2023

ACT NoWaste
REPORT
Audit of domestic kerbside waste bins

A.Prince Consulting
ABN 96 077 504 226
TH 4 / 28 West Street
Nth Sydney NSW 2060
P: +61 2 9907 0994
E: admin@aprince.com.au
W: www.aprince.com.au

This report was researched and prepared by

A.Prince Consulting Pty Ltd
ABN 96 077 504 226
TH 4/28 West St
North Sydney NSW 2060
Phone: (02) 9907 0994
Email: admin@aprince.com.au
Web: www.aprince.com.au

for:
Strategic Coordination and Planning
ACT NoWaste
Transport Canberra & City Services
Directorate Dickson Office Building
480 Northbourne Ave Dickson ACT 2603

Document status

Rev. no.	Document purpose	Author	Peer Review	Editor	Date
0	Draft	A Wander, E Cooney	Anne Prince --	Helen Cooney	30/09/2022
1	Draft	Wander			24/1/2023

DISCLAIMER

Any representation, statement, opinion or advice, expressed or implied in this publication is made in good faith, but on the basis that APC is not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever, which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect to any representation, statement or advice referred to here.

TABLE OF CONTENTS

INDEX OF TABLES

INDEX OF IMAGES

INDEX OF FIGURES

ACRONYMS

ABS	Australian Bureau of Statistics
ACT	Australia Capital Territory
APC	A.Prince Consulting
CDS	container deposit scheme
CI	confidence interval
EPA	Environmental Protection Authority
FO	food organics
GO	garden organics
GW	general waste
FOGO	food organics and garden organics
LPB	liquid paperboard
MGB	mobile garbage bin
MRF	material recovery facility
MSW	municipal solid waste
MUD	multi-unit dwelling
SD	single dwelling
SUP	single-use plastics

WASTE TERM DEFINITIONS

Containerised food and liquid: Bottle or takeaway container with residual food and liquid that would be considered a contaminant in a recycling or waste treatment facility.

Contamination*:* Items not accepted for processing in the bin they are placed in.

Commingled recycling stream*:* Mixed dry recyclable materials, source-separated for recycling.

Diversion rate*:* The percentage of the total kerbside waste stream diverted from disposal.

Mean: The mean is the 'average'. It is calculated by adding all values and dividing by the number of values.

Median: The median is the 'middle' value in the list of numbers. To find the median, numbers have to be listed in numerical order.

Recyclable*:* Able to be recovered, processed and used as a raw material for the manufacture of useful new product through a commercial process.

Recovery rate*:* The amount of material recovered from a product group as a percentage of overall consumption.

Total waste stream*:* The combined waste and recycling streams.

Waste composition: Component material types by proportion of weight and per cent.

EXECUTIVE SUMMARY

About the audit

- An audit of kerbside domestic waste in the ACT was undertaken over eight days from 4–13 April 2022.
- Samples of general waste and commingled recycling were collected from a total of 714 households, comprising 350 single dwellings (SDs) and 364 multi-unit dwellings (MUDs) accommodated in 15 buildings. SDs were divided into 280 baseline households and 70 households where a FOGO trial is currently being undertaken.
- The samples were sorted into 62 categories. A sub-audit of used eligible beverage containers, single-use plastics (SUPs), hazardous items and plastic bags was also undertaken to provide data relevant to past and future public policy decisions.

Bin presentation rates

- All MUD blocks presented both general waste and recycling bins.
- At single dwellings, only those households presenting both a general waste and recycling bin, termed a 'matched pair', were audited to measure household behaviour.

Waste generation

- The average ACT household generates 10.3 kg per household per week comprising 7.7 kg of general waste per week and 2.6 kg of commingled recycling.
- **Baseline SDs** generate 11.6 kg per week with 8.2 kg of general waste and 3.4 kg recycling.
- SDs within the **FOGO trial** area generate 7.2kg per week with 4.2kg of general waste and 3kg of recycling.
- MUDs generate 9 kg per week with 7.2 kg general waste and 1.8 kg recycling.

General waste composition

Single dwellings

- Overall, for SDs, the largest material category is loose food (26.3%) and containerised food (12.5%), followed by other organics – contaminated paper, animal waste and compostable cups (19%), nappies (6.9%), recyclable containers (9.4%) and textiles (4.8%), garden organics (3.1%).
- On average, 9.4% of general waste in SDs is material that should be in the commingled recycling bin.
- Based on the current FOGO pilot acceptable materials, loose food and garden organics these account for 29.4% of the current general waste stream and could be diverted. If residents decanted packaged and containerised food an additional 12.5% of food and used packaging could also be diverted to FOGO and recycling.

Trial vs Baseline SDs

- The total general waste generated by the trial SDs (4kg per week) is half that of baseline SDs at 8kg per week.
- The total amount of nappies and hygiene waste is exactly the same at 0.5kgs/hhld/week.
- Food organics are reduced to 0.7kgs/hhld/week in trial SDs which is less than a third of those found in baseline SDs indicating that the trial households are using the bins.
- Recyclable materials and non-recyclable plastic show negligible differences between trial and non-trial areas.

Multi-unit dwellings

- For MUDs, food comprising loose food (20.8%) and containerised food (13.8%) are the largest single materials
- Recyclables account for 13.4% and should be diverted to the recycling stream.
- Soft plastic made up 5.7% of the overall material by weight, which is a significant amount given soft plastics are light. This would represent a significant quantity by volume of the bin.
- Hazardous materials are very low at 0.1%.
- Based on the current FOGO pilot acceptable materials, loose food and garden organics account for 23%. If residents decanted packaged and containerised food, an additional 13.8% of food and used packaging could also be diverted to FOGO and recycling streams.

General waste capacity

Single dwellings

- For SDs, general waste bin fullness averaged 70% for the trial areas and 62% for the baseline SDs.
- 34% of the general waste bins in the FOGO trial area were full or overflowing and 24% were less than 50% full. The trend is reversed for baseline SDs where 25% of the bins are full or overflowing and 34% are less than 50% full.

Multi-unit dwellings

- For general waste bins, average fullness ranged from 52% to 89%.
- No over-full general waste bins were found at MUDs.
- The 240 litre bins were less full on average than the hoppers.
- More than half of the 240L MGBs were less than half full or only 24% full.

Plastic bags

- Despite the ACT-wide ban on lightweight single-use plastic bags, the audit found an average of 0.02 kg of lightweight plastic bags per household per week in the kerbside bins. By weight, these are 0.18% of the general waste stream.
- High-density plastic bags, which are not banned, are more common in the general waste than lightweight bags but are also found in the recycling stream.
- Barrier bags used for fresh fruits and vegetables and at deli and butcher shops form 0.24% of the overall waste stream.

Hazardous problematic and e-waste

- In total, 1,279 items were found, which averages at 1.77 items per household per week in the kerbside bins, with 97% in the general waste stream and only 3% in the recycling stream.
- The most common items found were batteries (182), electrical items, excluding computer equipment (123), paints /inks (17), toner cartridges (13) and fluorescent bulbs (13).
- In 2022, rapid antigen tests (RAT) kits and tests were included in medical and pharmaceutical.

Commingled recycling composition

Single dwellings

- Overall, for SDs recyclable containers (48%), recyclable paper and cardboard (43%) and contamination (9.7%).
- Overall, for bagged material at 4% is the single largest category of contamination.
- There is little difference in the quantity of paper and cardboard between the trial SDs (45%) and baseline SDs (42%).
- The biggest difference is between bagged material which is 11% in trial areas and 2% in baseline SDs. Detailed analysis shows that 10% of the bagged material in the trial SDs is bagged general waste indicating that some of the general waste in trial SDs is ending up as bagged material in the recycling bins.

Multi-unit dwellings

- Recyclable containers (41.3%), recyclable paper and cardboard (37%) and contamination (21.7%).
- Bagged material is the largest single category of contamination at 10.6%.

SDs vs. MUDs

- The contamination in MUDs, at 21.7%, is more than twice that of SDs (9.7%).
- Bagged material at SDs is 4% and at MUDs 10.6%.
- Loose contamination forms 5.7% of SDs and 11% in MUDs.
- MUDs have double the contamination of SDs, both loose and bagged.
- Common to both SDs and MUDs are four key materials – bagged waste, organics, textiles and plastic film. These materials are also the most common contaminants in both SDs and MUDs.

Image 1: Food wase recovery is the biggest single opportunity

Commingled recycling bin capacity

Single dwellings

- For SDs, commingled bin usage at single dwellings averaged 74% for baseline SDs and 71% for the trial SDs.
- About 30% were full or over-full for both, and 17% were less than half full for the baseline SDs and 20% were less than half full for the trial area SDs.

Multi-unit dwellings

- The bin fullness ranges, on average, from 58% to 82%.
- Almost half of the blocks with MGBs were less than half full and 20% were full or overflowing.
- For MUD blocks with MGBs and hoppers, almost 45% were full or overflowing and 15% had less than 50% material in them.
- For MUD blocks with hoppers only, 50% of the hoppers were full or overflowing and only one had less than 50% material in it.

Recovery rates

- The overall recovery rate is 70%. SDs achieve 82% and MUDs 57%.
- Paper/cardboard (89%), glass (89%) and plastic containers (59%) are reasonably well recovered by SDs, however SDs have room for improvement in the recycling of steel (65%) and aluminium (42%).
- The differences in recovery between the trial SDs and baseline SDs are negligible.
- MUDs recover paper/cardboard (66%) and glass containers (68%) reasonably well, but recycle less than half of all other materials. MUDs achieve 57% recovery, with glass containers (68%), paper/cardboard (66%), plastic containers (41%), steel (20%) and aluminium (18%).
- MUDs by bin infrastructure – MUDs with MGBs (85%), MUDs with hoppers and MGBs (53%) and MUDs with hoppers (52%).
- MUDs with MGBs had the highest recovery rate (85%), MUDs with hoppers and MGBs (53%) and MUDs with hoppers only (52%).

Landfill diversion

- Current landfill diversion of the waste produced by ACT households is 24% based on this audit. This is achieved primarily by the recovery of paper/cardboard and glass in the commingled recycling bins.
- Landfill diversion could increase by 9% if all currently accepted recyclables were placed into the commingled bin. This would lift diversion to 33%.
- If 60% of FOGO material from general waste is diverted, diversion could increase by another 10% in SDs and overall, and 17% at MUDs.

