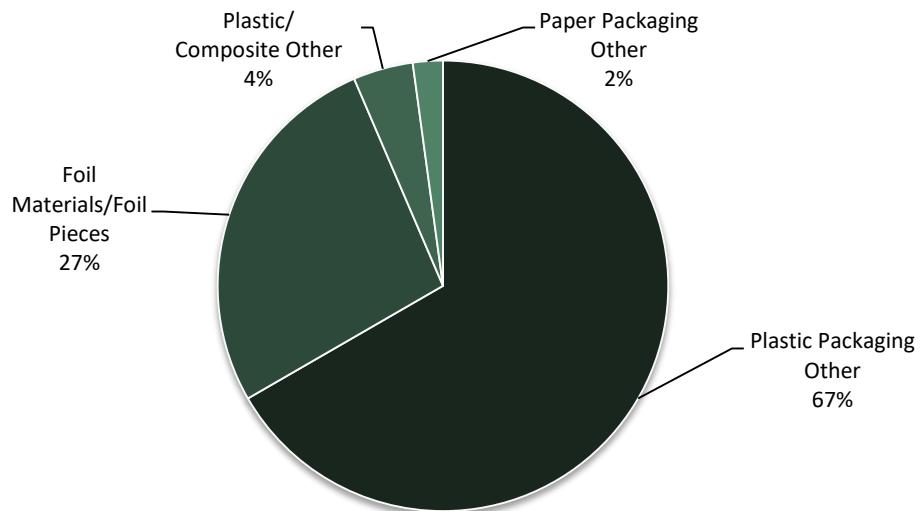


Figure 25: Other Miscellaneous Packaging Composition 2019

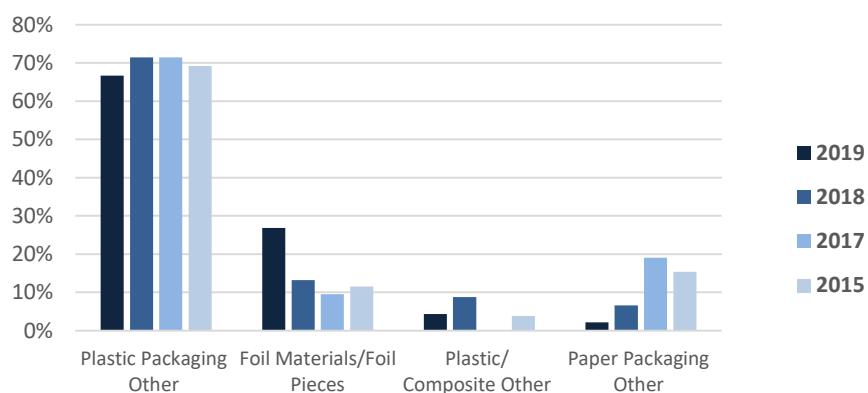


Figure 26: Other Miscellaneous Packaging 2019, 2018, 2017 and 2015 Comparison

Paper/Fibre Materials

Paper/Fibre Materials were the second highest in terms of items most littered and represented 19% of all large litter observed in the 2019 street litter audits. The majority of the paper/fibre materials category was non-brand name towels/napkins (41%), receipts (28%) and printed material (25%). **Figure 27** provides the detailed breakdown of this category. **Figure 28** compares the highest three sub-categories from 2019 to 2018, 2017 and 2015.

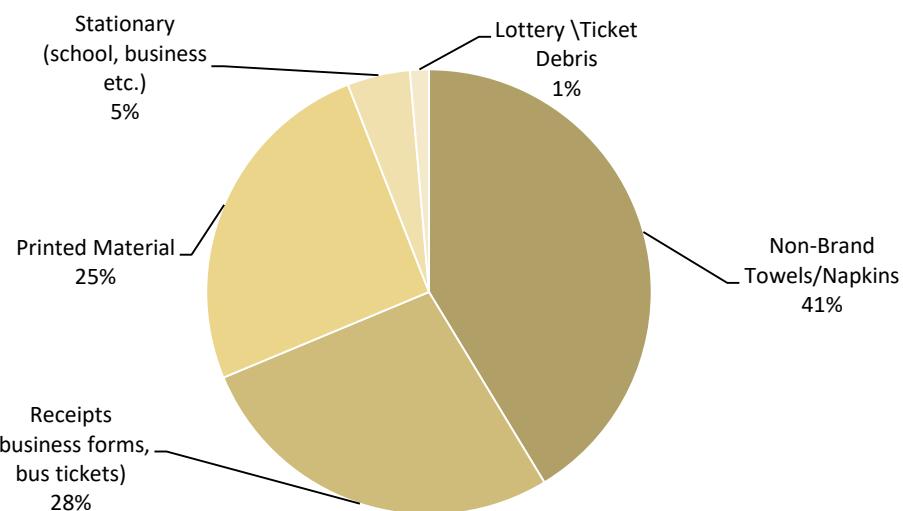


Figure 27: Paper/Fibre Composition 2019

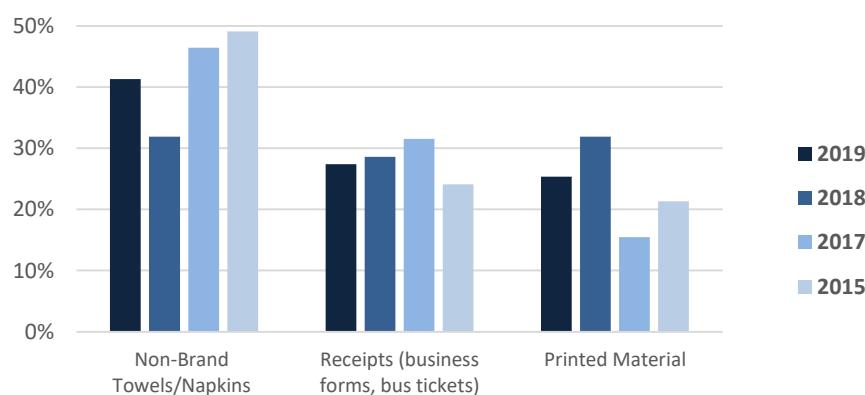


Figure 28: Paper/Fibre Material 2019, 2018, 2017 and 2015 Comparison

Tobacco Products

In 2019, tobacco products were 4% of the large litter items surveyed. Within this category, 89% was 'tobacco other' and 11% cigarette/cigar debris. Tobacco other includes cigarette packaging and cellophane wrapping. **Figure 29** compares the two sub-categories from the all completed audits.

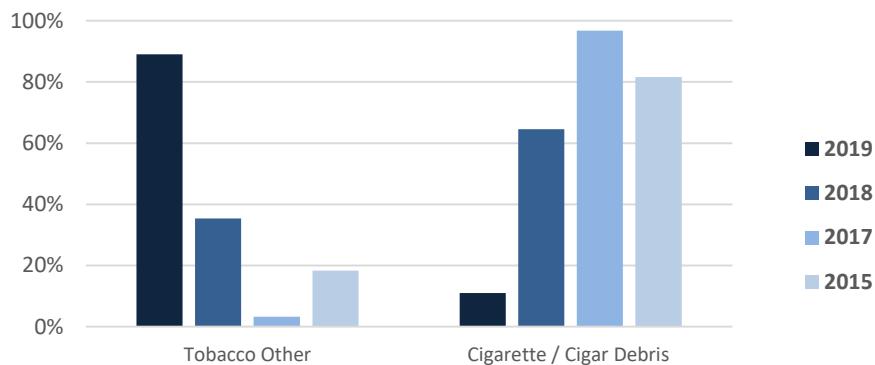


Figure 29: Tobacco Products 2019, 2018, 2017 and 2015 Comparison

Other Miscellaneous

'Other miscellaneous' was the largest category observed in 2019 and represented 25% of all large litter. The primary sub-categories assessed in 2019 included: miscellaneous plastic (38%) and miscellaneous paper (25%). It should be noted these items are made of plastic or paper that did not fit into any other category or could not be identified as such. Household items were items observed that did not fit into other categories such as composite hangers and pictures. **Figure 30** illustrates the breakdown of this category while **Figure 31** compares the highest four sub-categories observed in the 2019 audits to the 2018, 2017 and 2015 studies.

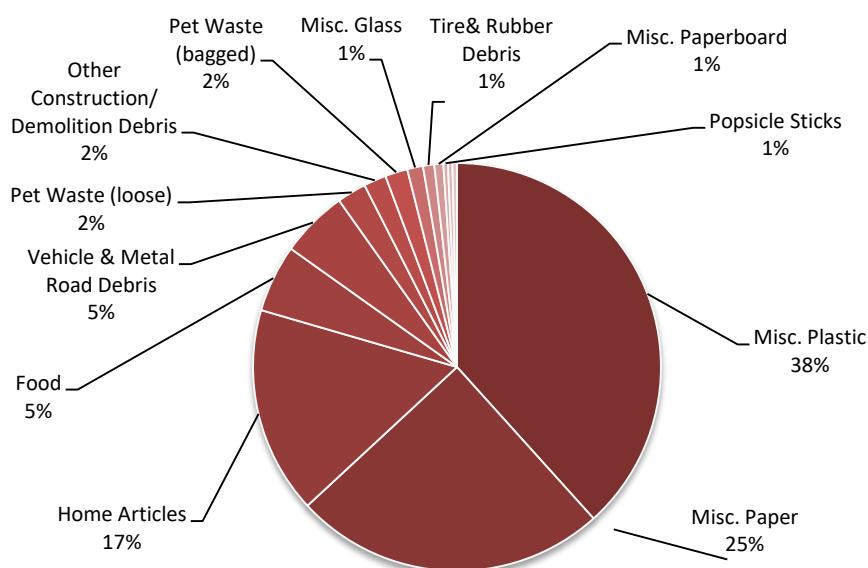


Figure 30: Other Miscellaneous Composition 2019

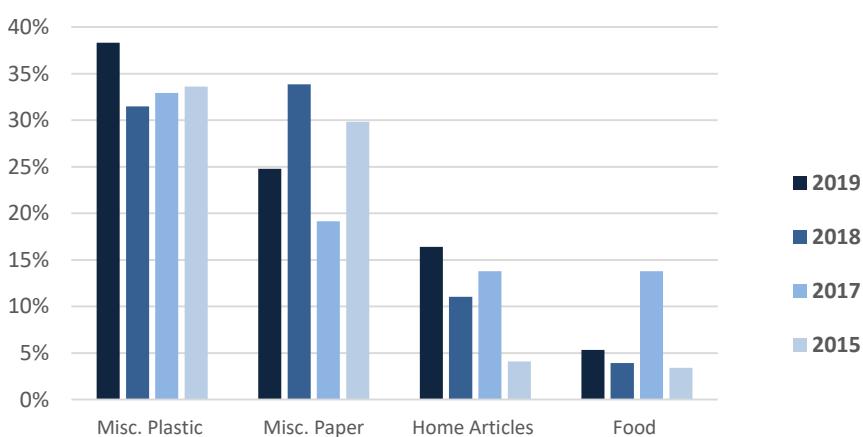


Figure 31: Other Miscellaneous 2019, 2018, 2017 and 2015 Comparison

3.3.1

Large Litter by Sites

The ten litter sites having the greatest number of large litter pieces are listed below in **Table 4**. The site with the most accumulated large litter in 2019 was Site 55 with 67.5 pieces of large litter observed. This site is zoned multi-family residential. In total, 40% of sites in the “top 10” were residential (sites 55, 17, 92, and 30). An additional 20% were mixed use sites (sites 97 and 76), 20% of sites were commercial (sites 110 and 31) and the remaining 20% were industrial (site 52 and 54). A full ranking of sites is provided in **Appendix F**. Of note, 7 of the top 10 sites - Sites 55, 92, 97, 17, 52, 76 and 31, were also litter sites with the highest number of large litter pieces in the 2018 audits.

Table 4: Large Litter Site Rankings

Site Number	Number of Pieces of Large Litter	Hundred Block	Street Name
55	67.5	3400	Vanness
17	65.5	2100	Renfrew
110	45	400	Main
52	43	600	Evans
92	41.5	2200	E. Pender
97	36	800	Commercial
54	25.5	1100	Clark
30	25	8300	Beatrice
76	25	700	E. 30 th
31	24	2700	E. Hastings

3.3.2

Large Litter Results Compared to 2015 Baseline, 2017 and 2018 Follow-Up Studies

Results from the 2015 audit were established as the baseline against which future litter audit results (e.g., 2017, 2018 and 2019) can be compared. Visual ratings for the litter index were completed for each site in all completed audits. **Table 5** compares the results of the 2019 study to the baseline 2015 visual litter index ratings as well as the follow-up audits completed in 2017 and 2018.

Table 5: Visual Litter Index Ranking 2018 vs. 2017 vs. 2015

Visual Litter Index Rating	Percentage of Sites Ranked (%) 2019	Percentage of Sites Ranked (%) 2018	Percentage of Sites Ranked (%) 2017	Percentage of Sites Ranked (%) 2015
1	66%	65%	69%	74%
2	23%	20%	24%	18%
3	8%	8%	6%	7%
4	3%	6%	1%	1%

The 2019 visual litter index ranking did not differ substantially compared to all other audit years. The number of sites ranked 4 (the most littered) dropped from 6% in 2018 to 3% this year.

The composition and accumulation from the 2015 baseline to the 2019 results by category are compared in **Table 6**. Overall, there was a 13% decrease in the amount of large litter observed in 2019 from the baseline assessment. It should be noted these values do not include the four sites that were immediately adjacent to construction activity. All categories with the exception of beverage containers, bags, take out extras and confectionary/snack decreased from the 2015 baseline assessment. Take out extras had the largest increase of 159% (34.5 pieces in the baseline to 89.5 in 2019) followed by bags, with an increase of 103% (54.5 pieces in 2015 to 110.5 in 2019).

Table 6: 2019 vs. 2015 Large Litter Comparison

Category	2019 Results (106 Sites)		2015 Baseline Results (108 Sites)		% Change
	# Litter Items	% of Total	# Litter Items	% of Total	
Beverage Containers	30	3%	16	1%	88%
Other Packaging	5	0%	7	1%	-29%
Cups	141	12%	284	22%	-50%
Bags	110.5	10%	54.5	4%	103%
Other Packaging (Boxes)	26	2%	55	4%	-53%
Other Containers	17	1%	17	1%	0%
Food Wraps/ Containers	4	0%	37	3%	-89%
Take Out Extras	89.5	8%	34.5	3%	159%
Trays	3	0%	8	1%	-63%
Confectionary/Snack	120.5	11%	77.5	6%	55%
Cloth	1.5	0%	32	2%	-95%
Other Miscellaneous Packaging	46.5	4%	26	2%	79%
Paper/ Fibre Material	219	19%	311.5	24%	-30%
Tobacco Products	41	4%	49	4%	-16%
Other Miscellaneous	280.5	25%	291.5	22%	-4%
Total	1,135	100%	1,300.5	100%	-13%

The composition and accumulation from the 2017 follow-up audit to the 2019 results by category are compared in **Table 7**. There was a 32% increase in the amount of large litter observed in 2019 from 2017. It should be noted that these values do not include the four sites that were immediately adjacent to construction activity in 2019 or the two sites in 2017. Compared to 2017, almost all categories, with the exception of cups, food wraps/containers, cloth and tobacco products, increased in 2019. There was over a 100% increase in the take out extras (180%), bags (170%) and other miscellaneous packaging (121%) categories.

Table 7: 2019 vs. 2017 Large Litter Comparison

Category	2019 Results (106 Sites)	2017 Follow-Up (106 Sites)	% Change
	# Litter Items	% of Total	
Beverage Containers	30	3%	20%
Other Packaging	5	0%	0%
Cups	141	12%	-18%
Bags	110.5	10%	170%
Other Packaging (Boxes)	26	2%	53%
Other Containers	17	1%	42%
Food Wraps/ Containers	4	0%	-93%
Take Out Extras	89.5	8%	180%
Trays	3	0%	0%
Confectionary/Snack	120.5	11%	85%
Cloth	1.5	0%	-92%
Other Miscellaneous Packaging	46.5	4%	121%
Paper/ Fibre Material	219	19%	30%
Tobacco Products	41	4%	-34%
Other Miscellaneous	280.5	25%	68%
Total	1,135	100%	32%

The composition and accumulation from the 2018 follow-up audit to the 2019 results by category are compared in **Table 8**. There was a 14% increase in the amount of large litter observed in 2019 from 2018. It should be noted that these values do not include the four sites that were immediately adjacent to construction activity in 2019 or the five sites in 2018. Compared to 2018, almost all categories, with the exception of other packaging (boxes), food wraps/containers, cloth, and tobacco products, increased in 2019. There was over a 100% increase in the beverage containers (233%), trays (200%), other containers (113%) and bags (101%) categories from 2018 to 2019.