Beverage containers in domestic bins

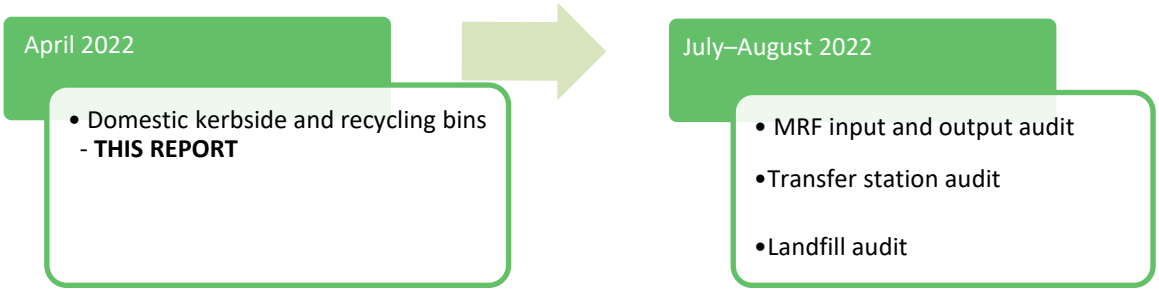
- Overall, 95% of the containers in the general waste stream and 79% in the recycling bins were found to be eligible.
- The average ACT dwelling places 4.6 eligible containers per week in the kerbside bins with 2.6 containers in the recycling bin and 2 containers in the general waste bin.
- Baseline SDs dispose of a total of 4 eligible containers per household per week and 3 containers end up in the recycling stream whereas the trial households are placing 2.3 eligible containers in the recycling stream per week.
- MUDs place 5.3 eligible containers per household per week overall, with 2.5 eligible containers going in the recycling.
- Assuming the number of households in the ACT is 135,735 SDs and 32,669 MUDs, there is a total of 690,673 in the ACT kerbside bins every week. Of these, 472,967 are in the recycling bins and are potentially being recovered at the Material Recycling Facility.
- Of all the containers found in the kerbside bins, 79% of those found in SDs and 88% found in MUDs were eligible for return through the CDS system. The number of eligible containers found in the trial SDs (88%) is slightly higher than those found in the baseline SDs (77%).
- Of all the eligible containers found in the kerbside bins, SDs generated (79%) and MUDs (88%).

1 INTRODUCTION

ACT NoWaste has conducted a series of kerbside waste audits – including those in 2001, 2003, 2004, 2005, 2009, 2011, 2014 and 2022 – to help inform future waste policy decisions. ACT is to be congratulated for investing in time-series data, as it provides a rich and valuable data resource for informed and fit-for-purpose decision-making. Time-series audits also provide opportunities to undertake longitudinal data analysis to study past directions and help predict future trends.

A.Prince Consulting (APC) has conducted eight of the nine previous kerbside audits. ACT NoWaste has engaged APC to conduct a series of audits in 2022 to gather data to inform future business and investment decisions as well as public policy. The range of audits conducted in 2022 and timings of each are detailed below:

Figure 1: ACT 2022 waste audits



Sample sizes for domestic waste audits have steadily increased over time, from 326 households in 2011 to 700 households in 2022.

Table 1: Sample sizes over time

Year	SDs	MUDs	Total
2011	219	60	326
2014	300	113	413
2022	350	350	700

Time-series kerbside audits provide valuable information on a range of KPIs for system performance, including waste generation, composition, contamination, recovery, diversion rates and bin utilisation. In 2022, detailed data was also collected on used beverage containers which is now part of the ACT's Container Deposit Scheme (CDS), hazardous materials, plastic bags and single-use plastics (SUPs).

This report contains the results of the audit of domestic waste and commingled recycling bins conducted in April 2022. Subsequent reports will detail results from other completed audits and future audits.

2 METHOD

APC adopted the principles of the NSW *Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas (2008)* and the *Addendum (2010)* in the conduct of this audit. However, the sample size framework and sorting categories were modified to meet the ACT NoWaste RFQ-specified requirements.

2.1 Project inception meeting

Following appointment, APC's Director attended a project inception meeting to discuss all operational aspects of the project. This meeting confirmed project requirements, sample collection logistics, the sorting site, sorting categories, documentation and the project timeline. ACT NoWaste specified that the data outputs and approach should be comparable with prior audits.

2.2 Staff inductions

APC undertook Quality, Health, Safety and Environment (QHSE) inductions for project staff in accordance with APC's Integrated Management System requirements. Sorting of all collected waste and recycling took place at the O'Sullivan & Sons depot in Queanbeyan, NSW.

2.3 Confidentiality

All APC staff members are required to sign a confidentiality agreement, prohibiting them from removing anything from the material they sort or from revealing any information they might obtain while sorting or auditing.

2.4 Sample size

ACT NoWaste specified a sample size of 700 households comprising 350 single dwellings (SDs) and 350 multi-unit dwellings (MUDs). The MUDs were sub-sampled by the type of bin infrastructure provided at each MUD. There are three types of bin infrastructure provided, based on MUD size and site constraints. The following samples were audited:

- 115 MUDs with mobile garbage bins (MGBs) for both general waste and recycling
- 84 MUDs with MGBs for recycling and hoppers (1.1 m^3 to 3 m^3) for general waste
- 165 MUDs with hoppers (1.1 m^3 to 3 m^3) for both general waste and recycling.

The number of MUD households represented by each housing type is shown in Section 2.6., Table 2 and Table 3.

2.5 Sample selection

When selecting streets for sampling, the *Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008* specify that: *'at the street level within each collection zone, the recommended number of households should be selected randomly. Any appropriate random sampling regime will be acceptable for this purpose'*.[1]

For single dwellings, streets to sample were selected randomly from ACT Government database. Of the 350 household sample, split into five suburbs, 70 properties were audited from the households participating in the FOGO rollout.

[1] *Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008*, section 4.3, p.9.

For multi-unit dwellings, the Guidelines recommend that: *'for those areas where a high proportion (greater than 10%) of MUDs exist, that stratified sampling is used as opposed to simple random sampling alone. This will involve identifying the ratio of SUDs to MUDs and altering sample sizes accordingly to accommodate these proportions'.*[2]

APC was provided a database of MUD addresses with the bin system noted. In consultation with ACT NoWaste and the waste collection contractor Suez, APC selected properties that were representative of the housing stock and system type.

2.6 Sample collection

APC and ACT NoWaste agreed to undertake an aggregated collection for this audit. This provides a safe work environment, with reduced manual handling and reduced risk of negative resident reaction as all waste is collected in a collection vehicle as normal. ACT NoWaste provided a letter outlining the audit details which could be provided to any concerned residents. A copy is provided at **Appendix A.** Queanbeyan-based contractor, O'Sullivan & Sons, provided a truck and driver to collect the MGB samples and Suez collected the large bulk bins (hoppers) by front-lift truck.

Image 2: Suez collected hoppers by front-lift collection vehicle

APC provided a collection supervisor to accompany the drivers on all collections to record bin presentation and bin fullness at each of the households sampled and to ensure the correct number of samples were collected.

In accordance with the NSW EPA Guidelines only 'matched pair' households were sampled, meaning only those households presenting both a general waste and recycling bin were sampled. This ensures that household behaviour, waste generation, recovery and diversion can be measured accurately.

For SDs, the collection vehicle collected from every second household presenting both a garbage and recycling bin (a 'matched pair'); where only one bin was presented at a selected household, the truck

[2] *Addendum 2010* to *Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas* section 8 Page 5

moved to the next matched-pair household. The collection resumed from every second household after that point. Belconnen was the suburb sampled that was included in the FOGO pilot. No MUDs were collected from Belconnen.

MUD bins were collected from the targeted blocks, using the appropriate vehicles depending on bin configuration. Two trucks were provided and the collections were completed in convoy to ensure matched pairs of garbage and recycling were collected from each household/building. The samples collected are shown in
Table 2 below.

Table 2: Samples collected

Collection date 2022	Suburbs sampled	General waste households sampled				Commingled recycling households sampled			
		SDs	MUDs with MGBs	MUDs with MGBs (R) hoppers (GW)	MUDs with hoppers (GW & R)	SDs	MUDs with MGBs	MUDs with MGBs (R) hoppers (GW	MUDs with hoppers (GW& R)
Monday 4 April	Chifley	70	0	0	0	70	0	0	0
Tuesday 5 April	Monash	70	0	0	0	70	0	0	0
Wednesday 6 April	Flynn	70	0	0	0	70	0	0	0
Thursday 7 April	Belconnen	70	0	0	0	70	0	0	0
Friday 8 April	Deakin	70	0	0	0	70	0	0	0
Monday 11 April	Weston	0	115	0	0	0	115	0	0
Tuesday 12 April	Gilmore	0	0	84	0	0	0	84	0
Tues & Wed 12 & 13 April	Moncrieff	0	0	0	165	0	0	0	165
Total		**350**	**115**	**84**	**165**	**350**	**115**	**84**	**165**
Total all		**714**				**714**			

GW – General waste. R - Recycling MGB – mobile garbage bins

Details of the MUD blocks sampled are shown in Table 3.

Table 3: Detail of MUDs sampled

Collection date 2022	Suburb	Number of households	General waste			Commingled recycling		
			Bin type	Bin size	Number of bins	Bin type	Bin size	Number of bins
Mon 11 Apr	Weston	24	MGB	140 L	6	MGB	240 L	6
	Weston	10	MGB	140 L	7	MGB	240 L	7
	Weston	31	MGB	140 L	18	MGB	240 L	18
	Holder	30	MGB	140 L	22	MGB	240 L	21
	Holder	20	MGB	140 L	13	MGB	240 L	13
Tues 12 Apr	Gilmore	25	Hopper	1.5 m^3	1	MGB	240 L	4
	Conder	15	Hopper	1.5 m^3	1	MGB	240 L	8
	Bonython	14	Hopper	1.5 m^3	1	MGB	240 L	10
	Bonython	12	Hopper	1.5 m^3	1	MGB	240 L	5
	Bonython	18	Hopper	3 m^3	1	MGB	240 L	6
Tues 12 Apr & Wed 13 Apr	Moncrieff	20	Hopper	3 m^3	1	Hopper	1100 L	3
	Taylor	36	Hopper	1100 L	4	Hopper	1100 L	4
	Casey	46	Hopper	1100 L	5	Hopper	1100 L	4
	Casey	45	Hopper	3 m^3	1	Hopper	1100 L	2
	Casey	18	Hopper	3 m^3	1	Hopper	1100 L	1
Total number	-	**364**	-	-	**83**	-	-	**112**

The samples were transported to O'Sullivans depot located in Queanbeyan for sorting.

Image 3: Recycling load arriving for sorting

2.7 Sorting

Material was sorted into 62 categories in the 2022 audit (refer to **Appendix B**), compared with 45 categories in 2014. In 2022, a more precise set of categories for plastic bags was used, as listed below:

- Barrier bags (fresh/vegetables/deli/butcher)
- Shopping bags <5 microns (not garbage bags)
- Shopping bags >35 microns

In 2022, a new set of single-use plastic categories was also added, as listed below:

- single-use plastic (SUP) cutlery/stirrers
- SUP straws
- SUP takeaway containers
- SUP takeaway container lids
- SUP balloons
- SUP balloon sticks

A preliminary sort of 'bagged' material from the loose general waste was undertaken. The purpose of this preliminary audit was to determine the proportion of material contained in bags and therefore not available for recovery at a materials recovery facility (MRF) or an advanced waste treatment (AWT) facility without added equipment, such as bag breakers or shredders to access the waste or recyclables. This bagged waste or recycling was weighed separately for each waste stream. For recycling, the bagged material was discarded after weighing. For general waste, the bagged material was audited along with the remainder of the material and sorted by category.

Separated materials were placed in appropriate containers, weighed on a set of electronic scales and the weight recorded.

A separate count of beverage containers for all general waste and commingled recycling samples was also undertaken. All sorted material was disposed of or recycled as appropriate.

Image 4: General waste stream sample being sorted

2.8 Analysis

Data analysis was performed by APC's data analyst and statistician. The aggregation for each category was also performed to ensure comparability with previous years audits. The detailed list of categories and their aggregation is presented in **Appendix B**.

Data used in composition charts is contained in **Appendix C.**

The analysis is based on the materials being accepted in each bin type as advised by ACT NoWaste. Any general waste in the recycling stream is deemed to be contamination.

Image 5:Materials accepted in ACT recycling bins

Given the various collection frequencies, the following calculations were undertaken to standardise data to kilograms per household per week (kg/household/week).

Single dwellings

- General waste – kilograms per week, divided by number of households for kg/household/week.
- Recycling – divided the raw data by two to obtain kilograms per week to account for fortnightly collection then divided by sample households for kg/household/week.

Multi-unit dwellings

- General waste – as a weekly collection raw data divided by number of households for kg/household/week.
- Recycling – as a weekly collection raw data divided by number of households for kg/household/week.

Units of measurement: Unless otherwise stated, the standard unit of measurement for reporting is weight. In some instances, results are presented by count, i.e. the **number** of items per household per week.

Results by weight are presented in two ways: generation and composition.

- **Generation** is the amount of waste generated per household. Generation is reported in *kilograms per household per wee*k and can refer to a total weight of a single or multiple waste streams per week, or weights of individual or consolidated categories within a single waste stream.
- **Composition** is the percentage, by weight, of individual or consolidated categories comprising the waste stream.

Individual material categories vs. consolidated material categories

Note the distinction between individual material categories and consolidated categories.

- **Individual material categories** are the agreed sorting categories for this audit, as agreed at the commencement of the project. This report aggregates some materials.
- **Consolidated categories** involve grouping individual material categories to assist interpretation and to present a large amount of data visually in charts.

Charts are generally based on consolidated categories while tables list the details of individual material categories. Note that both charts and tables consolidate small individual material categories. For example, materials that individually comprise less than 1% of the waste stream are consolidated and labelled accordingly.

The sample numbers from which generation is calculated are based on households included in the audit and are not representative of the actual bins collected. This is because some SD households may present more than one bin per stream. MUD households share bins, which may not equate to the number of households per MUD property but rather the allocation of bins per household per stream.

Contamination has been calculated based on acceptable and non-acceptable materials in the recycling stream.

Other details: Unless referring to whole numbers, results are presented to whole numbers or one decimal place. Consequently, data in charts and tables may not add up to 100%. When referring to exceptionally small numbers, two or more decimal places are used**.**

This report provides an analysis of MUDs by infrastructure and overall.

All raw data has been provided in Excel.

2.9 Study limitations

The data for this study was collected and analysed using the best and most accurate methods available within the constraints of available time and budget. This study is a survey, which means that a relatively small amount of data has been collected and then treated as representative of the total. As in any survey, there are limitations to the accuracy of the data, as described below.

Time frame	• These audits were carried out over eight (8) sample collection days. The data was then used as being representative of the whole ACT. • Seasonal trends (e.g. warmer weather leading to increased consumption of beverages and festivities Easter, Christmas) and weather events may change waste generation over time. • The results of this audit should be treated with caution when comparing the results with reports based on data taken at different times of year.
Representative sample	• The sample for this audit is necessarily small due to the high per-capita cost and resource-intensive nature of waste auditing. • There is always a small probability of inadvertently collecting waste from atypical households, resulting in non-representative data. • APC undertook the entire sample using random and stratified sampling by geographic area and collection day.
Sample size limitations	• All surveys carry an element of sampling error, which is the mathematical error associated with using a sample to represent a total population. • Sampling error can be reduced by taking larger samples. The sampling error involved in waste audits is usually small and can be tabulated by producing estimates augmented by upper and lower confidence intervals.
Weight-based analysis with counts	•The collection of data for this audit was recorded by weight (except for beverage containers, which were also counted and volume recorded). • This type of collection may cause some materials to appear to be present in quite small proportions due to their comparatively low densities (e.g. plastic film). They can, however, consume large amounts of volume. • Weight-based analysis has been used in this audit because it is a standard procedure and is the most accurate way to collect data on a number of different types of materials. •CDS container audit was conducted by count and weight.

3 RESULTS – DOMESTIC KERBSIDE AUDIT

All data in this section is weight-based unless otherwise stated. Some percentages have been rounded to the nearest whole number and therefore some figures and descriptions may not add up to 100%.

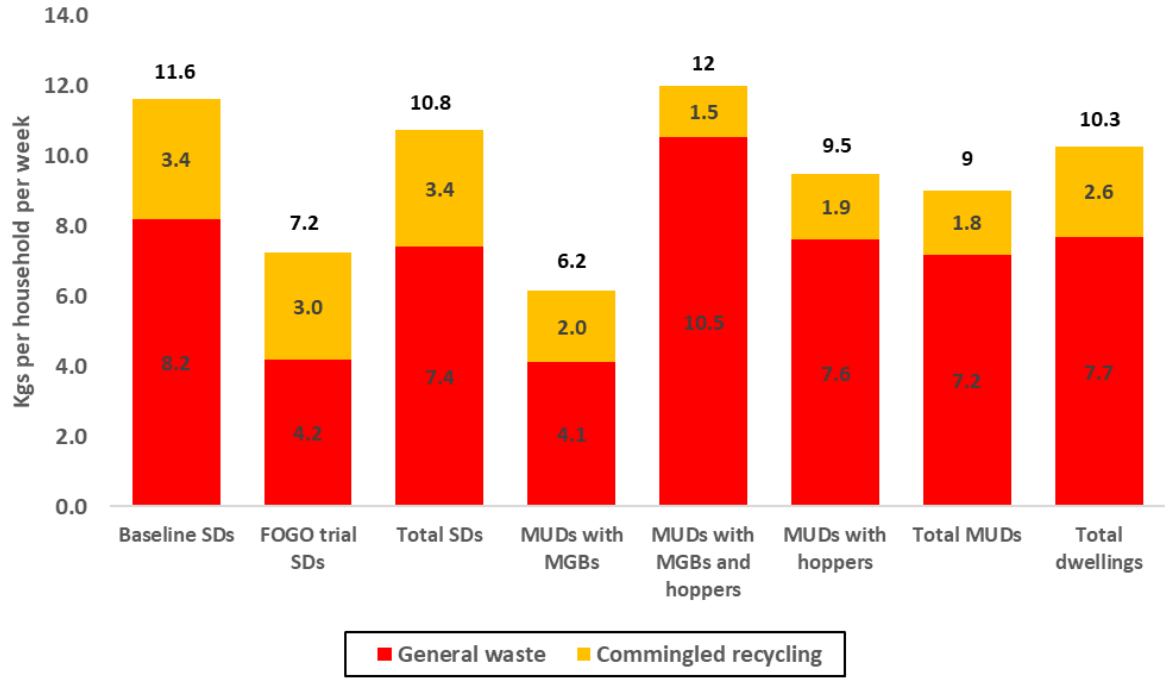
3.1 Overall waste generation

According to the audit results, the average ACT household generates 10.3 kg of waste per household per week, comprising 7.7 kg of general waste and 2.6 kg of commingled recycling per week, as shown in Figure 2.

The SDs that were a part of the FOGO trial at 4.2kgs/hhld/week generate almost half of the general waste generated by SDs not participating in the trial at 8.2kgs/hhld/week. The recycling stream between the two SD types are highly similar with the non-trial SDs generating 3.4kgs/hhld/week and the trial households generating 3.0kgs/hhld/week. The quantity of waste diverted to the FOGO bin could not be estimated as the FOGO bins were not audited as part of this audit process.

Baseline SDs in the ACT generate more than MUDs at 11.6 kg, with 8.2 kg of general waste and 3.4 kg of recycling per household per week. By comparison, the average MUD generates 9 kg, comprising 7.2 kg general waste and 1.8 kg recycling. Although the average generation of all MUDs is lower than SDs, MUDs sampled with MGBs and hoppers generated more waste than SDs (at 12 kg). The overall MUD average is lower due to the low waste generation in MUDs with MGBs, at 6.2 kg.

Figure 2: Overall waste generation per household per week



Note: slight differences in totals are due to rounding. The averages are for audited households not ACT households

Assuming the number of households in the ACT[3] is 135,735 SDs and 32,669 MUDs, an estimated 91,552 tonnes of waste and recycling are generated per year in the ACT, as shown in Table 4.

[3] Australian Bureau of Statistics 2021 Census Community Profile: ACT

Table 4: Estimates of yearly generation

Dwelling type	SDs (average across all SDs)		MUDs		Total
Waste stream	Kilograms per household per week	Tonnes per year	Kilograms per household per week	Tonnes per year	Tonnes per year
General waste	7.4	52,231	7.2	12,231	64,462
Commingled recycling	3.4	23,998	1.8	3,058	27,056
Total	**10.8**	**76,229**	**9**	**15,323**	**91,552**

3.1.1 Food waste in trial households

Data as presented in Figure 3 shows food waste (loose food available for recovery) in the general waste is less than a third in the FOGO trial households, from 2.26 kg/hhld/week to 0.67 kg/hhld/week in the non-FOGO trial households. Meanwhile, garden waste has remained low in the general waste of both FOGO trial and non-FOGO trial households.

Figure 3: FOGO in trial vs baseline SDs

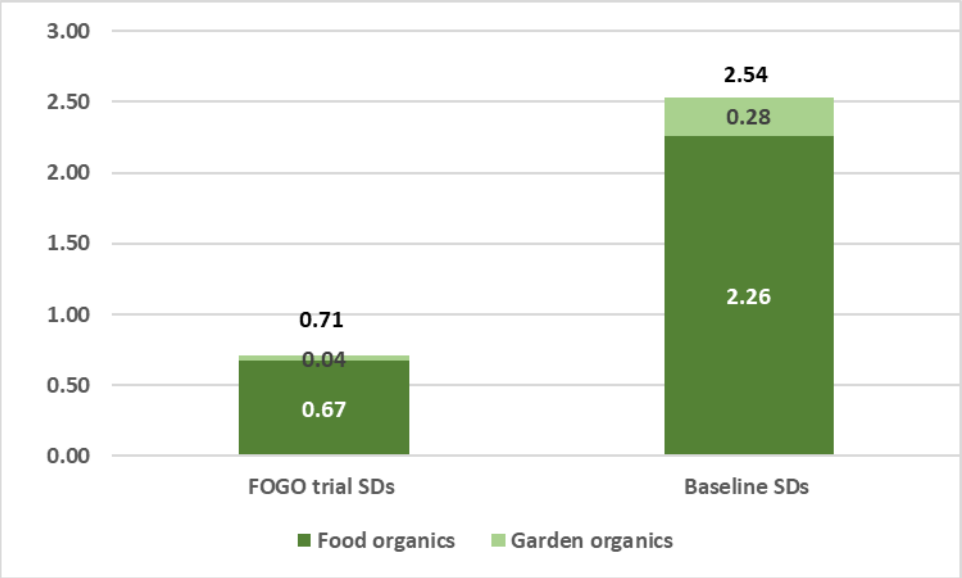


Image 6: Containerised food and garden organics represent more than 15% of SD general waste bins