Table 8: 2019 vs. 2018 Large Litter Comparison

Category	2019 Results (106 Sites)		2018 Follow-Up (103 Sites)		% Change
	# Litter Items	% of Total	# Litter Items	% of Total	
Beverage Containers	30	3%	9	1%	233%
Other Packaging	5	0%	5	1%	0%
Cups	141	12%	132	13%	7%
Bags	110.5	10%	55	6%	101%
Other Packaging (Boxes)	26	2%	28	3%	-7%
Other Containers	17	1%	8	1%	113%
Food Wraps/ Containers	4	0%	38	4%	-89%
Take Out Extras	89.5	8%	72	7%	24%
Trays	3	0%	1	0%	200%
Confectionary/Snack	120.5	11%	88	9%	37%
Cloth	1.5	0%	24	2%	-94%
Other Miscellaneous Packaging	46.5	4%	45.5	5%	2%
Paper/ Fibre Material	219	19%	182	18%	20%
Tobacco Products	41	4%	56.5	6%	-27%
Other Miscellaneous	280.5	25%	254	25%	10%
Total	1,135	100%	998	100%	14%

The top ten large litter sites were analyzed for each litter audit. During this analysis zoning and land use were recorded. In 2019, there was a relatively equal distribution of land use for the top ten most littered sites, but single-family was the biggest classification. In 2018 and 2015 the majority of sites were classified as mixed use and single family; 2017 the majority of sites were single family. As observed in **Figure 32**, these results vary year to year and indicate that land use may not be a strong indicator of litter accumulation.

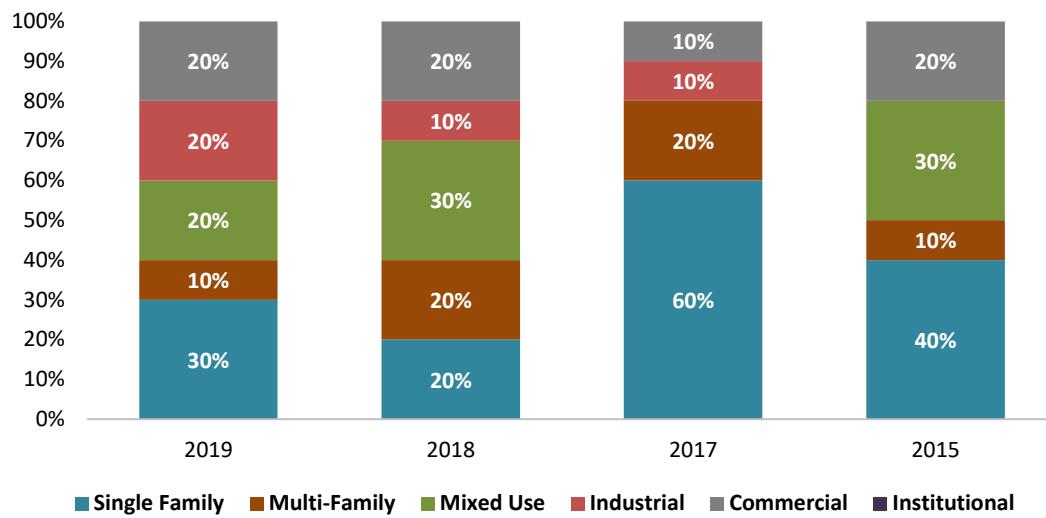


Figure 32: 2019, 2018, 2017 and 2015 top 10 Large Litter Sites by Zoning and Land Use

3.3.3 Large Litter Results Compared to Other North American Municipalities

Large litter audits are completed in several North American municipalities. These assessments audit large litter in similar categories using the same methodology as this study. **Table 9** illustrates the percentage breakdown per large litter item category for each municipality. **Figure 33** illustrates the top three large litter categories observed in the 2019 Vancouver street litter audits to the results for each municipality (as well as Vancouver in previous years). **Table 10** illustrates the average number of items counted per site based on category. **Figure 34** illustrates these results graphically.

Table 9: Vancouver Large Litter Audit Results Compared with Audit Results of Other Cities (by Percent Breakdown)

Category	Toronto 2016	Edmonton 2016	Edmonton 2017	Winnipeg 2014	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Beverage Containers	6%	2%	1%	10%	3%	1%	3%	1%	3%
Other Packaging	1%	0%	0%	5%	3%	1%	1%	1%	0%
Cups	11%	13%	18%	6%	6%	22%	20%	13%	12%
Bags	4%	2%	3%	6%	6%	4%	5%	6%	10%
Other Packaging (Boxes)	9%	3%	4%	2%	3%	4%	2%	3%	2%
Other Containers	1%	5%	8%	1%	2%	1%	1%	1%	2%
Food Wraps/Containers	3%	4%	4%	1%	4%	3%	6%	4%	0%
Take Out Extras	2%	8%	9%	13%	4%	3%	4%	7%	8%
Trays	0%	0%		N/A	0%	1%	0%	0%	0%
Confectionary/ Snack	5%	4%	6%	6%	8%	6%	8%	9%	10%
Cloth	2%	0%		1%	1%	3%	2%	2%	0%
Other Miscellaneous Packaging	0%	0%	0%	0%	0%	2%	2%	5%	4%
Paper/ Fibre Material	29%	8%	7%	7%	32%	24%	19%	18%	19%
Tobacco Products	6%	3%	5%	8%	4%	4%	7%	6%	3%
Other Miscellaneous	20%	33%	19%	31%	24%	20%	19%	25%	26%
Additional Categories	0%	1%	1%	0%	0%	3%	0%	0%	0%
Household Articles	0%	16%	15%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

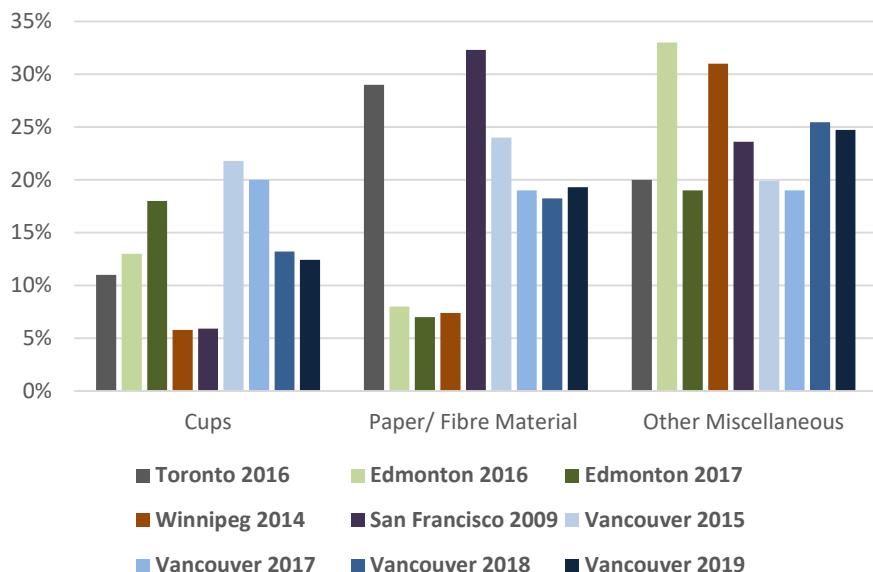


Figure 33: Comparison of Top Large Litter Categories by Municipality

Table 10: Vancouver Large Litter Audit Results Compared with Audit Results of Other Cities (Average Number of Items per Site)

Category	Toronto 2016	Edmonton 2016	Edmonton 2017	Winnipeg 2014	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Beverage Containers	0.7	0.2	0.1	1.5	1.3	0.2	0.2	0.1	0.3
Other Packaging	1.2	0	0	0.8	1.9	0.1	0.0	0.0	0.0
Cups	1.4	1.4	1.3	1.0	3.0	2.6	1.6	1.3	1.3
Bags	0.6	0.2	0.2	0.8	1.4	0.5	0.4	0.5	1.0
Other Packaging (Boxes)	0.1	0.3	0.3	0.3	0.7	0.5	0.2	0.3	0.2
Other Containers	0.1	0.6	0.6	0.1	0.7	0.2	0.1	0.1	0.2
Food Wraps/ Containers	0.4	0.4	0.3	1.8	1.2	0.3	0.5	0.4	0.0
Take Out Extras	0.3	0.8	0.6	0.0	1.4	0.3	0.3	0.7	0.8
Trays	0.1	0	0	0	0.2	0.1	0.0	0.0	0.0
Confectionary/Snack	0.7	0.5	0.4	0.9	3.2	0.7	0.6	0.9	1.1
Cloth	0.2	0	0	0.2	0.4	0.3	0.2	0.2	0.0
Other Miscellaneous Packaging	0	0	0	0	0	0.2	0.2	0.4	0.4
Paper/ Fibre Material	3.7	0.9	0.5	1.0	7.8	2.9	1.6	1.8	2.1
Tobacco Products	0.7	0.3	0.4	1.1	1.4	0.5	0.6	0.5	0.4
Other Miscellaneous	2.6	3.6	1.4	4.1	9.5	2.4	1.6	2.5	2.6
Additional Categories	0	0.1	0.1	0	0	0.3	0	0	0.0
Household Articles	0	1.7	1.1	0	0	0	0	0	0.0
Total	12.8	11.1	7.2	13.3	34.0	12.0	8.1	9.7	10.7

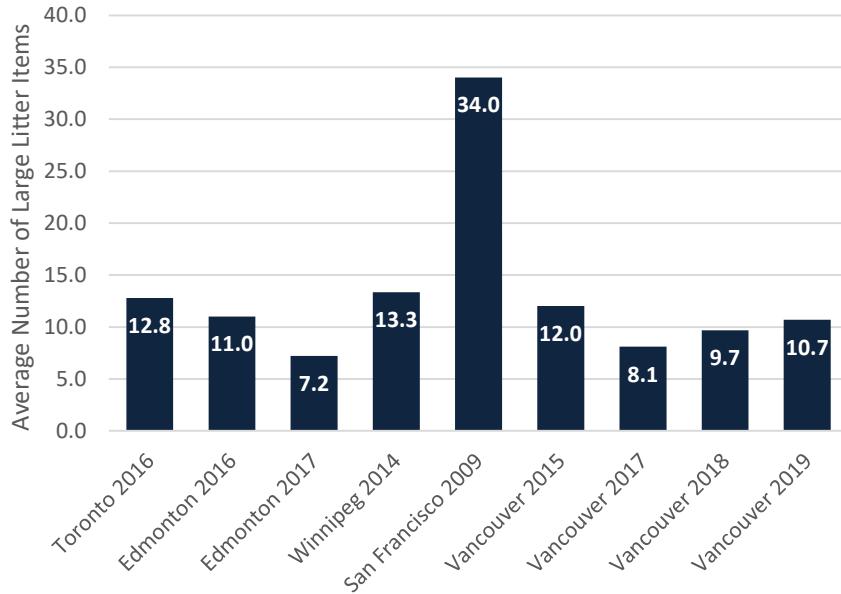


Figure 34: Average Large Litter Items per Site

3.3.4

Large Litter Statistical Analysis

The average number of large litter items per site in the 2019 audits was 10.7 pieces. There were three sites that had no large litter accumulation whatsoever. Of the 106 sites surveyed, two sites had an average of 11 pieces of large litter within the site, 73 sites had fewer than 11 pieces and 35 sites had more than 11 pieces of large litter.

3.4

Small Litter Results

Small litter is any piece of litter that is less than 4 square inches. Small litter is divided into 26 categories. As noted previously, the small litter audit involved examining three sections within the audit site, not the entire site (Supersite audit). This section reviews small litter by category, site and as compared to the baseline 2015 results and follow-up 2017 and 2018 results. In 2019, the average number of small litter items per site with no construction was 7.5 pieces. The most common categories of small litter observed were chewing gum (26%), cigarette butts/debris (21%) and paper (20%). **Table 11** provides these results.

Table 11: Small Litter Data 2019

Category	Total Number of Items	% of Total
Cigarette Butts/Debris	168	21%
Other Tobacco	1	0%
Bottle Caps	4	1%
Straws	1	0%
Candy Packaging and Wrappers	29	4%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	9	1%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	3	0%
Glass	28	4%
Paper	158	20%
Cup Sleeves	1	0%
Plastic Film	65	8%
Hard Plastic	54	7%
Aluminum/Foil Debris	15	2%
Rubber	9	1%
Metal (not aluminum)	8	1%
Chewing Gum (stuck on pavement)	203	26%
Food and Food Scraps	11	1%
Pet Waste (bagged)	1	0%
Pet Waste (loose)	3	0%
Needles/Syringes	0	0%
Medications	0	0%
Cell Phones	0	0%
Audio-Visual Devices	0	0%
Batteries	0	0%
Other Electronic Waste	0	0%
Other Material	22	3%
Total Site Small Litter	793	100%

3.4.1**Small Litter by Sites**

The ten small litter sites with the most observed small litter are listed below in **Table 12**. The site with the most accumulated small litter in 2019 was Site 75 with 43 pieces of small litter observed. This site was zoned commercial. In total, 30% of sites were zoned commercial, 20% mixed use, 20% multi-family residential and 10% each single-family, industrial and institutional. A full ranking of sites is provided in **Appendix F**.

Table 12: Small Litter Site Rankings

Site Number	Number of Pieces of Small Litter	Hundred Block	Street Name
75	43	400	Homer
107	35	600	Powell
110	31	400	Main
97	27	800	Commercial
55	25	3400	Vanness
19	25	700	Granville
60	24	7300	Dumfries
15	24	600	E. Broadway
106	21	1000	Burrard
54	20	1100	Clark

3.4.2**Small Litter Results Compared to 2015 Baseline 2018 and 2017 Follow-Up Studies**

Results from the 2015 audit were established as the baseline against which future litter audit results (e.g., 2017, 2018 and 2019) can be compared. **Table 13** compares the composition and accumulation from the 2015 baseline to the 2019 results while **Table 14** and **Table 15** compares the composition of accumulated small litter to the 2017 and 2018 follow-up audits, respectively.

Overall, there was a 1% increase in the small litter observed in 2019 from the baseline audit and a 43% increase and 5% decrease from the follow-up audits in 2017 and 2018, respectively. It should be noted these values do not include the four sites that were immediately adjacent to construction in 2019, the five sites in 2018 or the two in 2017.

Of note, compared to the 2015 baseline, small litter increases were predominantly seen in the ‘other material’ (450%), plastic film (261%) and other polystyrene packaging materials i.e. foam peanuts (200%) categories.

Table 13: 2019 vs 2015 Small Litter Comparison

Category	2019 Results (106 Sites)		2015 Baseline Results (108 Sites)		% Change
	# Small Litter Items	% of Total	# Small Litter Items	% of Total	
Cigarette Butts/Debris	168	21%	243	31%	-31%
Other Tobacco	1	0%	1	0%	0%
Bottle Caps	4	1%	0	0%	-
Straws	1	0%	0	0%	-
Candy Packaging and Wrappers	29	4%	20	3%	45%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	9	1%	42	5%	-79%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	3	0%	1	0%	200%
Glass	28	4%	13	2%	115%
Paper	158	20%	121	15%	31%
Cup Sleeves	1	0%	2	0%	-50%
Plastic Film	65	8%	18	2%	261%
Hard Plastic	54	7%	39	5%	38%
Aluminum/Foil Debris	15	2%	24	3%	-38%
Rubber	9	1%	4	1%	125%
Metal (not aluminum)	8	1%	8	1%	0%
Chewing Gum (stuck on pavement)	203	26%	231	29%	-12%
Food and Food Scraps	11	1%	10	1%	10%
Pet Waste (bagged)	1	0%	0	0%	-
Pet Waste (loose)	3	0%	4	1%	-25%
Needles/Syringes	0	0%	0	0%	-
Medications	0	0%	0	0%	-
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	0	0%	2	0%	-100%
Other Electronic Waste	0	0%	0	0%	-
Other Materials	22	3%	4	1%	450%
Total Site Small Litter	793	100%	787	100%	1%

Table 14: 2019 vs. 2017 Small Litter Comparison

Category	2019 Results (106 Sites)		2017 Results (106 Sites)		% Change
	# Small Litter Items	% of Total	# Small Litter Items	% of Total	
Cigarette Butts/Debris	168	21%	207	37%	-19%
Other Tobacco	1	0%	1	0%	0%
Bottle Caps	4	1%	3	1%	33%
Straws	1	0%	5	1%	-80%
Candy Packaging and Wrappers	29	4%	10	2%	190%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	9	1%	0	0%	-
Other Polystyrene Debris (i.e., Poly Foam Pieces)	3	0%	7	1%	-57%
Glass	28	4%	12	2%	133%
Paper	158	20%	65	12%	143%
Cup Sleeves	1	0%	0	0%	-
Plastic Film	65	8%	26	5%	150%
Hard Plastic	54	7%	36	6%	50%
Aluminum/Foil Debris	15	2%	21	4%	-29%
Rubber	9	1%	1	0%	800%
Metal (not aluminum)	8	1%	7	1%	14%
Chewing Gum (stuck on pavement)	203	26%	140	25%	45%
Food and Food Scraps	11	1%	0	0%	-
Pet Waste (bagged)	1	0%	0	0%	-
Pet Waste (loose)	3	0%	3	1%	0%
Needles/Syringes	0	0%	0	0%	-
Medications	0	0%	0	0%	-
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	0	0%	1	0%	-100%
Other Electronic Waste	0	0%	0	0%	-
Other Materials	22	3%	9	2%	144%
Total Site Small Litter	793	100%	554	100%	43%

Table 15: 2019 vs. 2018 Small Litter Comparison

Category	2019 Results (106 Sites)		2018 Results (103 Sites)		% Change
	# Small Litter Items	% of Total	# Small Litter Items	% of Total	
Cigarette Butts/Debris	168	21%	286	34%	-41%
Other Tobacco	1	0%	0	0%	-
Bottle Caps	4	1%	0	0%	1%
Straws	1	0%	1	0%	0%
Candy Packaging and Wrappers	29	4%	28	3%	4%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	9	1%	0	0%	-
Other Polystyrene Debris (i.e., Poly Foam Pieces)	3	0%	8	1%	-63%
Glass	28	4%	26	3%	8%
Paper	158	20%	155	19%	2%
Cup Sleeves	1	0%	0	0%	-
Plastic Film	65	8%	56	7%	16%
Hard Plastic	54	7%	28	3%	93%
Aluminum/Foil Debris	15	2%	42	5%	-64%
Rubber	9	1%	3	0%	200%
Metal (not aluminum)	8	1%	12	1%	-33%
Chewing Gum (stuck on pavement)	203	26%	155	19%	31%
Food and Food Scraps	11	1%	9	1%	22%
Pet Waste (bagged)	1	0%	3	0%	-67%
Pet Waste (loose)	3	0%	2	0%	50%
Needles/Syringes	0	0%	0	0%	-
Medications	0	0%	0	0%	-
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	0	0%	0	0%	-
Other Electronic Waste	0	0%	0	0%	-
Other Materials	22	3%	22	3%	0%
Total Site Small Litter	793	100%	836	100%	-5%

The top small litter sites were analyzed for each litter audit. During this analysis zoning and land use were recorded. In each year of the audit commercial sites comprised the majority of the top 10 small litter sites. These results are provided in **Figure 35**. The overall land use results vary year to year with the exception of commercial and multi-family zoning being the areas of highest small litter accumulation.