Image 7: Loose food represents 25% of the general waste in SDs

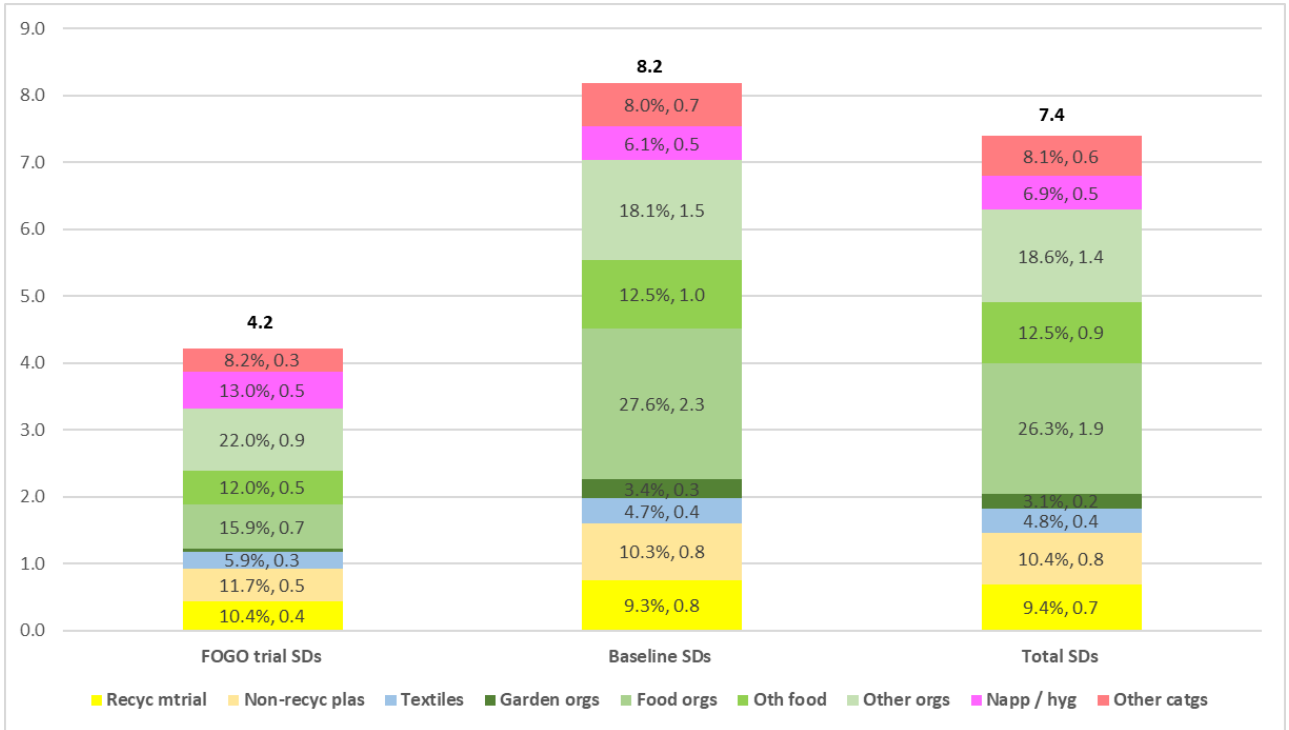
3.2 Waste generation and composition – single dwellings (SDs)

3.2.1 General waste composition – single dwellings

Figure 4 shows the composition of the general waste stream from SDs- from households with and without the FOGO trial in place, raw data is provided in **Appendix C.** The total quantity of waste has almost halved between the trial (4.2kg/hhld/week) and baseline SDs (8.2kgs/hhld/week).

The recyclable content in the general waste bins between the FOGO trial households and the baseline SDs is highly similar representing 10.4% in the trial SDs and 9.3% in the non-trial SDs. In fact, the proportion of organics in the general waste bins that could potentially be diverted to FOGO bins has also halved from 1kg/hhld/week to 0.5kg/hhld/week indicating a change in behaviour even though it represents the same proportion of the bin by percentage. Interestingly, the quantities of hygiene waste within the general waste bins has remained the same with 0.5kg/hhld/week in both trial and baseline SDs.

Figure 4: General waste composition – SDs



Future audits should consider auditing the FOGO bins for the trial households to provide a clearer picture of how the household behaviour has changed between trial and baseline SDs.

Overall, for ACT SDs, recyclables makes up 9.4%, including containers (6%) and paper and cardboard (2.4%) and should be diverted. Potentially, 29% is available for immediate diversion to a FOGO service with loose food (26%) and garden organics (3%). Packaged food (12.5%) is recoverable if decanted. Soft plastics (8%) and textiles (5%) can be returned to retailer/store, subject to condition and cleanliness.

Table 5: General waste composition – SDs

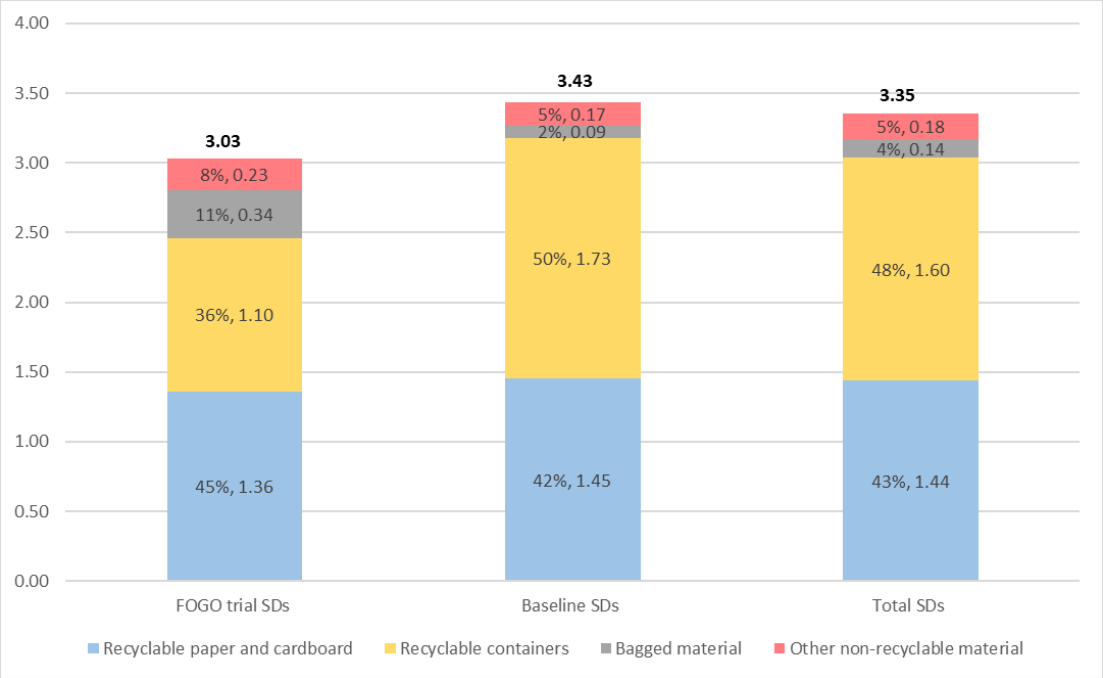
	FOGO trial SDs (kgs/hhld/ week)	Baseline SDs (kgs/hhld/ week)	Total SDs (kgs/hhld/ week)	FOGO trial SDs %	Baseline SDs %	Total SDs %
Recyclable paper & cardboard	0.1	0.2	0.2	2.5%	2.4%	2.4%
Recyclable glass	0.1	0.2	0.1	2.1%	2.0%	2.0%
Recyclable plastic	0.1	0.3	0.2	3.4%	3.3%	3.3%
Recyclable metals	0.1	0.1	0.1	2.4%	1.6%	1.7%
Garden organics	0.0	0.3	0.2	0.9%	3.4%	3.1%
Food organics	0.7	2.3	1.9	15.9%	27.6%	26.3%
Other metals	0.0	0.0	0.0	0.0%	0.0%	0.0%
Soft plastic / film	0.3	0.7	0.6	7.8%	8.0%	8.0%
Banned single use plastic (no bags)	0.0	0.0	0.0	0.0%	0.0%	0.0%
Other plastic	0.2	0.2	0.2	3.9%	2.2%	2.4%
Textiles	0.3	0.4	0.4	5.9%	4.7%	4.8%
Other food (containerised/packaged)	0.5	1.0	0.9	12.0%	12.5%	12.5%
Other organics	0.9	1.5	1.4	22.0%	18.1%	18.6%
Nappies / hygiene products	0.5	0.5	0.5	13.0%	6.1%	6.9%
E-waste	0.1	0.2	0.1	2.4%	1.9%	1.9%
Hazardous / problematic	0.0	0.1	0.1	0.3%	1.2%	1.1%
Building waste, inert	0.2	0.4	0.4	4.6%	4.8%	4.8%
Other	0.0	0.0	0.0	0.9%	0.1%	0.2%
Total	**4.2**	**8.2**	**7.4**	**100.0%**	**100.0%**	**100.0%**

Image 8: Plastic film is 8% of the GW (left) Contamination is 7.5% of the GW (right)

3.3 Recycling composition – single dwellings (SDs)

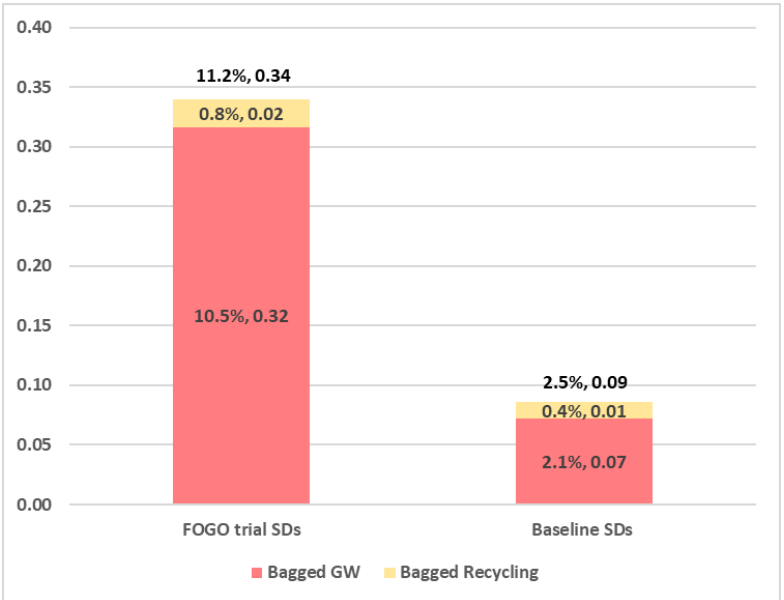
Figure 5 shows the composition of the recycling stream audited from SDs and consolidated into key categories, with the details shown below in Table 5. Data indicates that the introduction of FOGO has not had an impact on the composition of the key contents of the recycling bin. However, there is significant differences between the bagged material found in the recycling bins between trial SDs at 11% and baseline SDs at 2%.

Figure 5: Commingled recycling composition – SDs



A further investigation of the bagged material reveals that the vast majority of the bagged material in the commingled bins in the trial suburbs is general waste. This indicates that some of the general waste from the trial households is ending up in the recycling bins. The bin fullness data discussed in detail in section 3.6 does not indicate a lack of bin space in the general waste bins. Therefore, it is difficult to explain this behaviour without further investigation.