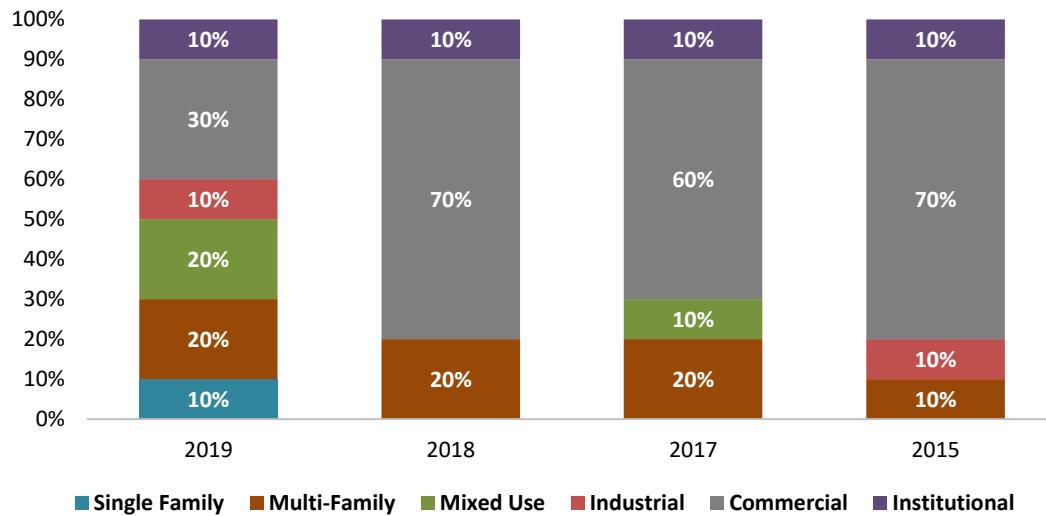


Figure 35: 2019 2018, 2017 and 2015 top 10 Small Litter Sites by Zoning and Land Use

3.4.3

Small Litter Results Compared to Other North American Municipalities

Small litter audits are completed in several North American municipalities. These audits record small litter in similar categories using the same methodology. **Table 16** illustrates the percentage breakdown per small litter item category for each municipality (as well as Vancouver in previous years). **Figure 36** illustrates a comparison of the top three small litter categories observed in the 2019 Vancouver street litter audits to the results for each municipality.

Table 17 illustrates the average number of items counted per site based on category. **Figure 37** illustrates these results graphically.

Table 16: Vancouver Small Litter Audit Results Compared to Other Cities

Category	Toronto 2016	Edmonton 2016	Edmonton 2017	Winnipeg 2014	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Cigarette Butts/Debris	22%	28%	34%	43%	13%	31%	37%	34%	21%
Other Tobacco	1%	0%	0%	1%	2%	0%	0%	0%	0%
Bottle Caps	1%	0%	1%	1%	0%	0%	1%	0%	1%
Straws	0%	0%	1%	1%	0%	0%	1%	0%	0%
Candy Packaging and Wrappers	3%	3%	6%	0%	2%	3%	2%	3%	4%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	1%	1%	2%	0%	2%	5%	0%	0%	1%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	1%	7%	6%	3%	1%	0%	1%	1%	0%
Glass	7%	12%	6%	8%	23%	2%	2%	3%	4%
Paper	21%	23%	18%	15%	8%	15%	12%	19%	20%
Cup Sleeves				n/a	n/a	0%	0%	0%	0%
Plastic Film	3%	5%	3%	8%	3%	2%	5%	7%	8%
Hard Plastic	7%	7%	9%	11%	6%	5%	6%	3%	7%
Aluminum/Foil Debris	2%	3%	1%	4%	1%	3%	4%	5%	2%
Rubber	0%	1%	1%	1%	1%	1%	0%	0%	1%
Metal (not aluminum)	2%	0%	0%	1%	2%	1%	1%	1%	1%
Chewing Gum (stuck on pavement)	25%	6%	11%	4%	32%	29%	25%	19%	26%
Food and Food Scraps	1%	1%	0%	0%	0%	1%	0%	1%	1%
Pet Waste (bagged)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pet Waste (loose)	0%	0%	0%	0%	0%	1%	1%	0%	0%
Needles/Syringes	0%	0%	0%	0%	0%	0%	0%	0%	0%
Medications	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cell Phones	0%	0%	0%	0%	0%	0%	0%	0%	0%
Audio-Visual Devices	0%	0%	0%	0%	0%	0%	0%	0%	0%
Batteries	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other Electronic Waste	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other Material	5%	2%	1%	1%	5%	1%	2%	3%	3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

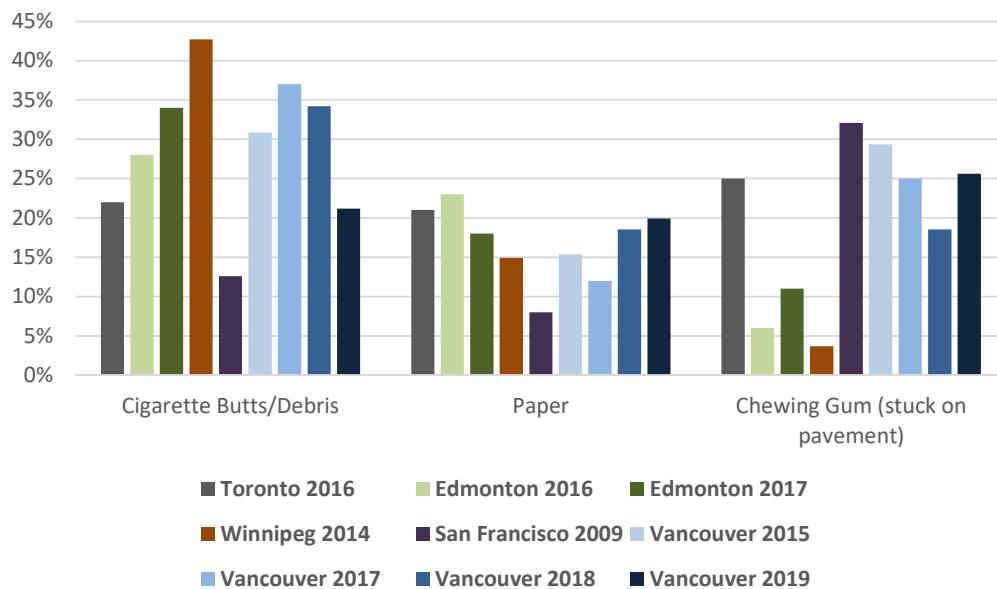


Figure 36: Comparison of Top Small Litter Categories by Municipality

Table 17: Vancouver Small Litter Results Compared to Other Cities (Average Number of Items per Site)

Category	Toronto 2016	Edmonton 2016	Edmonton 2017	Winnipeg 2014	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Cigarette Butts/Debris	2.6	2.6	2.4	3.5	3.2	2.3	2.0	2.8	1.6
Other Tobacco	0.1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Bottle Caps	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Straws	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Candy Packaging and Wrappers	0.3	0.3	0.4	0.0	0.4	0.2	0.1	0.3	0.3
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0.1	0.1	0.1	0.2	0.2	0.4	0.0	0.0	0.1
Other Polystyrene Debris (i.e., Poly Foam Pieces)	0.1	0.7	0.4	0.0	0.4	0.0	0.1	0.1	0.0
Glass	0.8	1.2	0.4	0.6	6.0	0.1	0.1	0.3	0.3
Paper	2.4	2.2	1.3	1.2	2.1	1.1	0.6	1.5	1.5
Cup Sleeves			0.0	n/a	n/a	0.0	0.0	0.0	0.0
Plastic Film	0.4	0.4	0.2	0.6	0.6	0.2	0.2	0.5	0.6
Hard Plastic	0.8	0.6	0.7	0.9	1.5	0.4	0.3	0.3	0.5
Aluminum/Foil Debris	0.2	0.3	0.0	0.3	0.3	0.2	0.2	0.4	0.1
Rubber	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1
Metal (not aluminum)	0.2	0.0	0.0	0.1	0.6	0.1	0.1	0.1	0.1
Chewing Gum (stuck on pavement)	3.0	0.6	0.8	0.3	8.2	2.1	1.3	1.5	1.9
Food and Food Scraps	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1
Pet Waste (bagged)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pet Waste (loose)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Needles/Syringes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medications	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cell Phones	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Audio-Visual Devices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Electronic Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Material	0.0	0.2	0.1	0.1	1.2	0.0	0.1	0.2	0.2
Total	11.1	9.4	7.0	8.1	25.5	7.3	5.2	8.1	7.5

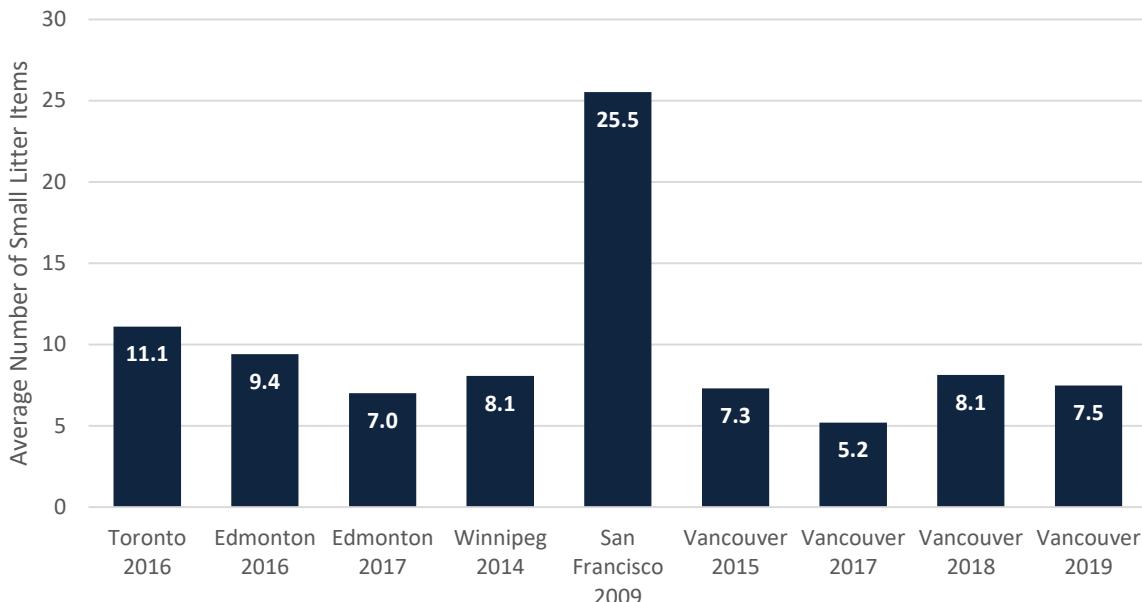


Figure 37: Average Small Litter Items per Site

3.4.4

Small Litter Statistical

The average number of small litter items per site in the 2019 audits was observed at 7.5 pieces with no construction adjacent. There were 16 sites that had no small litter accumulation whatsoever. Of the 106 sites surveyed, six sites had an average of eight pieces of small litter within the site, 72 sites had fewer than eight pieces and 20 sites had more than eight pieces of small litter.

3.5

Small Litter Supersites Result

A site is considered a supersite is when *all* small litter within the site is observed and counted, not only the three segmented portions of the site (beginning, end and mid-point). This assessment was completed at 19 pre-determined sites (same 19 sites for all previous audits done for the City). In 2019, the average number of small litter items per supersite was 247.2 pieces. The most common categories of small litter observed were chewing gum (52%) and cigarette butts/debris (27%), which accounted for a combined 79% of all small litter observed on the supersites. **Table 18** provides these results.

Table 18: Supersite Litter Data 2019

Category	Total Number of Items	% of Total
Cigarette Butts/Debris	1,273	27%
Other Tobacco	0	0%
Bottle Caps	14	0%
Straws	0	0%
Candy Packaging and Wrappers	71	2%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0	0%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	2	0%
Glass	185	4%
Paper	342	7%
Cup Sleeves	0	0%
Plastic Film	105	2%
Hard Plastic	91	2%
Aluminum/Foil Debris	48	1%
Rubber	8	0%
Metal (not aluminum)	27	1%
Chewing Gum (stuck on pavement)	2,450	52%
Food and Food Scraps	69	1%
Pet Waste (bagged)	2	0%
Pet Waste (loose)	4	0%
Needles/Syringes	0	0%
Medications	0	0%
Cell Phones	0	0%
Audio-Visual Devices	0	0%
Batteries	1	0%
Other Electronic Waste	0	0%
Other Material	5	0%
Total Supersite Small Litter	4,697	100%

3.5.1

Small Litter by Supersites

All 19 supersites are ranked in **Table 19**. The site with the most accumulated litter in 2019 was Site 106 with 808 pieces of small litter observed. Site 106 was the site with the most accumulated small litter in the 2018 audit as well.

Table 19: Supersite Rankings 2019

Site Number	Number of Pieces of Small Litter	Hundred Block	Street Name
106	808	1000	Burrard Street
38	695	1000	West Georgia Street
31	396	2700	East Hastings Street
104	336	1100	Denman Street
54	332	1100	Clark Drive
18	332	800	Hornby Street
97	324	800	Commercial Drive
108	287	2400	Main Street
41	273	300	Terminal Avenue
101	218	1700	West Broadway
109	171	1045	Kingsway
77	129	5500	Main Street
52	102	600	Evans Street.
32	92	1800	Yew Street
82	61	900	E. 24 Avenue
56	41	2900	Horley Street
42	41	1700	W. 3 Avenue
26	37	2300	Wall Street
21	22	300	E. 39 Avenue

3.5.2

2019 Supersite Small Litter Results Compared to Other Audits

Results from the 2015 audit were established as the baseline against which future litter audit results (e.g., 2017, 2018 and 2019) can be compared. **Table 20** provides the comparison in composition and accumulation from the 2015 baseline to the 2019 results for supersite small litter; **Table 21** and **Table 22** compare the small litter accumulation from the 2019 supersite audits to the 2017 and 2018 follow-up audits, respectively. Overall, there was an 8% decrease in the litter accumulated at the supersites in 2019 from the baseline. There was a 27% increase from the 2017 audits and a 34% decrease from the 2018 audits. **Table 23** compares the 2019, 2018, 2017 and 2015 results based on site.

Table 20: 2019 vs. 2015 Supersite Litter Comparison

Category	2019 Results		2015 Results		% Change
	# Small Litter Items	%	# Small Litter Items	%	
Cigarette Butts/Debris	1,273	27%	1,923	38%	-34%
Other Tobacco	0	0%	5	0%	-100%
Bottle Caps	14	0%	14	0%	0%
Straws	0	0%	0	0%	-
Candy Packaging and Wrappers	71	2%	49	1%	45%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0	0%	3	0%	-100%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	2	0%	1	0%	100%
Glass	185	4%	35	1%	429%
Paper	342	7%	312	6%	10%
Cup Sleeves	0	0%	0	0%	-
Plastic Film	105	2%	38	1%	176%
Hard Plastic	91	2%	84	2%	8%
Aluminum/Foil Debris	48	1%	69	1%	-30%
Rubber	8	0%	16	0%	-50%
Metal (not aluminum)	27	1%	9	0%	200%
Chewing Gum (stuck on pavement)	2,450	52%	2,475	48%	-1%
Food and Food Scraps	69	1%	27	1%	156%
Pet Waste (bagged)	2	0%	1	0%	100%
Pet Waste (loose)	4	0%	1	0%	300%
Needles/Syringes	0	0%	0	0%	-
Medications	0	0%	0	0%	-
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	1	0%	2	0%	-50%
Other Electronic Waste	0	0%	1	0%	-100%
Other Materials	5	0%	57	1%	-91%
Total Site Small Litter	4,697	100%	5,122	100%	-8%

Table 21: 2019 vs. 2017 Supersite Litter Comparison

Category	2019 Results		2017 Results		% Change
	# Small Litter Items	%	# Small Litter Items	%	
Cigarette Butts/Debris	1,273	27%	1,469	40%	-13%
Other Tobacco	0	0%	0	0%	-
Bottle Caps	14	0%	21	1%	-33%
Straws	0	0%	10	0%	-100%
Candy Packaging and Wrappers	71	2%	29	1%	145%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0	0%	0	0%	-
Other Polystyrene Debris (i.e., Poly Foam Pieces)	2	0%	4	0%	-50%
Glass	185	4%	19	1%	874%
Paper	342	7%	175	5%	95%
Cup Sleeves	0	0%	2	0%	-100%
Plastic Film	105	2%	44	1%	139%
Hard Plastic	91	2%	96	3%	-5%
Aluminum/Foil Debris	48	1%	62	2%	-23%
Rubber	8	0%	6	0%	33%
Metal (not aluminum)	27	1%	10	0%	170%
Chewing Gum (stuck on pavement)	2,450	52%	1,716	47%	43%
Food and Food Scraps	69	1%	5	0%	1280%
Pet Waste (bagged)	2	0%	0	0%	-
Pet Waste (loose)	4	0%	0	0%	-
Needles/Syringes	0	0%	0	0%	-
Medications	0	0%	0	0%	-
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	1	0%	0	0%	-
Other Electronic Waste	0	0%	1	0%	-100%
Other Materials	5	0%	16	0%	-69%
Total Site Small Litter	4,697	100%	3,685	100%	27%

Table 22: 2019 vs. 2018 Supersite Litter Comparison

Category	2018 Results		2019 Results		% Change
	# Small Litter Items	%	# Small Litter Items	%	
Cigarette Butts/Debris	1,273	27%	2,681	38%	-53%
Other Tobacco	0	0%	0	0%	-
Bottle Caps	14	0%	5	0%	180%
Straws	0	0%	9	0%	-100%
Candy Packaging and Wrappers	71	2%	117	2%	-39%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0	0%	0	0%	-
Other Polystyrene Debris (i.e., Poly Foam Pieces)	2	0%	18	0%	-89%
Glass	185	4%	104	1%	78%
Paper	342	7%	499	7%	-31%
Cup Sleeves	0	0%	0	0%	-
Plastic Film	105	2%	132	2%	-20%
Hard Plastic	91	2%	240	3%	-62%
Aluminum/Foil Debris	48	1%	112	2%	-57%
Rubber	8	0%	10	0%	-20%
Metal (not aluminum)	27	1%	39	1%	-31%
Chewing Gum (stuck on pavement)	2,450	52%	2,974	42%	-18%
Food and Food Scraps	69	1%	32	0%	116%
Pet Waste (bagged)	2	0%	3	0%	-33%
Pet Waste (loose)	4	0%	3	0%	33%
Needles/Syringes	0	0%	1	0%	-100%
Medications	0	0%	1	0%	-100%
Cell Phones	0	0%	0	0%	-
Audio-Visual Devices	0	0%	0	0%	-
Batteries	1	0%	1	0%	0%
Other Electronic Waste	0	0%	0	0%	-
Other Materials	5	0%	89	1%	-94%
Total Site Small Litter	4,697	100%	7,070	100%	-34%

Table 23: Supersite Audit Results by Site and Year

Site Number	2019 Number of Pieces of Small Litter	2018 Number of Pieces of Small Litter	2017 Number of Pieces of Small Litter	2015 Number of Pieces of Small Litter
106	808	779	385	368
38	695	622	478	561
31	396	485	109	461
104	336	581	293	196
54	332	661	210	248
18	332	384	153	344
97	324	409	126	282
108	287	636	492	470
41	273	764	418	533
101	218	283	116	502
109	171	476	299	369
77	129	210	92	211
52	102	170	141	71
32	92	159	67	160
82	61	52	26	37
42	41	114	49	126
56	41	61	134	77
26	37	206	84	69
21	22	18	13	37
Total Small Litter	4,697	7,070	3,685	5,122

3.5.3**Supersite Results Compared to Other North American Municipalities**

Supersite assessments are completed in a few North American municipalities. These assessments audit small litter throughout the entire site in similar categories using the same methodology. **Table 24** illustrates the percentage breakdown per small litter item category for each municipality. **Figure 38** compares the top four supersite categories in the 2019 Vancouver street litter audits to other municipalities that complete supersite audits. **Table 25** illustrates the average number of items counted per site based on category. **Figure 39** illustrates these results graphically.

Table 24: Vancouver Supersite Small Litter Comparison to Other Cities

Category	Toronto 2006	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Cigarette Butts/Debris	14%	25%	38%	40%	38%	27%
Other Tobacco	1%	0%	0%	0%	0%	0%
Bottle Caps	1%	1%	0%	1%	0%	0%
Straws	0%	1%	0%	0%	0%	0%
Candy Packaging and Wrappers	1%	4%	1%	1%	2%	2%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	1%	1%	0%	0%	0%	0%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	3%	0%	0%	0%	0%	0%
Glass	17%	38%	1%	1%	1%	4%
Paper	12%	17%	6%	5%	7%	7%
Cup Sleeves	n/a	n/a	0%	0%	0%	0%
Plastic Film	3%	3%	1%	1%	2%	2%
Hard Plastic	3%	7%	2%	3%	3%	2%
Aluminum/Foil Debris	2%	2%	1%	2%	2%	1%
Rubber	0%	1%	0%	0%	0%	0%
Metal (not aluminum)	1%	2%	0%	0%	1%	1%
Chewing Gum (stuck on pavement)	40%	not included	48%	47%	42%	52%
Food and Food Scraps	0%	0%	1%	0%	0%	1%
Pet Waste (bagged)	0%	0%	0%	0%	0%	0%
Pet Waste (loose)	0%	0%	0%	0%	0%	0%
Needles/Syringes	0%	0%	0%	0%	0%	0%
Medications	0%	0%	0%	0%	0%	0%
Cell Phones	0%	0%	0%	0%	0%	0%
Audio-Visual Devices	0%	0%	0%	0%	0%	0%
Batteries	0%	0%	0%	0%	0%	0%
Other Electronic Waste	0%	0%	0%	0%	0%	0%
Other Material	1%	1%	1%	0%	1%	0%
Total	100%	100%	100%	100%	100%	100%

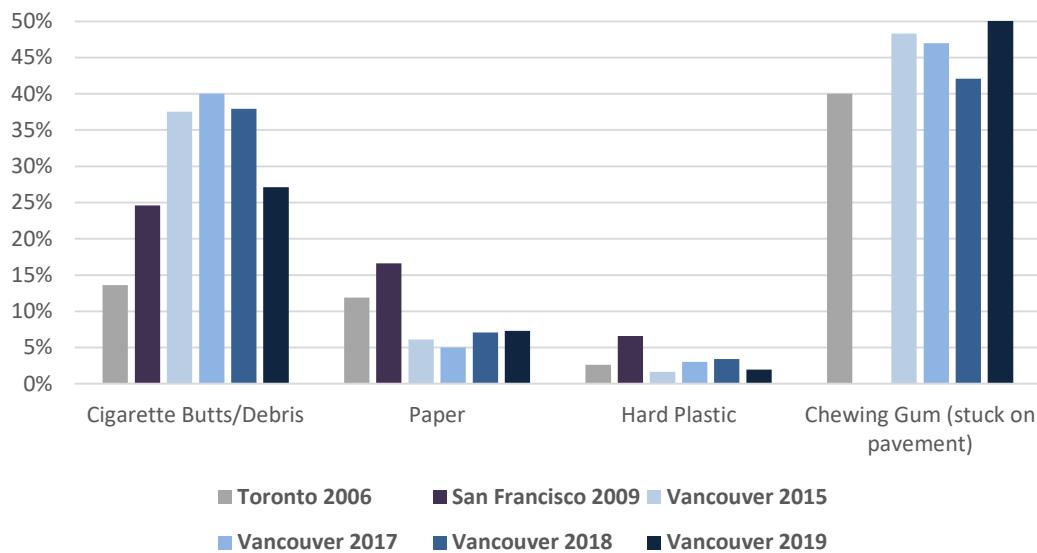


Figure 38: Comparison of Top Supersite Litter Categories by Municipality

Table 25: Vancouver Supersite Small Litter Comparison to Other Cities (Average Number of Items per Site)

Category	Toronto 2006	San Francisco 2009	Vancouver 2015	Vancouver 2017	Vancouver 2018	Vancouver 2019
Cigarette Butts/Debris	176.6	83.8	101.2	77.3	141.1	67.0
Other Tobacco	14.6	0.0	0.3	0.0	0.0	0.0
Bottle Caps	8.6	2.0	0.7	1.1	0.3	0.7
Straws	4.7	1.7	0.0	0.5	0.5	0.0
Candy Packaging and Wrappers	16.9	12.2	2.6	1.5	6.2	3.7
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	39.2	3.3	0.2	0.0	0.0	0.0
Other Polystyrene Debris, (i.e., Poly Foam Pieces)	14.5	0.5	0.1	0.2	0.9	0.1
Glass	218.7	128.1	1.8	1.0	5.5	9.7
Paper	154.3	56.8	16.4	9.2	26.3	18.0
Cup Sleeves	n/a	n/a	0.0	0.1	0.0	0.0
Plastic Film	35.7	10.3	2.0	2.3	6.9	5.5
Hard Plastic	34.1	22.5	4.4	5.1	12.6	4.8
Aluminum/Foil Debris	24.9	6.2	3.6	3.3	5.9	2.5
Rubber	5.4	1.8	0.8	0.3	0.5	0.4
Metal (not aluminum)	15.3	8.2	0.5	0.5	2.1	1.4
Chewing Gum (stuck on pavement)	518.5	0.0	130.3	90.3	156.5	128.9
Food and Food Scraps	0.0	0.0	1.4	0.3	1.7	3.6
Pet Waste (bagged)	0.0	0.0	0.1	0.0	0.2	0.1
Pet Waste (loose)	0.0	0.0	0.1	0.0	0.2	0.2
Needles/Syringes	0.0	0.0	0.0	0.0	0.1	0.0
Medications	0.0	0.0	0.0	0.0	0.1	0.0
Cell Phones	0.0	0.0	0.0	0.0	0.0	0.0
Audio-Visual Devices	0.0	0.0	0.0	0.0	0.0	0.0
Batteries	0.0	0.0	0.1	0.0	0.1	0.1
Other Electronic Waste	0.0	0.0	0.1	0.1	0.0	0.0
Other Material	13.0	4.0	3.0	0.8	4.7	0.3
Total	1,294.8	341.5	269.6	193.9	372.1	247.2

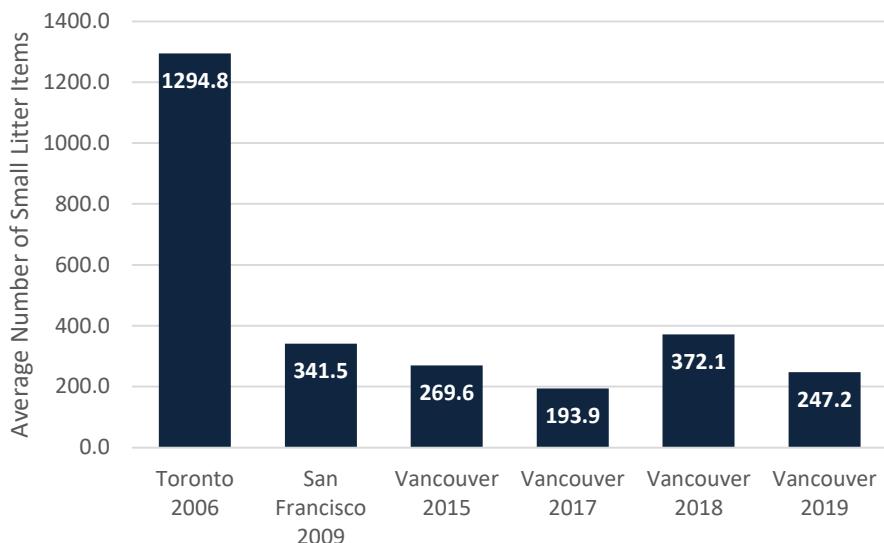


Figure 39: Average Supersite Small Litter Items per Site

3.5.4 Supersite Small Litter Statistical

The average number of small litter items per supersite in the 2019 audits was 247.2 pieces. All sites observed had some amount of small litter accumulated. Of the 19 sites surveyed, ten sites had less than 247 pieces of small litter and nine sites had more than 247 pieces of small litter.

3.5.5 Overall Litter Accumulation on Supersites

When a site is observed as a supersite every piece of litter is recorded. **Table 26** illustrates the combined results of small and large litter for each site. Of all the supersites, Site 106 had the most accumulated litter with 812 pieces of litter counted. This site had the most accumulated litter in 2018 as well.

Table 26: Overall Combined Small and Large Litter for Supersites

Site Number	Number of Pieces of Small Litter	Number of Pieces of Large Litter	Total Litter
106	808	4	812
38	695	14	709
31	396	24	420
97	324	36	360
54	332	25.5	357.5
104	336	6	342
18	332	3	335
108	287	6	293
41	273	16.5	289.5
101	218	9	227
109	171	3	174
52	102	43	145
77	129	14	143
32	92	5	97
82	61	6	67
56	41	10	51
42	41	3	44
26	37	3	40
21	22	4	26

3.6**Sites Immediately Adjacent to Construction**

Dillon staff were asked to note if any sites had construction occurring immediately adjacent to the site being studied. There were four sites where this occurred in 2019 (Sites 28, 68, 74 and 103). These four sites were analyzed separately because the construction activities were expected to increase accumulation of litter.

3.6.1**Large Litter Results**

Within the four sites that were immediately adjacent to construction, the average number of large litter items per site was 11 pieces of litter. This was, on average 3% more litter than the sites that did not have construction directly adjacent. The breakdown by material did not differ dramatically from these sites. Overall, 44% of material was plastic, 40% other and 11% paper.

The general composition of material did differ between the sites that had construction and the sites that did not. **Figure 40** illustrates the composition of litter found within the construction sites. **Table 27** provides a comparison of large litter observed on sites with and without construction based on category.

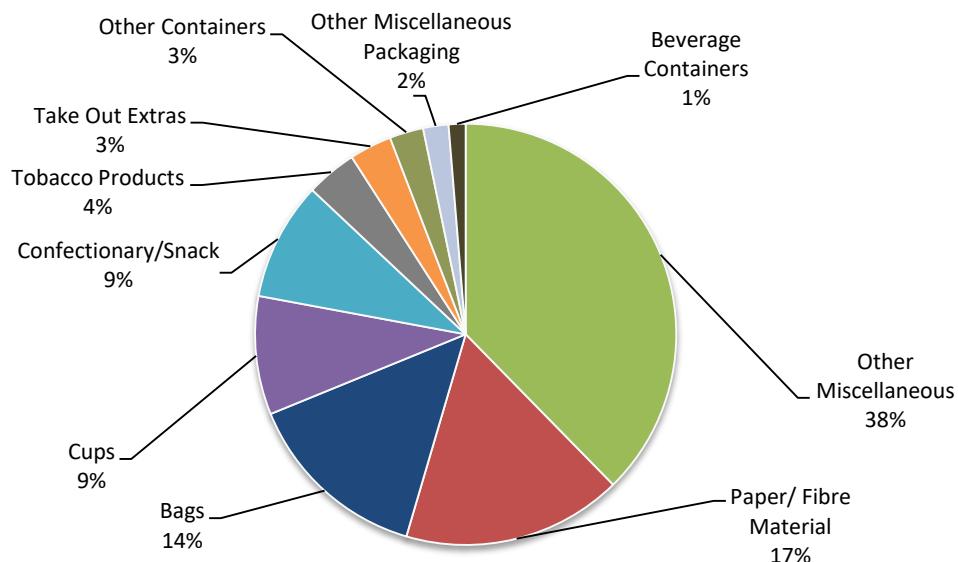


Figure 40: Litter Sites with Immediately Adjacent Construction - Large Litter by Category

Table 27: Large Litter Categories Comparison for Sites with and without Construction

Category	Sites with Construction	Sites without Construction
Other Miscellaneous	38%	25%
Paper/Fibre Material	17%	19%
Bags	14%	10%
Cups	9%	12%
Confectionary/Snack	9%	11%
Tobacco Products	4%	4%
Take Out Extras	3%	8%
Other Containers	3%	1%
Other Miscellaneous Packaging	2%	4%
Beverage Containers	1%	3%
Other Packaging	0%	0%
Other Packaging (Boxes)	0%	2%
Food Wraps/Containers	0%	0%
Trays	0%	0%
Cloth	0%	0%
Total	100%	100%

3.6.2

Small Litter Results

Within the four sites that were immediately adjacent to construction, the average number of small litter items per site was 2.5 pieces of litter. This was, on average, 31% of the small litter accumulated at the sites that did not have construction (at 7.9 pieces). **Table 28** provides a comparison of small litter

observed on sites with and without construction based on category. Overall, the comparison is quite similar from one category to the next. The most significant difference is the increase in plastic film (30% with construction, 8% without construction) and a decrease in gum (0% on construction sites and 26% on sites without construction).