Figure 6: Bagged material in commingled bins – SDs



Overall, for SDs, recyclable containers are 47.7%, paper/cardboard at 42.8% and contamination is 9% including bagged material.

Recycling in SDs shows a high degree of compliance, with only 9.7% being contamination and bagged material contributing 4%. There is potential to almost halve contamination in this stream if the community is effectively educated about not placing bagged material in the recycling bin.

Table 6: Recycling composition SDs

	kgs/hhld/day			Per cent (%)		
	FOGO trial SDs	Baseline SDs	Total SDs	FOGO trial SDs	Baseline SDs	Total SDs
Recyclable paper & cardboard	1.36	1.45	1.44	45.0%	42.4%	42.8%
Recyclable glass	0.64	1.27	1.15	21.1%	37.1%	34.2%
Recyclable plastic	0.34	0.35	0.34	11.1%	10.1%	10.2%
Recyclable aluminium	0.02	0.02	0.02	0.7%	0.6%	0.6%
Recyclable steel	0.11	0.09	0.09	3.5%	2.5%	2.7%
Organics	0.05	0.06	0.06	1.7%	1.7%	1.7%
Other non-recyclable metals	0.00	0.01	0.01	0.1%	0.2%	0.2%
Textiles	0.03	0.02	0.02	0.9%	0.6%	0.6%
Soft plastic / film	0.04	0.02	0.02	1.4%	0.6%	0.7%
E-waste	0.00	0.00	0.00	0.1%	0.1%	0.1%
Banned Single use plastics (not bags)	0.00	0.00	0.00	0.0%	0.0%	0.0%
Hazardous / problematic	0.00	0.00	0.00	0.0%	0.0%	0.0%
Building waste, inert	0.01	0.02	0.01	0.2%	0.5%	0.4%
Nappies and hygiene waste	0.00	0.00	0.00	0.0%	0.0%	0.0%
Bagged material	0.34	0.09	0.14	11.2%	2.5%	4.1%
Other	0.09	0.04	0.05	3.1%	1.2%	1.5%
Total	**3.03**	**3.43**	**3.35**	**100.0%**	**100.0%**	**100.0%**

3.4 Waste generation and composition – multi-unit dwellings (MUDs)

3.4.1 General waste composition – all MUDs

In all MUDs, 13.4% of the material is recyclable in nature and should be in the recycling bins. Organics suitable for a FOGO service represents 22.5% by weight, comprising loose food (20.8%) and garden organics (1.7%). Potentially, if residents decanted food from packaging an additional 13.8% is available which is combined food and packaging. The other organics including contaminated paper and kitty litter/ animal faeces (17.2%) are now banned from NSW FOGO services. Textiles (6.7%) and soft plastic (5.7%) can both be delivered to stores for recovery, subject to condition and cleanliness.

Figure 7: General waste composition – MUDs

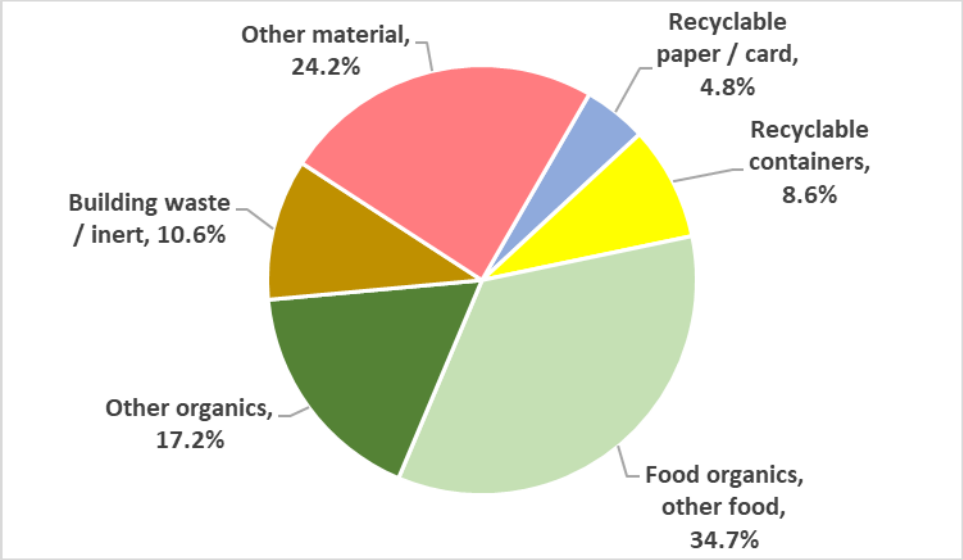


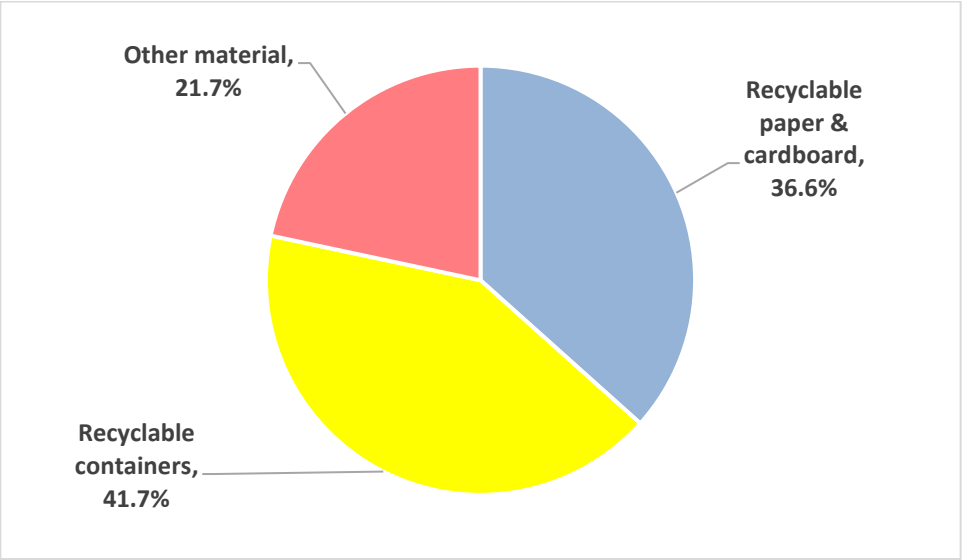
Table 7: General waste composition – MUDs (kg per household per week as %)

Category	MUDs with MGBs	MUDs with MGBs & hoppers	MUDs with hoppers	Total MUDs
Recyclable paper & cardboard	1.7%	5.0%	5.8%	4.8%
Recyclable glass	1.5%	3.0%	4.8%	3.6%
Recyclable plastic	2.9%	2.3%	3.6%	3.0%
Recyclable metals	1.4%	1.1%	2.8%	2.0%
Food organics	29.8%	14.5%	21.9%	20.8%
Other food	13.5%	12.9%	14.7%	13.8%
Other organics	21.7%	10.0%	20.6%	17.2%
Building waste	6.6%	26.8%	0.2%	10.3%
Inert	0.3%	0.5%	0.2%	0.3%
Other metals	0.2%	0.1%	0.3%	0.2%
Soft plastic/film	7.5%	3.3%	6.7%	5.7%
Single-use plastic	0.3%	0.2%	0.4%	0.3%
Other plastic	1.4%	3.0%	1.9%	2.2%
Textiles	7.7%	7.1%	6.0%	6.7%
Garden organics	2.4%	2.3%	1.0%	1.7%
Nappies/hygiene products	0.0%	4.0%	7.3%	4.9%
Hazardous/problematic/e-waste	1.3%	2.5%	1.4%	1.7%
Other	0.0%	1.6%	0.5%	0.8%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

3.4.2 Recycling composition – multi-unit dwellings (MUDs)

Figure 8 shows the composition of the recycling stream, audited from MUDs and consolidated into key categories, with the details shown below in a Table 7. Recyclable containers make up 41.7%, followed by paper/cardboard at 36.6% and contamination at 21.7%.

Figure 8: Recycling composition – MUDs



The contamination in MUD recycling, at 21.7%, is more than twice that at SDs (9.7%). Bagged recyclables are the largest category of contamination at 10.6%. Consolidated categories of recyclables are provided below. A large quantity of 'other material' found in the recycling bins included a soccer ball, a basketball and some paint rollers. Full detail is provided in **Appendix C.**

Table 8: Recycling composition – MUDs (kg per household per week as %)

Category	MUDs with MGBs	MUDs with MGBs & hoppers	MUDs with hoppers	Total MUDs
Recyclable paper & cardboard	29.4%	42.7%	39.7%	36.6%
Recyclable glass	38.7%	32.1%	22.4%	29.8%
Recyclable plastic	7.0%	10.6%	8.6%	8.4%
Recyclable aluminium	0.5%	1.1%	0.7%	0.7%
Recyclable steel	2.6%	2.9%	2.8%	2.7%
Bagged waste	13.6%	3.6%	11.1%	10.6%
Organics	2.9%	0.7%	4.3%	3.2%
Textiles	1.1%	0.5%	0.4%	0.6%
Soft plastic/film	0.7%	0.3%	0.6%	0.6%
Building waste, inert	0.3%	0.3%	0.6%	0.5%
Non-recyclable plastic	0.1%	0.2%	0.2%	0.2%
E-waste	0.0%	0.4%	0.1%	0.1%
Other non-recyclable metals	0.0%	0.9%	0.3%	0.3%
Other	3.0%	3.7%	8.3%	5.6%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

3.4.3 Waste composition by bin system – MUDs

MUDs in the ACT currently use a variety of bin systems. The waste collected from MUDs was aggregated by the type of bin system in place in order to determine if different bin configurations had an impact on the performance of the system, if any.

3.4.3.1 General waste

Clearly, the MUDs with MGBs generate the least amount of general waste at 4.1 kg/household/day and MUDs with MGBs and hoppers generate the highest, with 10.5 kg/household/day. MUDs with hoppers are midway, at 7.6 kg/household/week. The key limitation of this audit is that the occupation rate of the unit blocks that the general waste was collected is unknown. Therefore, the results should be interpreted with caution.