Table 28: Small Litter Comparison for Sites with and without Construction

Category	Sites with Construction	Sites without Construction
Cigarette Butts/Debris	20%	21%
Other Tobacco	0%	0%
Bottle Caps	0%	1%
Straws	0%	0%
Candy Packaging and Wrappers	0%	4%
Expanded Polystyrene Packing Materials (i.e., Foam Peanuts)	0%	1%
Other Polystyrene Debris (i.e., Poly Foam Pieces)	0%	0%
Glass	0%	4%
Paper	30%	20%
Cup Sleeves	0%	0%
Plastic Film	30%	8%
Hard Plastic	0%	7%
Aluminum/Foil Debris	10%	2%
Rubber	0%	1%
Metal (not aluminum)	10%	1%
Chewing Gum (stuck on pavement)	0%	26%
Food and Food Scraps	0%	1%
Pet Waste (bagged)	0%	0%
Pet Waste (loose)	0%	0%
Needles/Syringes	0%	0%
Medications	0%	0%
Cell Phones	0%	0%
Audio-Visual Devices	0%	0%
Batteries	0%	0%
Other Electronic Waste	0%	0%
Other Material	0%	3%
Total Site Small Litter	100%	100%

4.0

Additional Observations

Within the City of Vancouver there are a few public spaces programs that are ongoing. These programs promote waste diversion in the public realm and support the GCAP and are a part of the ongoing zero waste initiatives that aim to promote diversion and reduce litter.

During the litter audits, Dillon staff would note if there were any City waste receptacles within 50m of the site. There were several types of receptacles that were noticed within and around the litter sites as illustrated in **Figure 41** to **Figure 43**. The downtown on-street recycling project started in the summer of 2017 with 15 new three stream waste receptacles being installed in the downtown core. In 2018 there were 28 more receptacles installed, 10 in the summer and 18 in the winter. It is our current understanding that there has not been any analysis done to determine if the installation of these receptacles has assisted in reducing curbside littering.



Figure 41: City Park Litter Receptacle



Figure 42: City Single Stream Receptacle and Beverage Container Receptacle



Figure 43: City Receptacles in the Downtown Core

There were 86 sites (78%) where City litter bins were not within 50 m of the site being audited and 24 sites (22%) where there were City litter receptacles within 50 m. Sites in proximity to waste receptacles had on average 15.0 pieces of large litter while sites without had an average of 9.5 pieces of large litter. Small litter also, was on average higher where there were waste receptacles (12.8 pieces) versus when there were no waste receptacles (5.8 pieces). These results are illustrated in **Figure 44**. It should be noted that the City installs waste receptacles in high-traffic areas, and in some instances, waste receptacles are installed because of litter issues in specific areas. Thus, the fact that there typically is more litter accumulation near waste receptacles is not necessarily due to the presence of the receptacle itself. The increase in litter accumulation near waste receptacles may simply be due to the nature of the area where receptacles are installed.

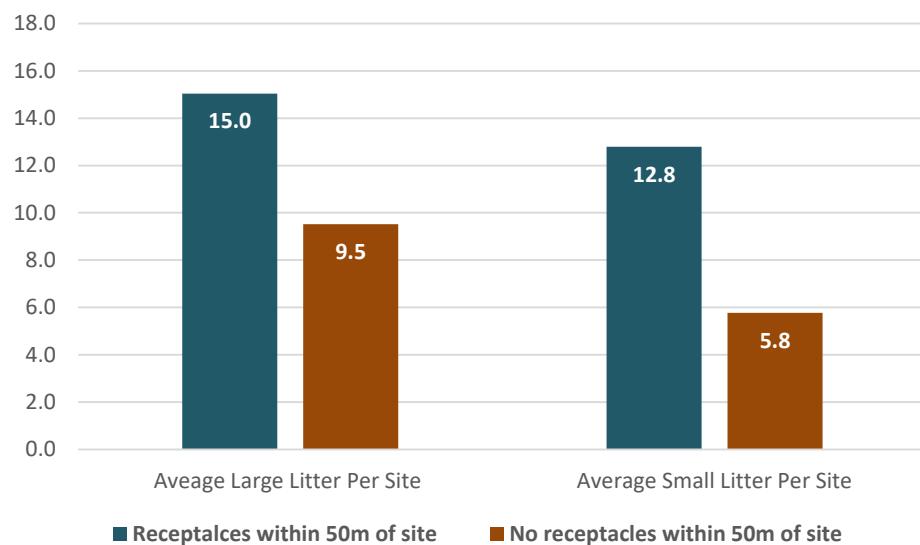


Figure 44: Average Large and Small Litter Pieces per Site based on the Presence of Waste Receptacle

5.0

Site Ranking and Attributes

Dillon staff ranked each of the 110 audited sites in three different ways, as follows:

1. Total number of large litter items audited within each site;
2. Total number of small litter items audited within each site; and
3. Total number of combined large and small litter items within each site.

Table 29 indicates the top ten sites, having the most accumulated large and small litter combined. A full list of all sites is provided in **Appendix F**.

In an effort to examine the audit results further, various attributes which may contribute to litter levels were examined. Attributes associated with the ten sites having the highest amount of combined litter sites are proved in **Table 29**. Of these sites 30% had a fast food restaurant within sight. A convenience store was noted within sight in 20% of the sites. There was a bus stop within the survey area of 70% of the sites and City litter receptacles were within 50 m of 50% of the sites.

Table 29: Combined Ranking for Large and Small Litter

Site #	All Litter	Hundred Block	Street Name	Fast Food	Conv. Store	Bus Stop	Litter Bin
55	92.5	3400	Vanness	Y	N	Y	Y
17	81.5	2100	Renfrew	N	N	Y	Y
110	76	400	Main	N	Y	Y	N
97	63	800	Commercial	N	N	Y	Y
75	61.5	400	Homer	N	N	Y	Y
107	54.5	600	Powell	N	N	Y	N
52	51	600	Evans	N	N	N	N
60	48	7300	Dumfries	Y	Y	N	N
54	45.5	1100	Clark	N	N	Y	Y
92	45.5	2200	E. Pender	Y	N	N	N

The combined small and large litter sites were analyzed for each litter audit. During this analysis zoning and land use were recorded (**Figure 45**). Combined litter had the most variation in land use from the baseline audit in 2015 (30% mixed use and 30% commercial) while 2017, 2018 and 2019 had more similar results (30% single family, 20-30% multi-family, 20-30% commercial). This variation may indicate that land use is not a strong indicator of litter accumulation.

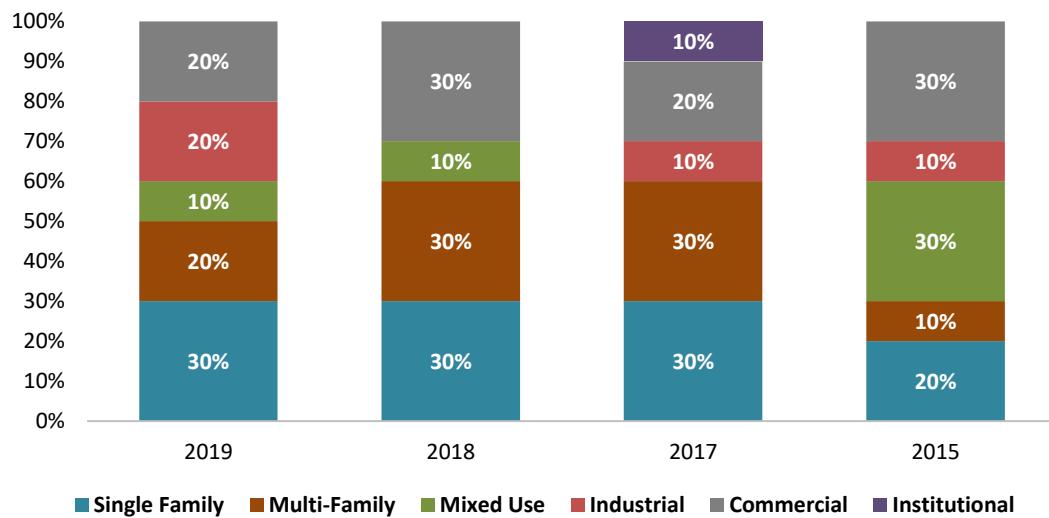


Figure 45: 2018, 2017 and 2015 top 10 Combined Litter Sites by Zoning and Land Use

6.0

Conclusions

It is important to note the information contained within this report outlining the litter audit results is a “snapshot” in time. These results only reflect the conditions of the period of time in which they were collected. Seasonal variability and weather, among other factors, can affect the amount of accumulated litter within an area. The litter audit results for the assessments that took place September 16 to September 19, 2019 are those reflected in this report.

6.1

Key Findings of the Large Litter Audits

Large litter was observed at all 110 sites. Four of these audits are analyzed separately as they were immediately adjacent to construction sites. The key findings of the large litter audits were:

- The average number of large litter items per site was 10.7 pieces for sites with no adjacent construction and 10.7 if the sites with construction were included in the overall analysis. This number (of pieces of litter accumulated) was less than the baseline audit in 2015 (12 pieces per site) but more than the 2017 follow-up audit (8.1) and 2018 follow-up audit (9.7).
- Total large litter observed in 2019 was 1,135 pieces for the 106 sites (10.7 per site) without construction.
- The total large litter observed in 2019 was 44 pieces for the four sites (11 per site) immediately adjacent to construction.
- In 2019, the most common categories for large litter observed were ‘other miscellaneous’ (26%), paper/fibre materials (19%) and cups (12%).

6.2

Key Findings of the Small Litter Audits

Small litter was observed at all 110 sites. Four of these assessments are analyzed separately as they were immediately adjacent to construction. The key findings of the small litter audits were:

- The average number of small litter items per site was 7.5 pieces for sites with no construction and 7.3 if the sites with construction were included in the overall analysis. This was more than both the baseline audit (7.3 pieces) and the follow-up audit in 2017 (5.2 pieces). This is less than the follow-up 2018 audit (8.1 pieces).
- The total small litter audited in 2019 was 793 pieces for sites without construction.
- The total small litter audited in 2019 was 10 pieces for sites immediately adjacent to construction.
- The most common categories of small litter observed were chewing gum (25%) and cigarette butts/debris (21%).

6.3

Key Findings of the Supersite Audits

Supersite audits were completed within 19 sites. The key findings of the supersite assessments were:

- The average number of small litter items per site was 247.2 pieces of small litter. This was more than the 2015 baseline audits (269.6 pieces/site) and the 2017 follow-up audits (193.9 pieces/site) but less than the 2018 follow-up audits (372.1 pieces/site).
- The total small litter audited in the 2019 supersites was 4,697 pieces.
- The most common categories of small litter observed in the supersites were chewing gum (52%) and cigarette butts/debris (27%).

7.0

Recommendations

Success in combating litter is not an easy task. Reviews completed on jurisdictional litter abatement practices and policies for litter management show that the best practices for reducing litter and illegal waste dumping include litter campaigns and education. It is recommended that follow-up litter audits are completed to assess the success of litter abatement practices and City-wide litter programs.

7.1

Campaigns and Education

The City has several programs and initiatives in place to reduce litter. Currently, the City is working on a Single Use-Item Reduction Strategy with new by-laws and bans going to council for approval in November, 2019. This strategy is designed to explore ways in which residents can reduce single-use items from going to landfill. During the 2017 street litter audits it was determined that 20% of large litter observed was cups. This reduced to 13% of the large litter observed in 2018 and reduced further to 12% of large litter items recorded in 2019. Continuing to target key litter groups, such as single-use items should positively impact litter abatement within the City and promote the SUI Reduction Strategy.

Should the City create more of a targeted approach to litter abatement it is recommended that the campaigns focus on these small litter categories:

- Chewing gum; and
- Cigarette butts/debris.

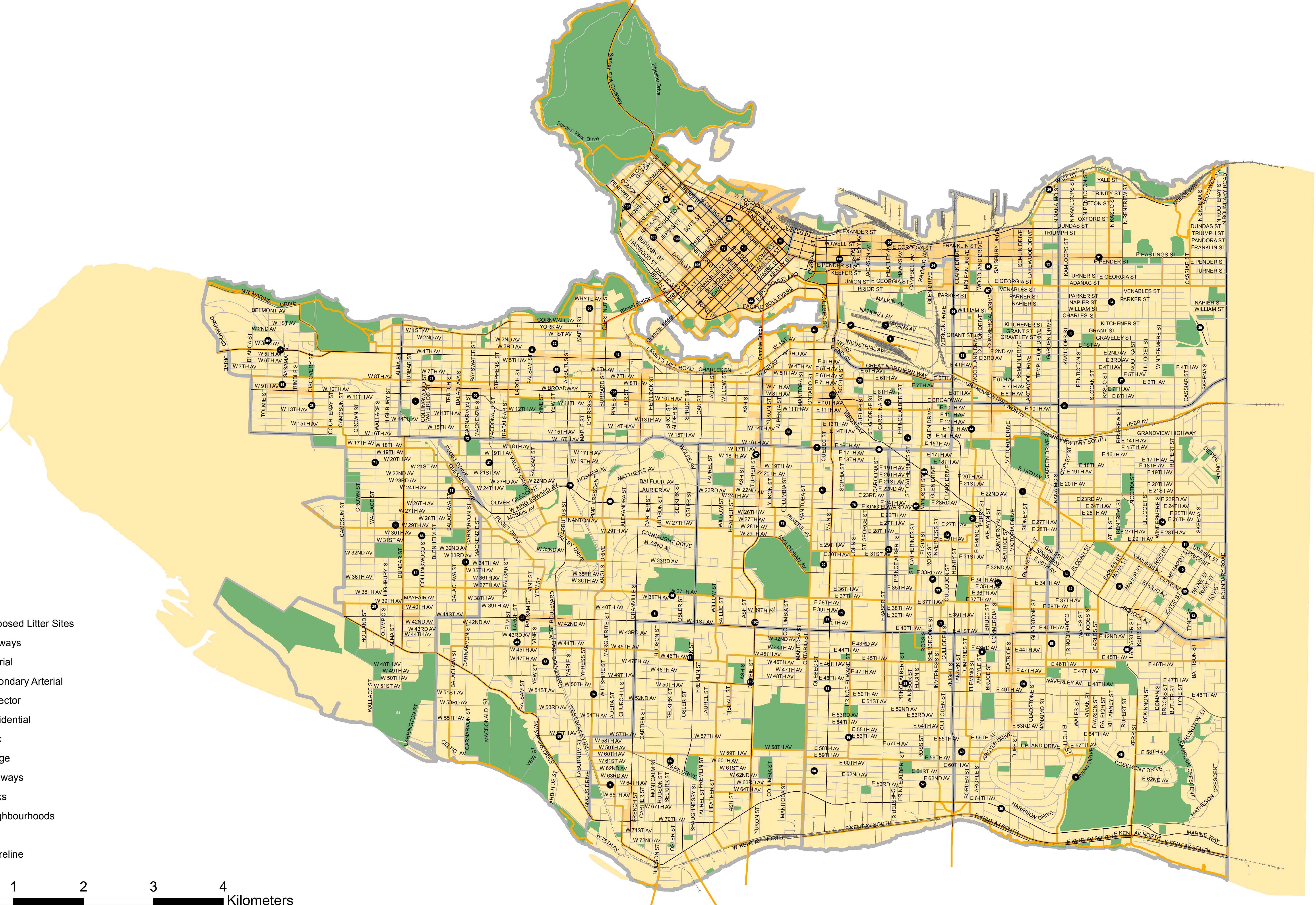
Targeted litter approaches on large litter items (all SUIs) are also recommended that focus on:

- Bags;
- Cups; and
- Take out extras.

Focusing campaigns and educational outreach on targeted items and specific areas of the City noted for high litter accumulation could decrease the requirement for litter management within these areas.