Figure 9: General waste composition by bin system – MUDs

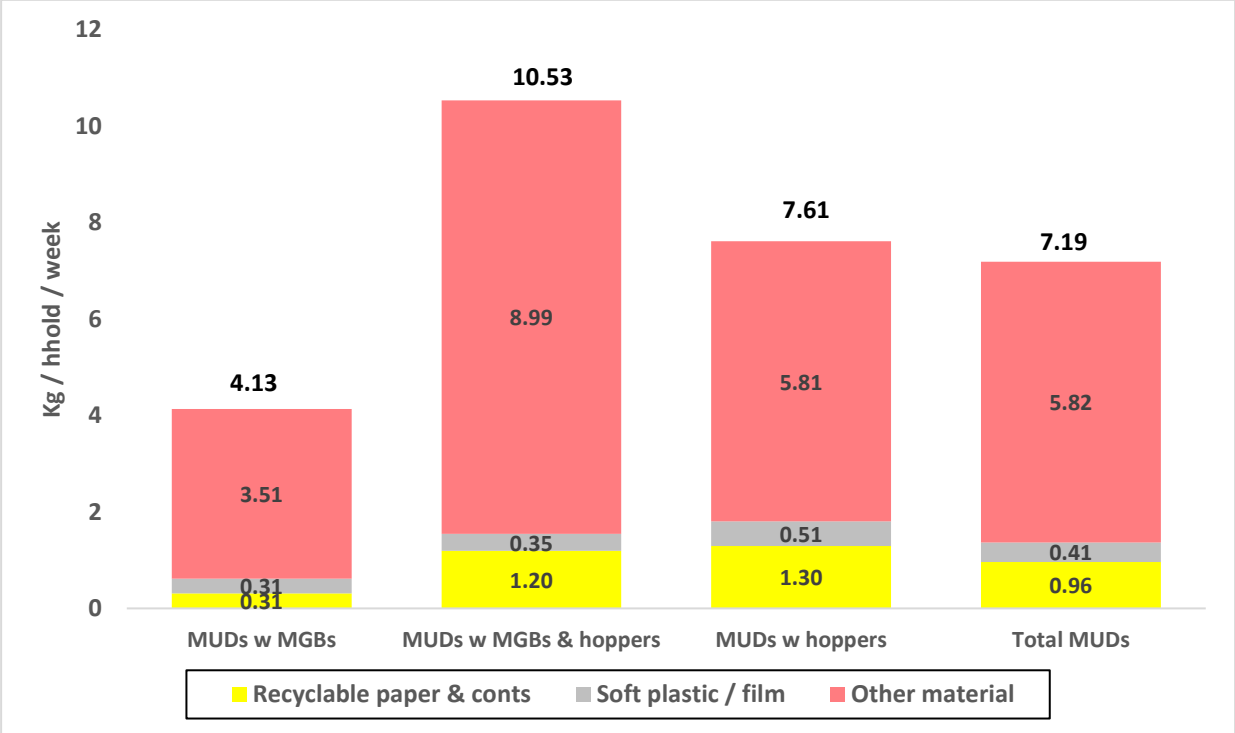


Image 9: Mattress and building materials found in general waste bins

3.4.3.2 Recycling

For the recycling stream, MUDs with MGBs have the highest average generation of recycling at 2.02 kg and MUDs with MGBs and hoppers have the lowest generation of recycling at 1.45 kg. The amount of contamination is highest in MUDs with hoppers (0.49kg) and lowest in MUDs with MGBs and hoppers (0.15 kg).

Figure 10: Recycling composition by bin system – MUDs

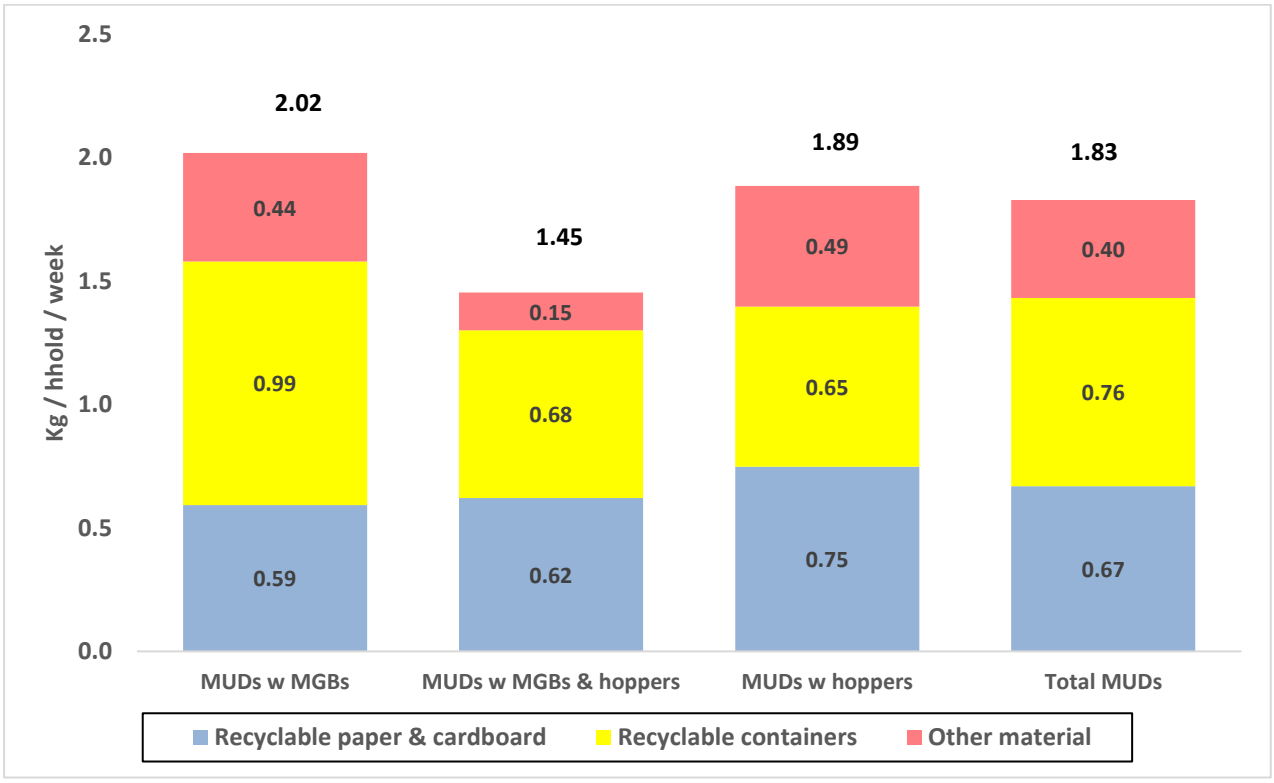


Image 10: SodaStream cylinder found in recycling bin is a recent issue

3.5 Single and multi-unit dwellings – comparisons

3.5.1 General waste at SDs vs. MUDs

SDs generate an average of 1 kg/hhld/week more general waste than the average MUD household. Of this, 2.4% is recyclable paper and cardboard in SDs and 4.8% in MUDs. Potential FOGO material is by far the highest component of general waste, with 41.8% of SD waste and 36% of MUD waste consisting of this material.

Figure 11: General waste composition by housing type

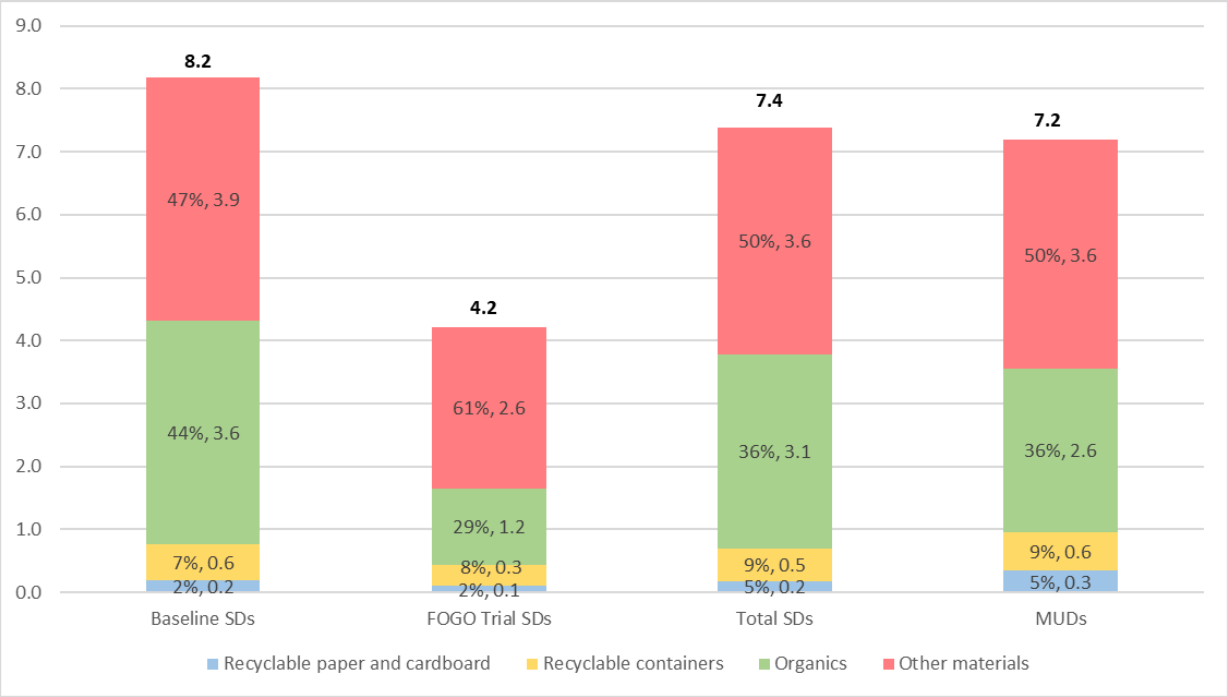


Table 9: Composition of the general waste, all households (kg/household/week)

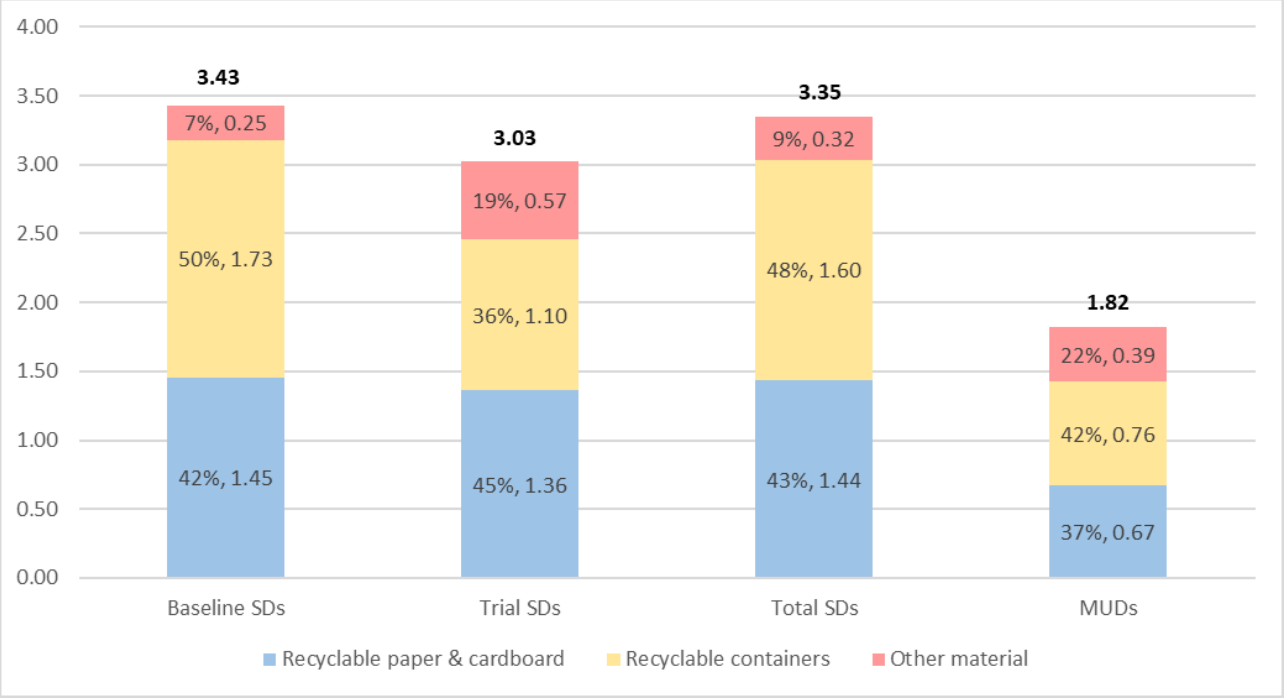
	Kgs/hhld/week				Per Cent (%)			
	FOGO trial SDs	Baseline SDs	Total SDs	MUDs	FOGO trial SDs	Baseline SDs	Total SDs	MUDs
Recyclable paper & cardboard	0.1	0.2	0.2	0.3	2.5%	2.4%	2.4%	4.8%
Recyclable glass	0.1	0.2	0.1	0.3	2.1%	2.0%	2.0%	3.6%
Recyclable plastic	0.1	0.3	0.2	0.2	3.4%	3.3%	3.3%	3.0%
Recyclable metals	0.1	0.1	0.1	0.1	2.4%	1.6%	1.7%	2.0%
Garden organics	0.0	0.3	0.2	0.1	0.9%	3.4%	3.1%	1.7%
Food organics	0.7	2.3	1.9	1.5	15.9%	27.6%	26.3%	20.8%
Other food (containerised/packaged)	0.5	1.0	0.9	1.0	12.0%	12.5%	12.5%	13.8%
Other metals	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.2%
Soft plastic / film	0.3	0.7	0.6	0.4	7.8%	8.0%	8.0%	5.7%
Banned single use plastic (no bags)	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.3%
Other plastic	0.2	0.2	0.2	0.2	3.9%	2.2%	2.4%	2.2%
Textiles	0.3	0.4	0.4	0.5	5.9%	4.7%	4.8%	6.7%
Other organics	0.9	1.5	1.4	1.2	22.0%	18.1%	18.6%	17.2%
Nappies / hygiene products	0.5	0.5	0.5	0.4	13.0%	6.1%	6.9%	4.9%

	Kgs/hhld/week				Per Cent (%)			
	FOGO trial SDs	Baseline SDs	Total SDs	MUDs	FOGO trial SDs	Baseline SDs	Total SDs	MUDs
e-waste/hazardous/problematic	0.1	0.3	0.2	0.1	2.6%	3.1%	3.0%	1.7%
Building waste, inert	0.2	0.4	0.4	0.8	4.6%	4.8%	4.8%	10.6%
Other	0.0	0.0	0.0	0.1	0.9%	0.1%	0.2%	0.8%
Total	**4.2**	**8.2**	**7.4**	**7.2**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

3.5.2 Recycling in SDs vs. MUDs

By housing type, the largest difference was seen in contamination rates with baseline SDs at 9%, trial SDs at 19% compared with 21.7% in MUDs. The contamination in trial SDs was mostly made up of bagged material at 11.2%, 4.6% in baseline SDs, and 10.6% in MUDs and represents almost 50% of the contamination rates at both housing types.

Figure 12: Recycling composition by housing type (kgs)



Consolidated categories are listed below, and a detailed breakdown is provided in **Appendix C**.

Table 10: Composition of the recycling stream, all households (kg / household / week)

	Kgs/hhld/week				Per Cent (%)			
category	Baseline SDs	Trial SDs	Total SDs	MUDs	Baseline SDs	Trial SDs	Total SDs	MUDs
Recyclable paper & cardboard	1.45	1.36	1.44	0.67	42.4%	45.0%	42.8%	36.6%
Recyclable glass	1.27	0.64	1.15	0.55	37.1%	21.1%	34.2%	29.8%
Recyclable plastic	0.35	0.34	0.34	0.15	10.1%	11.1%	10.2%	8.4%
Recyclable aluminium	0.02	0.02	0.02	0.01	0.6%	0.7%	0.6%	0.7%
Recyclable steel	0.09	0.11	0.09	0.05	2.5%	3.5%	2.7%	2.7%
Bagged waste	0.09	0.34	0.14	0.19	2.5%	11.2%	4.1%	10.6%
Other non-recyclable metals	0.01	0.00	0.01	0.01	0.2%	0.1%	0.2%	0.3%

	Kgs/hhld/week				Per Cent (%)			
category	Baseline SDs	Trial SDs	Total SDs	MUDs	Baseline SDs	Trial SDs	Total SDs	MUDs
Organics	0.06	0.05	0.06	0.06	1.7%	1.7%	1.7%	3.2%
Textiles	0.02	0.03	0.02	0.01	0.6%	0.9%	0.6%	0.6%
Soft plastic / film	0.02	0.04	0.02	0.01	0.6%	1.4%	0.7%	0.6%
E-waste	0.00	0.00	0.00	0.00	0.1%	0.1%	0.1%	0.1%
Non-recyclable plastic	0.00	0.00	0.00	0.00	0.0%	0.0%	0.0%	0.2%
Building waste, inert	0.02	0.01	0.01	0.01	0.5%	0.2%	0.4%	0.5%
Other	0.04	0.09	0.05	0.10	1.2%	3.1%	1.6%	5.6%
Total	**3.43**	**3.03**	**3.35**	**1.83**	**100%**	**100%**	**100%**	**100%**

Figure 13: Commingled recycling contamination levels by housing type

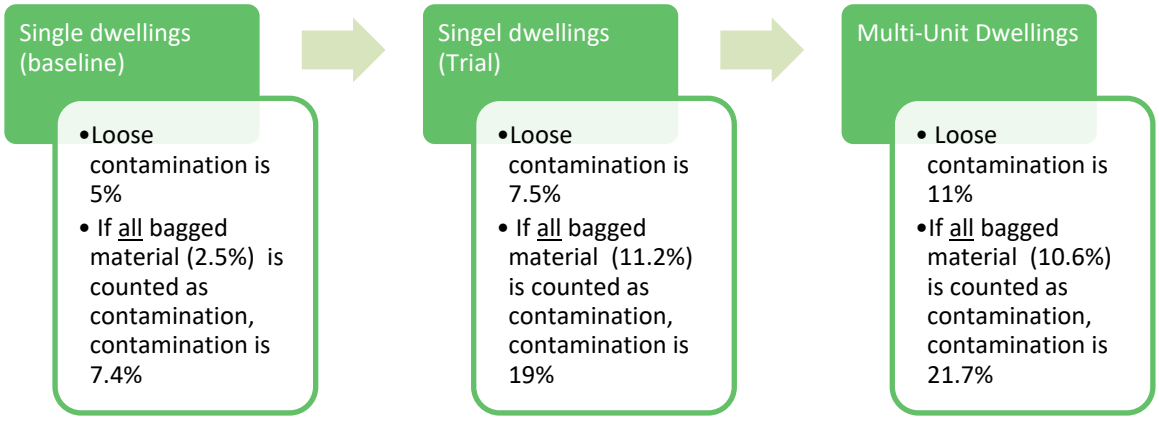


Figure 14 shows the top five contaminants in the recycling (from highest to lowest percentage) for SDs and MUDs. This includes materials presented in bags.

Figure 14: Top five recycling contaminants – SDs and MUDs

Top five contaminants: SDs baseline	Top five contaminants: SDs trial	Top five contaminants: MUDs
•Bagged waste	•Bagged waste	•Bagged waste
•Organics	•Other	•Other
•Other	•Organics	•Organics
•Textiles	•Soft plastic / film	•Textiles
•Soft plastic / film	•Textiles	•Soft plastic / film

Image 11: Plastic film and textiles are common contaminants in both housing types

3.6 Bin volume used

Table 11 shows detail of bin usage at single dwellings. General waste bin fullness in areas with the FOGO trial is of interest because the GW bins are being serviced fortnightly as compared to weekly for the baseline SDs. 34% of the GW bins in the FOGO trial area were full or overflowing and 24% were less than 50% full. The trend is reversed for baseline SDs where 25% of the bins are full or overflowing and 34% are less than 50% full. Data indicates that the fortnightly collection is having minimal impact on the fullness of the general waste bins. The bin fullness data for commingled bins between baseline SDs and trial suburb was highly similar and shows no major difference.

Table 11: Detail of bin use – single dwellings (baseline vs trial areas)

Volume used	General waste bins audited trial area		General waste bins audited - Baseline SDs		Comm bins for trial suburbs		Comm bins - Baseline SDs	
	Number of bins	% of bins	Number of bins	% of bins	Number of bins	% of bins	Number of bins	% of bins
<50%	17	24%	95	34%	14	20%	47	17%
50–74%	18	26%	70	25%	23	33%	73	26%
75–99%	10	14%	45	16%	12	17%	75	27%
100% or more	24	34%	70	25%	21	30%	85	30%
Total	70	100%	280	100%	70	100%	280	100%
Volume statistics								
Mean bin fullness		70%		62%		71%		74%
Median bin fullness		75%		60%		70%		80%
% bins full or over full		34%		25%		100%		30%
% bins less than half full		24%		34%		20%		17%

Table 12 shows detail of general waste bin usage at MUDs. All general waste bins at MUDs were assessed by bin type and the average fullness ranged from 52% to 89%. The 240 litre MGBs were less full on average than the hoppers. More than half of the 240 litre MGBs were less than half full, with only 24% at maximum fullness. By contrast, 50% of the hoppers were full or overflowing and none were less than half full. Only five blocks were assessed with both MGBs and hoppers and most of these were between three-quarters to full.

Table 12: Detail of bin use general waste – multi-unit dwellings

Site type	MGBs	MGBs with hoppers (1)	Hoppers
Sizes used	**140 L**	**3m^3, 1100 L**	**3m^3, 1100 L**
Volume used	**(no. of bins)**		
<50%	35	0	0
50–74%	12	1	3
75–99%	4	3	3
100% or more	15	1	6
Total	**66**	**5**	**12**
Volume statistics (%)			
Mean bin fullness	52%	Too few	89%

Site type	MGBs	MGBs with hoppers (1)	Hoppers
Median bin fullness	40%	Too few	95%
% bins full or over-full	23%	Too few	50%
% bins less than half full	53%	Too few	0%

Table 13 below shows the bin usage for recycling bins at MUD blocks. The bin fullness ranges on average from 58% to 82%. Almost half of the blocks with MGBs were less than half full and 20% were full or overflowing. For MUD blocks with MGBs and hoppers, almost 45% were full or overflowing and 15% had less than 50% material in them. For MUD blocks with hoppers only, 50% of the hoppers were full or overflowing and only one had less than 50% material in it.

Table 13: Detail of bin use recycling – multi-unit dwellings

Site type	MGBs	MGBs with hoppers	Hoppers
Sizes used	240 L	240 L	1100 L
Volume used (no. of bins)			
<50%	29	5	1
50–74%	14	7	4
75–99%	9	7	2
100% or more	13	14	7
Total	**65**	**33**	**14**
Volume statistics (%)			
Mean bin fullness	58%	78%	82%
Median bin fullness	50%	90%	95%
% bins full or over-full	20%	42%	50%
% bins less than half full	45%	15%	7%

Image 12: Overflowing hopper bin

3.7 Confidence interval analysis

3.7.1 General Waste

APC chose to use 90% confidence intervals rather than 95% because of the variability of waste measurements. Both average weights and percentages of totals are provided. Percentages may be more useful as they have a more general application in comparisons with other results and are likely to be more stable in the presence of different dwelling types. As the data collection was carried out in an aggregated manner by day, there is a small number of individual observations. The total sample is n=8 (days) rather than n=714 (households), leading to a wider confidence interval (CI) than if the sample size was larger. The table below indicates the average weights per dwelling per day of components of general waste with 90% confidence intervals over both housing types – SDs and MUDs.