Appendix A

Site Distribution Maps and Litter Hot Spots



Legend

- Proposed Litter Sites
- Railways
- Arterial
- Secondary Arterial
- Collector
- Residential
- Park
- Bridge
- Bikeways
- Parks
- Neighbourhoods
- BIA
- Shoreline

0 0.5 1 2 3 4 Kilometers

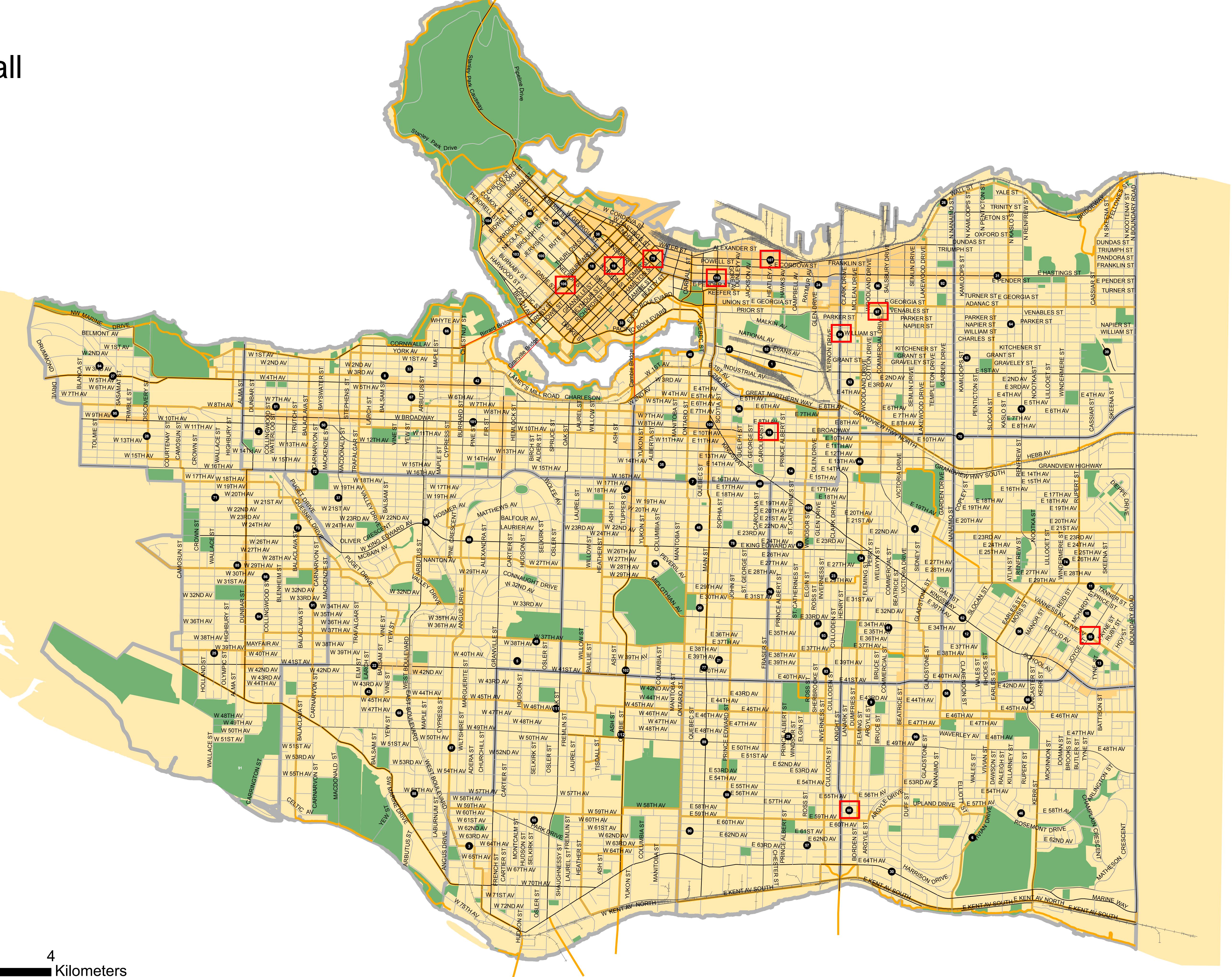


Top 10 Large Litter Sites



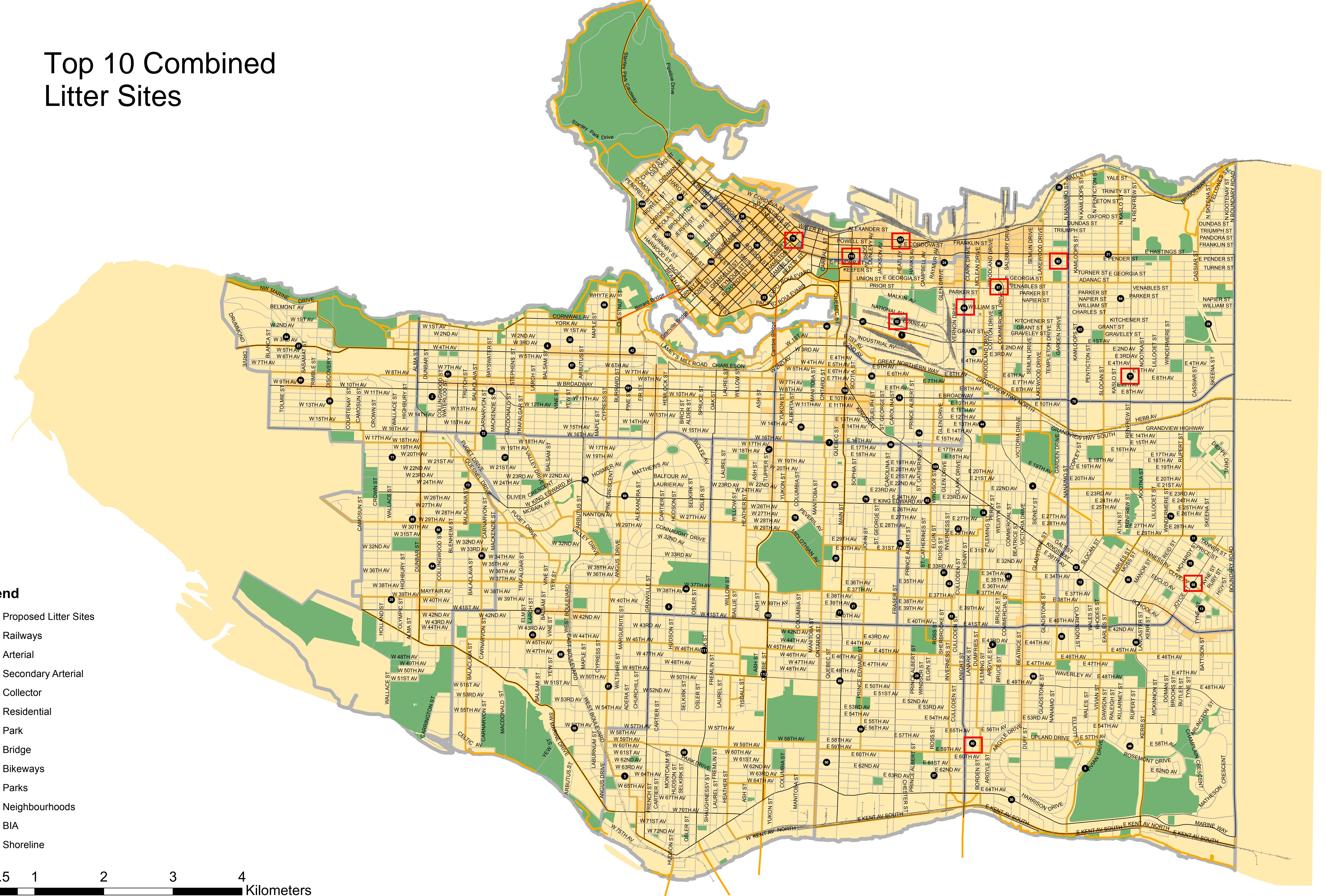


Top 10 Small Litter Sites





Top 10 Combined Litter Sites



Appendix B

Detailed Methodology

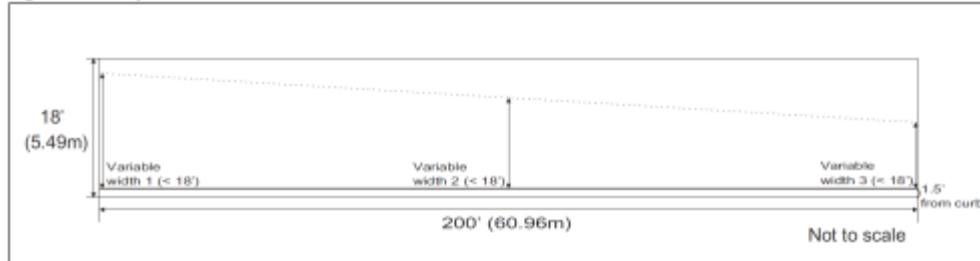
Conducting the Litter Audit

Audit area at the sites should be the same size. Audit Areas are to be 200 feet x 18 feet. These full sized audit areas are termed “fixed” sites. The site width may be less than 18 feet in some cases, such as when in commercial areas the storefront is set back less than the prescribed distance. In these cases, each site should be 200 feet in length by the width available (<18 feet), which will be recorded. These sites are termed “variable” sites.

Beginning at the front of the parked car or the start of the site, the team shall use a measuring device to measure 50 feet ahead of the start of the site. Using street marking paint (water based to dissolve) or some other temporary marking method (e.g., chalk, pylons), a mark should be made on the pavement ahead to denote the starting point of the audit site. From this point the team will measure 100 feet, marking the roadway with another identifier to show the mid-point of the site. A final measurement of an additional 100 feet denotes the end of the audit site. As mentioned above, each site is to be 200 feet in length.

The width measurement shall be taken at the start, midpoint and end of the site. The width of the site should be measured 1.5 feet from inside the curb or the start of the pavement, towards the outer edge of the site, up to a maximum width of 18 feet and marked to indicate the boundary. This rule is set to include 1.5 feet into the street since curbs are normal catchment structures, for which the City is responsible for litter clean up. Refer to **Figure 1** below depicting the audit site setup.

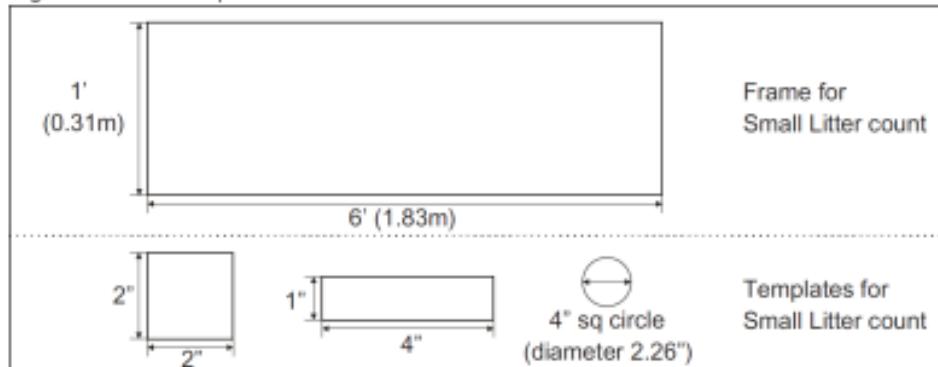
Figure 1: Survey Site



Classification of Large Litter

For purposes of classifying litter, and in accordance with the methods used in previous litter surveys, large litter is defined as being greater than 4 square inches in size. To assist the field teams with determining the litter sizes, each audit team will be provided with three templates of 4 square inches in rectangle, square and round shape form. Refer to **Figure 2** depicting diagrams of the litter templates. At each site location this litter audit will observe and document large litter in 15 categories and 120 sub-categories.

Figure 2: Litter Templates



Classification of Small Litter and Supersites

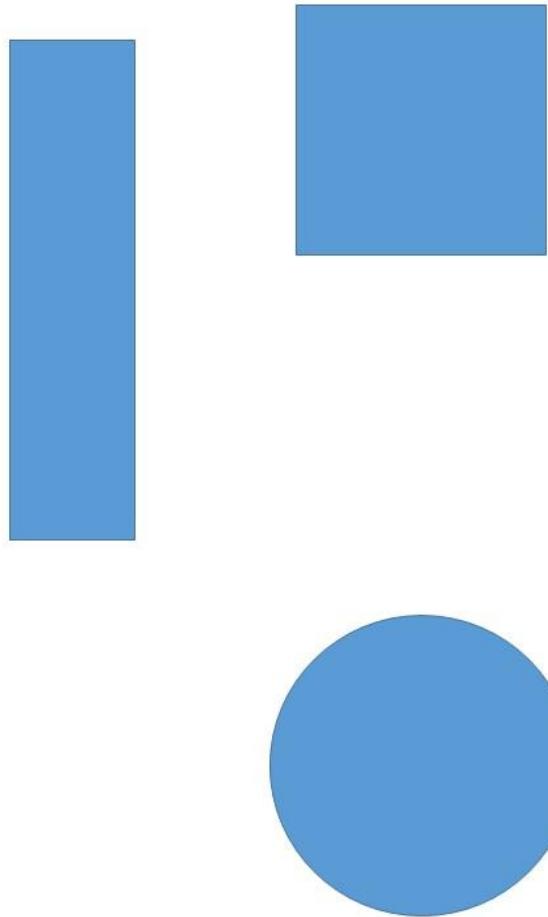
Small litter is defined as those pieces of debris that are less than 4 square inches in size. It is classified under 26 categories. The small litter audit involves examining three segments, or slices taken through the audit site. A frame shall be constructed for each audit team, using $\frac{1}{2}$ inch PVC plastic tubing (or a similar material) to act as the template. This frame shall measure 1 foot wide and 6 feet long. Three successive “flips” of the frame will complete crossing the site to the 18 foot boundary of the site. The litter auditor will observe and count all the small litter contained within the frames at three locations within each site: at the start, mid-point and end of the site. At each segment three flips of the frame will be analyzed, thus surveying a total of 18 square feet segment for a total of 54 square feet of the entire site. See **Figure 3** for a depiction of the site setup for the small litter survey. The Site Surveyor Form – Small Litter Count Sheet will be used to record the findings for each site. All small litter within supersites is to be observed, counted and classified as per the small litter categories outlined.

Figure 3: Small Litter Site Layout



An example of the large litter template, to determine what is large and what is small litter is provided below (**Figure 4**). It should be noted that this template may not be to scale in this document.

Figure 4: Large Litter Template



Appendix C

Site Location Details

Site #	Hundred Block	Date (mm/dd/yyyy)	Start Time	End Time	Team	Fixed	Width 1	Width 2	Width 3	Street Type	Lanes	Divided	Area	Grass Ht. (inches)	Fast Food	Name of Fast Food	Conv. Store	Stop	Bus Stop Within Sight	Bus Stop Survey Area	Traffic Calming	Litter Bin	Details on Litter Bin	Catch Points	Litter Visual Index	Clean Up	Details on Cleanup	Comments	
1	700	09/17/2019	13:04	13:20	B	N	10.5	10.5	10.5	Major	4	Y	Commercial	3-6	Y	Starbucks	N	Y	N	N	N	N		grass line, tree line	1	N			
2	3500	09/16-2019	9:15	9:22	A	N	18	12	12	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
3	1600	09/16-2019	14:25	14:34	A	N	9	9	9	Minor	2	N	Residential	<3	N	N/A	N	N	Y	Y	N	N	N		Curb, grass line	1	N		
4	2000	09/18/2019	14:12	14:25	B	N	13	13	13	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	Y	N	N		Hedge, curb, grass line, tree line	1	N		
5	5400	09/17/2019	8:50	9:00	A	N	14	14	14	Minor	2	N	Residential, Institutional	<3	N	N/A	N	Y	N	N	N	N	N	Bin at school	Curb, grass line	1	N		
6	7600	09/19/2019	10:30	10:39	A	N	18	16	18	Minor	2	N	Residential, parkland	<3	N	N/A	N	N	N	N	N	N	N		Grass line, tree line	1	N		
7	50	09/17/2019	9:53	10:02	A	N	5	5	5	Minor	2	N	Residential, parkland	<3	N	N/A	N	Y	N	N	N	N	Y		Single stream garbage bin	Curb, grass line	2	N	
8	2400	09/16/2019	10:01	10:08	A	N	7	7	7	Minor	2	N	Residential	N/A	N	N/A	N	Y	N	N	N	N	N		Curb, tree line	1	N		
9	5900	9/19/2019	11:29	11:37	A	N	16	16	16	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	3	N		
10	3400	9/19/2019	8:34	8:48	B	N	11.5	11.5	11.5	Minor	2	N	Residential	N/A	N	N/A	N	Y	Y	N	N	N	N		Curb, grass line, tree line	1	N		
11	3400	09/18/2019	15:06	15:17	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
12	5000	09/19/2019	10:12	10:27	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
13	3500	09/19/2019	9:20	9:32	B	N	13.5	13.5	13.5	Minor	2	N	Residential, parkland	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
14	800	09/17/2019	11:40	11:59	A	N	13	13	13	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	Y	N			Curb, grass line	1	N		
15	600	09/17/2019	11:23	11:34	A	N	8	12	18	Major	6	N	Commercial	N/A	Y	Subway, Mac's, Noor Convenience	Y	Y	Y	Y	N	Y	Garbage bin at bus stop	Curb, building	3	N			
16	3800	09/16/2019	12:32	12:39	A	N	5	12	7	Minor	2	N	Residential	<3	N	N/A	N	Y	Y	N	Y	Y	Y	Garbage bin at bus stop	Hedge, curb, grass line	1	N		
17	2100	09/18/2019	13:25	13:44	B	N	12.5	12.5	12.5	Major	4	N	Residential	Over 6	N	N/A	N	Y	Y	N	N	Y	Bin at bus stop	Curb, grass line, wall	2	N			
18	800	09/16/2019	15:41	16:03	B	N	13.5	13.5	13.5	Minor	2	N	Commercial	N/A	Y	Starbucks	Y	Y	N	N	Y	N		Curb	1	Y			
19	700	09/17/2019	9:55	10:25	B	Y	18	18	18	Major	2	N	Commercial	N/A	Y	Starbucks	Y	Y	Y	Y	N	Y	3 stream recepticle	Curb	2	N			
20	4800	09/18/2019	9:51	10:03	A	N	17	17	17	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Hedge, curb, grass line	1	N		
21	300	09/18/2019	12:12	12:21	A	N	16	16	16	Minor	2	N	Residential, parkland	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	1	N		
22	2400	09/16/2019	13:05	13:11	A	N	9	18	18	Major	4	N	Commercial, Parkland	N/A	N	N/A	N	Y	Y	Y	N	N	N		Fence, curb	1	N		
23	1200	09/18/2019	10:27	10:36	A	N	15	15	15	Minor	2	Y	Residential, institutional	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
24	500	09/18/2019	8:04	8:19	B	N	9.5	9.5	9.5	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Fence, curb, grass line, tree line	1	N		
25	5500	09/16/2019	9:17	9:34	B	N	16.5	16	16	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
26	2300	09/18/2019	10:35	10:53	B	Y	18	18	18	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Hedge, grass line	1	N		
27	4500	09/16/2019	12:03	12:15	B	N	9.5	6	8.5	Major	2	N	Residential	<3	N	N/A	N	N	Y	Y	N	N	N		Hedge, curb, grass line	1	N		
28	4300	09/16/2019	11:23	11:38	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	N	N	N	Y	N		Hedge, curb, grass line, tree line	1	N	House under construction within site		

Site #	Hundred Block	Date (mm/dd/yyyy)	Start Time	End Time	Team	Fixed	Width 1	Width 2	Width 3	Street Type	Lanes	Divided	Area	Grass Ht. (inches)	Fast Food	Name of Fast Food	Conv. Store	Stop	Bus Stop within Sight	Bus Stop Within Survey Area	Traffic Calming	Litter Bin	Details on Litter Bin	Catch Points	Litter Visual Index	Clean Up	Details on Cleanup	Comments
30	8300	09/19/2019	10:12	10:22	A	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	Y	Y	N	N		Curb, grass line	4	N		
31	2700	09/18/2019	11:25	11:49	B	N	14.5	14.5	14.5	Major	6	N	Commercial, Residential	N/A	N	N/A	Y	Y	Y	Y	N	Y	Garbage bin at bus stop	Curb, grass line, tree line, buildings	1	N		
32	1900	09/16/2019	10:15	10:26	A	N	12	12	12	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line, tree line	3	N		
33	900	09/17/2019	11:09	11:28	B	N	11	13.5	13.5	Major	2	N	Residential	3-6	Y	7 days coffee	Y	Y	N	N	N	N		Fence, curb, tree line	3	N		
34	4100	09/18/2019	10:54	11:01	A	N	9	9	9	Major	6	Y	Residential, parkland	<3	N	N/A	N	N	Y	N	N	N		Fence, curb	1	N		
35	2900	09/17/2019	9:40	9:48	A	N	12	12	12	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	1	N		
36	2200	09/17/2019	11:08	11:15	A	N	8	8	8	Minor	2	N	Residential, parkland	<3	N	N/A	N	Y	N	N	N	Y	2 stream receptable (garbage & recycling)	Curb, grass line	1	N		
37	2800	09/16/2019	12:15	12:21	A	N	15	15	15	Minor	2	N	Residential	<3	N	N/A	N	Y	Y	N	N	N		Curb, grass line	1	N		
38	1000	09/17/2019	9:10	9:50	B	Y	18	18	18	Major	6	N	Commercial	N/A	Y	McDonalds, Tim Hortons	N	Y	Y	Y	N	Y	2 stream across street	Curb	2	N		
39	1400	09/18/2019	12:58	13:13	B	N	11	15.5	14.5	Minor	2	N	Commercial	<3	N	N/A	N	N	N	N	N	N		Hedge, curb, grass line	1	N		
40	43	09/17/2019	11:51	12:08	B	N	14.5	18	18	Minor	2	N	Residential	N/A	Y	Coffee Shop	N	Y	N	N	N	N		Hedge, curb, grass line, tree line	1	N		
41	300	09/17/2019	12:19	12:58	B	N	11	11	11	Major	6	Y	Commercial, industrial, institutional	Over 6	Y	Tim Hortons, A&W	Y	Y	Y	N	N	N		Fence, hedge, curb, grass line, tree line	1	N		
42	1700	09/16/2019	11:01	11:11	A	N	14	14	14	Minor	2	N	Commerical	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	1	N		
43	6400	09/16/2019	13:23	13:21	A	N	16	14	14	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	Y	N		Fence, curb, grass line, tree line	1	N		
44	2800	09/17/2019	12:35	12:45	A	N	8	8	8	Minor	2	N	Residential, Parkland	<3	N	N/A	N	Y	N	N	N	N		Hedge, curb, grass line	2	N		
45	1200	09/17/2019	9:06	9:14	A	N	12	12	12	Minor	2	N	Residential, Parkland	<3	N	N/A	N	N	Y	N	N	N		Hedge, curb	1	N		
46	3000	09/19/2019	10:45	10:52	A	N	10	10	10	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	1	N		
47	500	09/17/2019	9:26	9:34	A	N	15	15	15	Minor	2	N	Residential, Commercial	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	1	N		
48	3700	09/17/2019	10:22	10:33	A	N	15	15	15	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	2	N		
49	3200	09/17/2019	11:54	12:09	A	N	13	12	13	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line	1	N		
50	2900	09/16/2019	9:46	9:52	A	N	15	15	15	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Hedge, curb, grass line	1	N	2941 does not exist - started at 2945 and went west	
51	3400	09/16/2019	9:30	9:37	A	N	8	7	6	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Fence, hedge, curb, grass line	2	N		
52	600	09/17/2019	13:29	13:53	B	N	10.5	10.5	10.5	Minor	2	N	Commercial	<3	N	N/A	N	N	N	N	N	N		Curb, grass line	2	N		
53	1800	09/18/2019	9:01	9:14	B	N	11.5	11.5	11.5	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line, tree line	1	N		
54	1100	09/18/2019	8:26	8:55	B	N	11	11	12	Major	6	N	Commercial	N/A	N	N/A	N	Y	Y	Y	N	Y	Garbage bin at bus stop	Hedge, curb, tree line	2	N		
55	3400	09/19/2019	8:55	9:15	B	N	14.5	14.5	14.5	Major	2	N	Commercial, Residential	<3	Y	Fresh Slice, Tim Hortons	N	Y	Y	N	N	Y	garbage and recycling at skytrain stop	Curb, grass line, tree line	4	N	started at 3488 and headed west	
56	2900	09/19/2019	9:51	10:06	B	N	14.5	14.5	14.5	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N		Curb, grass line, tree line	1	N		

Site #	Hundred Block	Date (mm/dd/yyyy)	Start Time	End Time	Team	Fixed	Width 1	Width 2	Width 3	Street Type	Lanes	Divided	Area	Grass Ht. (inches)	Fast Food	Name of Fast Food	Conv. Store	Stop	Bus Stop within Sight	Bus Stop Within Survey Area	Traffic Calming	Litter Bin	Details on Litter Bin	Catch Points	Litter Visual Index	Clean Up	Details on Cleanup	Comments	
57	7800	09/19/2019	8:57	9:12	A	N	13	17	13	Minor	2	N	Residential	<3	N	N/A	N	N	N	N	N	N		Curb, grass line	1	N			
58	5700	09/19/2019	11:15	11:25	B	Y	18	18	18	Minor	2	Y	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	2	N		Construction 3 houses away from site
59	300	09/19/2019	9:30	9:41	A	N	15	15	15	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	2	N		
60	7200	09/19/2019	10:00	10:08	A	Y	18	18	18	Minor	2	Y	Residential	<3	Y	McDonalds	Y	Y	N	N	N	N	N		Curb, grass line	3	N		
61	5000	09/19/2019	11:16	11:22	B	N	15	10	10	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	2	N		
62	2400	09/19/2019	10:31	10:42	B	Y	14.5	14.5	14.5	Major	6	N	Commercial, residential	<3	Y	Churches Chicken	N	Y	N	N	Y	N	N		Curb, grass line, tree line	1	N		Highrise construction across street
63	1500	09/18/2019	12:37	12:46	B	N	14.5	14.5	14.5	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
64	2800	09/18/2019	12:13	12:28	B	N	16.5	15.5	15.5	Minor	2	N	Institutional	3-6	N	N/A	N	Y	Y	N	N	N	N		Curb, grass line, tree line	1	N		
65	7500	09/16/2019	14:40	14:47	A	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	1	N		
66	1300	09/16/2019	10:46	10:53	A	N	13	13	13	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line, tree line	1	N		
67	2100	09/16/2019	11:39	11:46	A	N	11	11	15	Minor	2	N	Residential	<3	N	N/A	Y	Y	N	N	Y	N		Hedge, curb	1	N			
68	2100	09/16/2019	13:38	13:53	A	Y	18	18	18	Minor	2	N	Commercial, Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	3	N		construction
69	3900	09/16/2019	12:43	12:51	A	N	14	14	14	Minor	2	Y	Residential, institutional	<3	N	N/A	N	Y	Y	N	N	Y		bus stop garbage bin	Curb, grass line	1	N		
70	2400	09/18/2019	13:51	14:02	B	N	12.5	12.5	12.5	Major	6	Y	Commercial, Residential	<3	Y	Subway, Kair's Coffee	N	Y	Y	Y	Y	N		Curb, grass line	1	N			
71	3900	09/16/2019	11:00	11:15	B	Y	18	18	18	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Fence, grass line, tree line	2	N		
72	3000	09/16/2019	12:01	12:08	A	N	15	15	15	Major	2	Y	Residential, institutional	<3	N	N/A	N	Y	Y	N	Y	Y		Garbage receptable	French, curb, grass line	1	N		
73	3200	09/16/2019	10:44	10:54	B	Y	18	18	18	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Hedge, curb, grass line, tree line	1	N		
74	3200	09/18/2019	14:51	15:01	B	Y	18	18	18	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N		Fence, curb, grass line, tree line	1	N		House under construction within site
75	400	09/17/2019	10:43	10:59	B	N	16.5	16.5	16.5	Major	2	N	Commercial, Institutional	N/A	N	N/A	N	Y	Y	Y	N	Y		Single stream garbage bin	Curb	2	N		
76	700	09/18/2019	10:12	10:21	A	N	7	7	7	Minor	2	N	Commercial, residential	<3	Y	Starbucks	Y	Y	N	N	N	N	N		Hedge, curb, grass line	3	N		
77	5500	09/18/2019	12:27	12:38	A	N	5	7	14	Major	4	Y	Commercial, residential	N/A	Y	Subway	Y	Y	Y	Y	N	N	N		Hedge, curb	2	N		
78	3900	09/18/2019	9:20	9:29	A	N	13	13	13	Minor	2	N	Residential, institutional	<3	N	N/A	N	Y	N	N	Y	N			Hedge, curb, grass line, tree line	1	N		
79	200	09/18/2019	9:41	9:50	A	N	13	13	13	Minor	2	N	Residential	<3	N	N/A	N	N	N	N	N	N		Curb, grass line	1	N		Construction site nearby but not within site	
80	1600	09/16/2019	14:11	14:29	B	N	16	15	15	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	Y	N		Hedge, curb, grass line, tree line	2	N			
81	4900	09/18/2019	11:11	11:18	A	N	8	8	8	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N		Curb, grass line	1	N		
82	900	09/18/2019	9:04	9:15	A	N	14	14	14	Minor	2	Y	Residential, Parkland, Institutional	<3	N	N/A	N	Y	N	N	Y	N		Hedge, curb, grass line, tree line	1	N			

Site #	Hundred Block	Date (mm/dd/yyyy)	Start Time	End Time	Team	Fixed	Width 1	Width 2	Width 3	Street Type	Lanes	Divided	Area	Grass Ht. (inches)	Fast Food	Name of Fast Food	Conv. Store	Stop	Bus Stop within Sight	Bus Stop Within Survey Area	Traffic Calming	Litter Bin	Details on Litter Bin	Catch Points	Litter Visual Index	Clean Up	Details on Cleanup	Comments
83	5500	09/18/2019	11:35	11:43	A	N	16	16	16	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Curb, grass line	3	N		
84	3500	09/16/2019	9:42	9:52	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Curb, grassw line, tree line	1	N		
85	3700	09/16/2019	10:21	10:32	B	Y	18	18	18	Minor	2	N	Residential	3-6	N	N/A	Y	Y	N	N	Y	N	N	Fence, hedge, curb, grass line, tree line	1	N		
86	3400	09/16/2019	9:58	10:07	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Hedge, curb, grass line, tree lie	1	N		
87	66	09/16/2019	13:57	14:05	A	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	Y	N	N	Hedge, curb, grass line	1	N		
88	2100	09/16/2019	14:15	14:20	A	N	2	2	2	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Curb, grass line	1	N		
89	6500	09/18/2019	13:24	13:32	A	N	17	18	12	Major	4	N	Commercial, residential	N/A	Y	Tim Horton's	N	Y	Y	Y	N	Y	2 stream (garbage and recycling)	Curb, buildings	2	N		
90	0	09/18/2019	13:36	13:45	A	N	16	16	16	Minor	2	N	Residential	<3	N	N/A	N	N	N	N	N	N	N	Curb, grass line	1	N		
91	2900	09/16/2019	8:47	9:07	B	N	16.5	16.5	16.5	Major	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Curb, grass line, tree line	1	N		
92	2200	09/18/2019	11:04	11:17	B	Y	18	18	18	Minor	2	N	Residential	3-6	Y	Church's Chicken	N	Y	N	N	N	N	N	Fence, curb, grass line, tree line	4	N		
93	1200	09/18/2019	11:20	11:27	A	N	12	10	8	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Fence, hedge, curb	1	N		
94	1800	09/16/2019	12:20	12:28	B	N	18	18	15	Minor	2	N	Residential	<3	N	N/A	N	Y	N	N	N	N	N	Hedge, curb, grass line, tree line	1	N		
95	4400	09/16/2019	11:45	11:57	B	N	16.5	16.5	17	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N	Hedge, curb, grass line, tree line	2	N		
96	1700	09/18/2019	9:59	10:15	B	N	12.5	12.5	12.5	Minor	2	N	Residential	3-6	N	N/A	Y	Y	Y	N	N	N	N	Curb, grass line, tree line	2	N		
97	800	09/18/2019	9:22	9:51	B	N	16	16	16	Minor	2	N	Commercial, residential	3-6	N	N/A	N	Y	Y	N	N	Y	Garbage bin around corner	Curb, grass line, tree line	4	N		
98	2900	09/19/2019	10:58	11:08	B	Y	18	18	18	Minor	2	N	Residential	<3	N	N/A	N	Y	N	Y	Y	Y	Garbage bin at bus stop	Curb, grass line, tree line	2	N		
100	1200	09/16/2019	14:57	15:10	B	N	15	15	15	Minor	2	N	Residential	3-6	N	N/A	N	Y	N	N	N	N	N	Hedge, cub, grass line, tree line	1	N		
101	2500	09/16/2019	11:17	11:30	A	Y	18	18	18	Major	6	N	Commercial	N/A	Y	Starbucks	N	Y	Y	Y	N	Y	bus stop garbage and bottle recycling	Curb	2	N		
102	5600	09/16/2019	12:52	13:02	A	N	18	16	16	Major	4	Y	Commercial, residential	N/A	N	N/A	N	Y	Y	Y	N	Y	Garbage bin at bus stop	Curb, grass line	1	N		
103	1100	09/16/2019	15:16	15:30	B	N	7.5	14	16	Minor	2	N	Residential	<3	N	N/A	N	Y	N	Y	N	Y	Single stream garbage bin	Curb, construction safety corridor	1	N		construction site
104	1100	09/16/2019	13:30	14:04	B	N	13.5	13.5	12	Major	4	N	Commercial	N/A	Y	Fat Burger, Catrina Taco	Y	Y	Y	Y	N	Y	mixed contaienrs, paper and garbage	Curb	2	N		
105	1300	09/16/2019	14:36	14:50	B	Y	18	18	18	Major	2	N	Commercial	N/A	Y	Starbucks, Tim Horton's	Y	Y	Y	N	N	Y	Single stream garbage bin	Curb, tree line	1	N		

Site #	Hundred Block	Date (mm/dd/yyyy)	Start Time	End Time	Team	Fixed	Width 1	Width 2	Width 3	Street Type	Lanes	Divided	Area	Grass Ht. (inches)	Fast Food	Name of Fast Food	Conv. Store	Stop	Bus Stop within Sight	Bus Stop Within Survey Area	Traffic Calming	Litter Bin	Details on Litter Bin	Catch Points	Litter Visual Index	Clean Up	Details on Cleanup	Comments	
106	1000	09/17/2019	8:11	8:56	B	N	16.5	16.5	16.5	Major	4	N	Commercial	N/A	Y	Starbucks	N	Y	Y	N	N	Y	Singel stream garbage bin	Curb, tree line	1	Y	1 cleaner with bin		
107	600	09/17/2019	14:25	15:12	B	N	14.5	14	15	Major	2	N	Commercial, Residential	Over 6	N	N/A	N	Y	Y	N	N	N	N		Curb, wall	4	N		
108	2400	09/17/2019	10:45	11:01	A	N	14	7	12	Major	6	Y	Commercial	N/A	Y	Tim Hortons	Y	Y	Y	N	N	Y	Garbage bin at bus stop	Fence, curb	2	N			
109	1100	09/17/2019	12:10	12:25	A	N	9	9	13	Major	4	N	Commercial	N/A	N	N/A	Y	Y	Y	N	N	Y	Single stream garbage bin	Curb, grass line	1	N			
110	400	09/17/2019	14:05	14:33	B	Y	18	18	18	Major	6	N	Commercial	N/A	N	N/A	Y	Y	Y	N	N	N		Curb, tree line	3	Y	Garbage pickers on site		

Appendix D

Field Forms

Site Surveyor Form

Date: _____ (DD/MM/YYYY) Start Time: _____ (AM/PM) End Time: _____ (AM/PM)

Team ID _____ Surveyors Names: _____

Site ID Number: _____ Site Name: _____

Site Description (hundred block, street, side street, etc)

Hundred Block: _____ Street Name: _____ Side of Street (NSEW) _____

Site type: Fixed Variable Site length: **Always 200 feet long**

If variable:

Width 1 - Start: _____ ft. (up to 18ft.)

Width 2 - Middle: _____ ft. (up to 18ft.)

Width 3 - End: _____ ft. (up to 18ft.)

Road type (check one): Major City Street Minor City Street Laneway

Is roadway divided: Y / N

Number of Lanes: 2 4 6 Other (explain): _____

Area Attributes:

Commercial Residential Industrial Parkland Institutional

Grass Height (Check one): N/A < 3 inches 3" – 6" over 6"

Fast food within sight: Y / N Name of Fast Food Facility: _____

Convenience store within sight: Y / N Traffic light or stop sign within sight? Y / N

Bus Stop within sight? Y/N Bus stop within survey area? Y/N

Traffic Calming Device within survey area? (median bulge etc. Y/N If yes then describe?)

City street/park litter bin within 50 meter radius from site boundary: Y / N

City street/park litter bin details: _____

Evidence of litter cleanup? Y / N

Cleanup details: _____

Catch point: fence hedge curb grass line tree line other _____

Details:

Photos Taken: _____

Visual rating of site (1 = cleanest, ie. <5 large pieces of litter; 4 = dirtiest, ie. >20 large pieces of litter) _____

Additional Comments: _____

Large Litter Survey Form Pg1:

Site ID:

Site Name:

Time:

Survey Team:

CATEGORY	PASS 1	TOTAL	PASS 2	TOTAL	BRAND NAMES OBSERVED
BEVERAGE CONTAINERS					
Beer Cans					
Beer Bottles (glass)					
Soft Drink (glass)					
Soft Drink (cans)					
Soft Drink (plastic)					
Sport Drink (glass)					
Sport Drink (plastic)					
Water (glass)					
Water (plastic)					
Wine/ Liquor (glass)					
Wine/ Liquor (plastic/other)					
Juice (plastic)					
Milk-Milk Type Beverage (plastic)					
Juice (glass)					
Milk-Milk Type Beverage (Glass)					
Juice (gable top)					
Milk-Milk Type Beverage (gable top)					
Non-Milk Aseptic (box)					
Milk-Milk Type Beverage (Aseptic)					
Drink Foil Pouches					
Beverage Bi-Metal					
OTHER PACKAGING					
Foil Pouches					
Non-Beverage Aseptic Box					
Non-Beverage Gable Top					
Broken Cont. Glass					
Six Pack Plastic Rings					
Foil Containers					
CUPS					
Plastic Drink Cups					
Paper Cups (cold)					
Paper Cups (hot)					
Polystyrene Cups (foam)					
Other Paper Cups					
Cup Lids, Pieces, Lids					
BAGS					
Plastic Retail Bags & Grocery					
Paper Retail Bags& Grocery					
Paper Bags - Fast Food					
Plastic Bags - Fast Food					
Plastic Bags -Consumable Packaging					
Paper Bags -Consumable Packaging					
Plastic Bags-Dry-Cleaning Bags					
Other plastic Bags					
Pet waste bags (empty)					
Plastic Bags non-packaging					
Paper Bags non-packaging					
Zipper Bags/Sandwich Bags					
OTHER PACKAGING (Boxes)					
Cardboard Boxes/ Box Material					
Paperboard (boxboard)					
Paper Beverage Cases/Sleeves					
Polystyrene Clamshells					
Paper Clamshells					
Other Plastic Shells/Boxes					

CATEGORY	PASS 1	TOTAL	PASS 2	TOTAL	BRAND NAMES OBSERVED
OTHER CONTAINERS					
Plastic Jars / Bottles/ Lids					
Paint Containers/Cans					
Pesticide Containers					
Used Lubricating oil containers					
Solvent Containers					
Gasoline Containers					
Glass Jars/ Bottles Misc					
Cans/Containers-steel					
Cans-Aluminum					
Spiral Wound Containers					
Container Lids					
Other Aerosol Containers					
FOOD WRAPS/CONTAINERS					
Paper Food Wrap					
Paper /Foil Composite Wrap					
Plastic Wrap					
TAKE OUT EXTRAS					
Condiment Packaging					
Utensils					
Branded Napkins / Serviettes					
Paper Fast Food Plates					
Poly Fast Food Plates					
Aluminum Food Containers					
Other Plastic Fast Food Plates					
Plates-Other Materials					
TRAYS					
Polystyrene Trays					
Paper Trays					
Other Material Trays					
CONFECTIONARY/ SNACK					
Gum Wrappers					
Candy Bar Wrappers					
Candy Pouches					
Sweet Packaging (describe)					
Other Confectionary (describe)					
Snack Food Packaging					
CLOTH					
Clothing or Clothing Pieces					
Other Cloth					
OTHER MISCELLANEOUS PACKAGING					
Plastic Packaging Other					
Paper Packaging Other					
Plastic/ Composite Other					
Foil Materials/Foil Pieces					
PAPER/ FIBRE MATERIAL					
Non-Brand Towels/Napkins					
Lottery \Ticket Debris					
Printed Material					
Stationary (school, business etc.)					
Receipts (business forms, bus tickets)					
TOBACCO PRODUCTS					
Cigarette / Cigar Debris					
Tobacco other					

CATEGORY	PASS 1	TOTAL	PASS 2	TOTAL	BRAND NAMES OBSERVED
Large Litter Survey Form Pg 2: SiteID:					
OTHER MISCELLANEOUS					
Misc. Paper					
Misc. Plastic					
Misc. Paperboard					
Misc. Cardboard					
Misc. Glass					
Vehicle & Metal Road Debris					
Gypsum/ Drywall					
Rigid Asphalt Products					
Carpet					
Other Construction/Demolition Debris					
Tire & Rubber Debris					
Cell Phones					
Batteries					
Audio Visual Devices					
Electronic Toys					
Small Appliances, power tools					
Alarms					
Light Bulbs					
Home Articles					
Medications					
Food					
Pet Waste (bagged)					
Pet Waste (loose)					
Popsicle Sticks					

TAKE OUT EXTRAS Pass 1 Total Pass 2 Total

Straws
Stir Sticks

Site Surveyor Form - Small Litter (<4") Count Sheet

Date (DD/MM/YY): _____

Start Time: _____ End Time: _____

Team ID: _____ Surveyors Names: _____

Site ID Number: _____

Site Name: _____

SMALL LITTER CATEGORY	Item	Section #1*				Section #2				Section #3				Grand Total
		Flip 1	Flip 2	Flip 3	Total	Flip 1	Flip 2	Flip 3	Total	Flip 1	Flip 2	Flip 3	Total	
Cigarette butts/debris	1													
Other tobacco	2													
Bottle caps	3													
Straws	4													
Candy packaging and wrappers	5													
Expanded Polystyrene packing materials, ie. foam peanuts	6													
Other polystyrene debris, ie. poly foam pieces	7													
Glass	8													
Paper	9													
Cup Sleeves	10													
Plastic film	11													
Hard plastic	12													
Aluminum/foil debris	13													
Rubber	14													
Metal (not aluminum)	15													
Chewing gum (stuck on pavement)	16													
Food & Food Scraps	17													
Pet Waste (bagged)	18													
Pet Waste (loose)	19													
Needles/Syringes	20													
Medications	21													
Cell Phones	22													
Audio-Visual devices	23													
Batteries	24													
Other Electronic Waste	25													
Other Material	26													

*closest to vehicle/starting point

Date:

Time:

Survey Team:

CATEGORY	PASS 1	TOTAL
Small Litter Categories		
Cigarette butts/debris		
Other tobacco		
Bottle caps		
Straws		
Candy packaging and wrappers		
Expanded Polystyrene packing materials, i.e.. foam peanuts		
Other polystyrene debris, i.e.. poly foam pieces		
Glass		
Paper		
Cup Sleeves		
Plastic film		
Hard plastic		
Aluminum/foil debris		
Rubber		
Metal (not aluminum)		
Chewing gum (stuck on pavement)		
Food & Food Scraps		
Pet Waste Loose		
Pet Waste (bagged)		
Needles/Syringes		
Medications		
Cell Phones		
Audio-Visual devices		
Batteries		
Other Electronic Waste		
Other Material		

Appendix E

Litter Data

Large Litter Item	Total	Percent
Misc. Plastic	118	10%
Non-Brand Towels/Napkins	93.5	8%
Cup Lids, Pieces	70.5	6%
Misc. Paper	69.5	6%
Receipts (business forms, bus tickets)	61	5%
Printed Material	55.5	5%
Home Articles	47	4%
Snack Food Packaging	46	4%
Straws	44.5	4%
Plastic Bags -Consumable Packaging	42	4%
Tobacco other	36.5	3%
Candy Pouches	33	3%
Plastic Packaging Other	32	3%
Plastic Drink Cups	27	2%
Condiment Packaging	23.5	2%
Gum Wrappers	19	2%
Paper Cups (cold)	18.5	2%
Paper Cups (hot)	17	1%
Zipper Bags/Sandwich Bags	16	1%
Food	16	1%
Vehicle & Metal Road Debris	15	1%
Candy Bar Wrappers	14.5	1%
Foil Materials/Foil Pieces	12.5	1%
Utensils	12	1%
Cardboard Boxes/ Box Material	11	1%
Plastic Jars / Bottles/ Lids	11	1%
Plastic Bags Non-Packaging	10.5	1%
Polystyrene Cups (foam)	10	1%
Paper Bags - Fast Food	10	1%
Stationary (school, business etc.)	10	1%
Other Construction/ Demolition Debris	10	1%
Plastic Retail Bags & Grocery	9.5	1%
Other Plastic Bags	9.5	1%
Water (plastic)	8	1%
Sweet Packaging (describe)	8	1%
Pet Waste (loose)	7.5	1%
Soft Drink (cans)	6	1%
Paper Bags Non-Packaging	6	1%
Paperboard (boxboard)	6	1%
Cans-Aluminum	5	0%
Paper Fast Food Plates	5	0%
Pet Waste (bagged)	5	0%
Cigarette / Cigar Debris	4.5	0%
Six Pack Plastic Rings	4	0%
Paper Bags -Consumable Packaging	4	0%

Large Litter Item	Total	Percent
Pet Waste Bags (Empty)	4	0%
Polystyrene Clamshells	4	0%
Misc. Glass	3.5	0%
Wine/ Liquor (plastic/other)	3	0%
Paper Retail Bags& Grocery	3	0%
Other Plastic Shells/Boxes	3	0%
Other Confectionary (describe)	3	0%
Lottery \Ticket Debris	3	0%
Gypsum/ Drywall	3	0%
Rigid Asphalt Products	3	0%
Tire& Rubber Debris	2.5	0%
Beer Cans	2	0%
Juice (plastic)	2	0%
Juice (gable top)	2	0%
Paper Clamshells	2	0%
Paper Food Wrap	2	0%
Plastic Wrap	2	0%
Branded Napkins / Serviettes	2	0%
Aluminum Food Containers	2	0%
Plastic Stir Sticks	2	0%
Other Material Trays	2	0%
Plastic/ Composite Other	2	0%
Misc. Paperboard	2	0%
Beer Bottles (glass)	1	0%
Soft Drink (plastic)	1	0%
Sport Drink (plastic)	1	0%
Wine/ Liquor (glass)	1	0%
Milk-Milk Type Beverage (plastic)	1	0%
Milk-Milk Type Beverage (gable top)	1	
Milk-Milk Type Beverage (Aseptic)	1	0%
Beverage Bi-Metal	1	0%
Foil Pouches	1	0%
Plastic Bags-Dry-Cleaning Bags	1	0%
Paint Containers/Cans	1	0%
Spiral Wound Containers	1	0%
Container Lids	1	0%
Polystyrene Trays	1	0%
Clothing or Clothing Pieces	1	0%
Paper Packaging Other	1	0%
Misc. Cardboard	1	0%
Carpet	1	0%
Popsicle Sticks	1	0%
Other Cloth	0.5	0%
Soft Drink (glass)	0	0%
Sport Drink (glass)	0	0%

Large Litter Item	Total	Percent
Water (glass)	0	0%
Juice (glass)	0	0%
Milk-Milk Type Beverage (Glass)	0	0%
Non-Milk Aseptic (box)	0	0%
Drink Foil Pouches	0	0%
Non-Beverage Aseptic Box	0	0%
Non-Beverage Gable Top	0	0%
Broken Cont. Glass	0	0%
Foil Containers	0	0%
Other Paper Cups	0	0%
Plastic Bags - Fast Food	0	0%
Paper Beverage Cases/Sleeves	0	0%
Pesticide Containers	0	0%
Used Lubricating Oil Containers	0	0%
Solvent Containers	0	0%
Gasoline Containers	0	0%
Glass Jars/ Bottles Misc	0	0%
Cans/Containers-Steel	0	0%
Other Aerosol Containers	0	0%
Paper /Foil Composite Wrap	0	0%
Poly Fast Food Plates	0	0%
Other Plastic Fast Food Plates	0	0%
Plates-Other Materials	0	0%
Paper Trays	0	0%
Cell Phones	0	0%
Batteries	0	0%
Audio-Visual Devices	0	0%
Electronic Toys	0	0%
Small Appliances, Power Tools	0	0%
Alarms	0	0%
Light Bulbs	0	0%

Appendix F

Ranking of Sites

Site Number	Large Litter
55	67.5
17	65.5
110	45
52	43
92	41.5
97	36
54	25.5
30	25
68	25
76	25
31	24
60	24
83	23
33	22
44	21
15	20
107	19.5
75	18.5
10	17.5
48	17
58	17
12	16.5
41	16.5
24	15.5
7	15
9	14
38	14
77	14
81	14
112	14
34	13
53	13
4	12
14	12
49	12
59	12
67	11
93	11
71	10.5
56	10
79	10
80	10
45	9
61	9
101	9

Site Number	Small Litter
75	43
107	35
110	31
97	27
19	25
55	25
15	24
60	24
106	21
54	20
31	18
34	18
18	17
17	16
24	16
48	16
33	15
83	14
100	14
104	13
56	12
62	12
96	12
13	11
80	11
108	11
112	11
41	10
44	10
22	9
30	9
64	9
26	8
38	8
52	8
58	8
95	8
109	8
6	7
10	7
61	7
70	7
40	6
59	6
101	6

Site Number	Total
55	92.5
17	81.5
110	76
97	63
75	61.5
107	54.5
52	51
60	48
54	45.5
92	45.5
15	44
31	42
33	37
83	37
30	34
48	33
24	31.5
34	31
44	31
68	30
19	28
76	27
41	26.5
58	25
106	25
112	25
10	24.5
38	22
56	22
80	21
7	20
18	20
96	20
104	19
59	18
100	18
12	17.5
53	17
77	17
108	17
14	16
61	16
67	16
62	15.5
4	15

Site Number	Large Litter
20	8
74	8
89	8
96	8
103	8
3	7
23	7
51	7
72	7
95	7
98	7
6	6
39	6
82	6
85	6
104	6
108	6
11	5
27	5
32	5
66	5
78	5
2	4
21	4
35	4
43	4
57	4
69	4
70	4
100	4
102	4
106	4
111	4
13	3.5
62	3.5
16	3
18	3
19	3
25	3
26	3
28	3
37	3
42	3
47	3
50	3

Site Number	Small Litter
102	6
105	6
7	5
32	5
36	5
57	5
67	5
68	5
78	5
82	5
85	5
89	5
103	5
11	4
14	4
42	4
43	4
53	4
72	4
92	4
93	4
4	3
5	3
21	3
50	3
77	3
87	3
90	3
98	3
8	2
25	2
27	2
37	2
45	2
46	2
65	2
69	2
76	2
12	1
16	1
47	1
51	1
66	1
71	1
79	1

Site Number	Total
81	15
93	15
95	15
101	15
13	14.5
9	14
6	13
89	13
103	13
49	12
71	11.5
26	11
45	11
64	11
70	11
72	11
79	11
82	11
85	11
109	11
32	10
78	10
98	10
102	10
11	9
22	9
57	9
40	8.5
20	8
43	8
51	8
74	8
105	8
3	7
21	7
23	7
27	7
42	7
36	6
39	6
50	6
66	6
69	6
87	6
90	6

Site Number	Large Litter
63	3
84	3
87	3
90	3
109	3
40	2.5
1	2
8	2
64	2
65	2
88	2
91	2
105	2
5	1
36	1
86	1
94	1
22	0

Site Number	Small Litter
81	1
111	1
1	0
2	0
3	0
9	0
20	0
23	0
28	0
35	0
39	0
49	0
63	0
73	0
74	0
84	0
86	0
88	0

Site Number	Total
25	5
37	5
111	5
2	4
5	4
8	4
16	4
35	4
47	4
65	4
28	3
63	3
84	3
1	2
46	2
88	2
91	2
86	1