Table 14: General waste confidence intervals by weight

Material category	Average weight (kg)	90% confidence interval	Lower limit	Upper limit
Recyclable paper & cardboard	0.25	0.09	0.17	0.34
Recyclable containers	0.56	0.10	0.46	0.66
Soft plastic/film	0.56	0.10	0.46	0.65
Textiles	0.44	0.10	0.35	0.54
Garden organics	0.20	0.11	0.09	0.31
Food organics, other food	2.87	0.33	2.54	3.20
Other organics	1.41	0.26	1.16	1.67
Nappies/hygiene products	0.51	0.18	0.33	0.69
Building waste/inert	0.64	0.53	0.11	1.18
E-waste	0.15	0.05	0.10	0.20
Hazardous	0.05	0.05	0.00	0.11
Other materials	0.27	0.08	0.19	0.36
Total	**7.93**	**1.06**	**6.87**	**8.99**

Table 15 shows the same information presented as percentage of total waste for components of general waste, with 90% confidence intervals.

Table 15: General waste confidence intervals by per cent

Material category	Per cent of general waste by weight	90% confidence interval	Lower limit	Upper limit
Recyclable paper & cardboard	3.1%	0.9%	2.2%	3.9%
Recyclable containers	7.1%	1.1%	6.0%	8.1%
Soft plastic/film	7.1%	1.0%	6.1%	8.1%
Textiles	5.7%	1.0%	4.7%	6.6%
Garden organics	2.5%	1.2%	1.3%	3.7%
Food organics, other food	37.0%	3.5%	33.4%	40.5%
Other organics	18.2%	3.0%	15.3%	21.2%
Nappies/hygiene products	6.1%	2.2%	4.0%	8.3%
Building waste/inert	7.4%	4.9%	2.5%	12.3%
E-waste	1.9%	0.6%	1.3%	2.5%
Hazardous	0.7%	0.6%	0.0%	1.3%
Other materials	3.3%	0.7%	2.6%	4.0%
Total	**100.0%**	-	-	-

3.7.2 Recycling confidence intervals

Table 16 below indicates the average weights per dwelling per day of components of the recycling stream with 90% confidence intervals.

Table 16: Recycling confidence intervals by weight

Material category	Average weight (kg)	90% confidence interval	Lower limit	Upper limit
Paper & cardboard	2.04	0.68	1.36	2.72
Recyclable containers excluding glass	0.63	0.21	0.43	0.84
Recyclable glass containers	1.64	0.60	1.04	2.24
Other material	0.54	0.19	0.36	0.73
Total material	**4.86**	**1.51**	**3.35**	**6.37**

Table 17 shows the same information presented as a percentage of total for components of recycling with 90% confidence intervals.

Table 17: Recycling confidence intervals by per cent

Material category	Percentage of general waste by weight	90% confidence interval	Lower limit	Upper limit
Paper & cardboard	40.8%	3.3%	37.5%	44.2%
Recyclable containers ex. glass	12.9%	0.9%	12.0%	13.8%
Recyclable glass containers	32.8%	4.3%	28.5%	37.2%
Other material	13.5%	4.6%	8.9%	18.0%
Total material	**100.0%**	-	-	-

3.8 Plastic bags

All retailers in the ACT are banned from providing single-use, lightweight polyethylene polymer plastic bags that are less than 35 microns in thickness (these are the thin plastic bags with handles that are typically supplied at supermarket checkouts). The ban does not apply to other bags such as barrier bags for fruit and vegetables or high-density bags thicker than 35 microns.

Despite the ACT-wide ban on lightweight single-use plastic bags, these make up 0.18% of the general waste stream. Encouragingly, considerably fewer lightweight bags were found in the commingled recycling stream during the audit as compared with general waste. The audit found an average of 0.02 kg of lightweight plastic bags per household per week in the domestic waste and recycling.

High-density plastic bags, which are not banned, are more common in the general waste than lightweight bags but are also found in the recycling stream. This indicates a replacement effect, whereby residents are starting to use shopping bags over 35 microns to do their shopping rather than bring a reusable bag. They then use these to contain waste or just discard them to the general waste or recycling stream.

Barrier bags usually used for fresh fruits, vegetables and for deli/butcher products form 0.24% of the overall waste stream. More recently, Coles has announced that it will ban barrier bags from all 12 of

its Canberra supermarkets[4], which should make a significant difference in the bags being found in the waste stream.

Table 18: Plastic bags detail*

Bag type	Status	General waste		Commingled recycling		Total waste & recycling	
Measure		kg/hhld/ week	% of waste stream	kg/hhld/ week	% of waste stream	kg/hhld/ week	% of waste stream
Barrier bags (fresh/veggie/deli/ butcher)	Not banned ACT	0.02	0.3%	0.0002	0.01%	0.02	0.24%
Shopping bags – over 35 microns		0.04	0.5%	0.0015	0.06%	0.04	0.42%
Shopping bags <5 microns (not garbage bags)	Banned in ACT	0.02	0.2%	0.0003	0.01%	0.02	0.18%
Total plastic bags		**0.08**	**1.1%**	**0.0020**	**0.08%**	**0.09**	**0.84%**

Slight differences in totals are the result of rounding

**No significant different was found in the plastic bag contents of trial and baseline SDs. All data provided in appendices.*

SD households have slightly higher quantities of the banned bags and barrier bags in the waste and recycling when compared with MUDs, however the shopping bags over 35 microns make up a higher proportion of MUD waste and recycling. Due to the extremely small quantities of bags found in the SD waste streams, the analysis has not been split between trial and non-trial households. Detailed data split between trial and non-trial households is provided in **Appendix C**.

Table 19: Plastic bags by stream and housing type

Dwelling type	Status	SDs				MUDs			
Bag type		General waste		Commingled recycling		General waste		Commingled recycling	
Measure		Kg / hhld / week	% of waste stream	Kg / hhld / week	% of waste stream	Kg / hhld / week	% of waste stream	Kg / hhld / week	% of waste stream
Barrier bags (fresh/veggie/deli/ butcher)	Not banned ACT	0.04	0.49%	0.0001	0.00%	0.01	0.11%	0.0000	0.00%
Shopping bags – over 35 microns		0.04	0.52%	0.0014	0.04%	0.04	0.57%	0.0003	0.02%
Shopping bags <5 microns (not garbage bags)	Banned in ACT	0.02	0.26%	0.0002	0.01%	0.02	0.22%	0.0002	0.01%
Total plastic bags		**0.10**	**1.26%**	**0.0017**	**0.05%**	**0.06**	**0.90%**	**0.0006**	**0.03%**

[4] https://www.news.com.au/lifestyle/food/eat/coles-trials-ban-on-soft-plastic-produce-bags-in-canberra-stores/news-story/09f175a4fd2ea0564ff8cf8d50a79e28

Image 13: Shopping bags found in the waste stream – empty and full

3.9 Hazardous items

Table 20 identifies the quantity of hazardous items found during the audit. In total, 1,279 items were found. This averages 1.77 items per household per week in the domestic waste and recycling. The majority (97%) of the hazardous items found were in the general waste stream and only 3% were in the commingled recycling.

The most common hazardous items found were electrical items (excluding computer equipment), household chemicals and batteries. A smaller number of fluorescent tubes, toner cartridges, syringes and mobile phones were also found. In 2022, clinical and pharmaceutical included rapid antigen tests (RAT) kits.

Due to the small number of items found and little to no difference in the number of items found in the general waste and recycling bins between the trial and non-trial households, the data has not been split between SD household types. However, this analysis has been performed and details provided in **Appendix C.**

Table 20: Hazardous items

Item (only non-zero items)	Number of items			Average number per household per week
	General waste	Commingled recycling	Total	
Paint, resins, inks, etc.	17	0	17	0.02
Batteries – household	182	9	191	0.26
Gas bottles	1	0	1	0.00
Fluorescent tubes/bulbs	13	5	18	0.02
Clinical/pharmaceuticals	896	11	907	1.26
Oil – motor/cooking	1	0	1	0.00
TVs/computers/peripherals	2	2	4	0.00
Toner cartridges	13	0	13	0.02
Other, with cord or battery	123	4	127	0.18
Total	**1,248**	**31**	**1,279**	**1.77**

Image 14: Batteries, toner cartridges, fluorescent bulbs, electrical and e-waste

Image 15: RAT kits included with medical

3.10 Single-use plastic Items

A range of single-use plastic items are banned in the ACT effective from July 2021. These items are:

- single-use plastic cutlery
- single-use plastic stirrers
- expanded polystyrene takeaway food and beverage containers.

New bans came into force in July 2022. The banned items are:

- single-use plastic straws (with exemptions for those who need them)
- cotton buds with plastic sticks
- all oxo-degradable plastics. These plastics contain additives which cause them to break down into harmful microplastics. They are often used in products such as dog waste bags and rubbish bags, and can be labelled as degradable.

Single-use plastic (SUP) items were counted and weighed as part of the waste audit conducted in 2022. For some items it will form a baseline to determine how the banned items perform when the ban comes into effect in future. For single-use plastic cutlery and stirrers, it assists in understanding if these items are still in use.

SUP items make up 0.7% of the overall waste stream. As per the data, by count, more SUP items were found in general waste for both single dwellings (35% of all items found) and MUDs (30% of all items

found). Only 15% of the items were found in SD recycling bins and 20% in the MUD recycling bins. The details of SUPs found in SDs and MUDs are presented below.

Table 21: SUP items in SDs and MUDs

Dwelling/disposal type	Average SUP items per week per household	Percentage of all SUP items counted	Total SUP items weight/ 1,000 hhlds/week (kg)	Per cent
SDs general waste	2.08	34.9%	28.76	41.2%
SDs dwellings recycling	0.91	15.3%	8.14	11.7%
MUDs general waste	1.75	29.5%	23.03	33.0%
MUDs recycling	1.21	20.3%	9.94	14.2%
Total	**5.95**	**100.0%**	**69.88**	**100.0%**

Image 16: Example of SUP cutlery and compostable cutlery found in kerbside bins

By count, takeaway containers (at 37%) and container lids (at 57%) are the items most prevalent in the kerbside bins. By weight, the outcome is reversed, with takeaway containers forming 67% of the material found and container lids 30%. Balloons (1.7%) and cutlery/stirrers (1.2%) are the next most commonly found material in the kerbside bins.

Table 22: SUP items in SDs and MUDs

SUP type	Average SUP items per week per household by type	Percentage of all SUP items counted	Weight of SUP items (kg/1,000 hhlds/week)	Percentage of all SUP items counted
SUP takeaway containers	2.20	37.1%	46.90	67.1%
SUP takeaway container lids	3.38	56.8%	20.83	29.8%
SUP cutlery/stirrers	0.19	3.2%	0.87	1.2%
SUP straws	0.06	1.0%	0.12	0.2%
SUP balloons	0.12	1.9%	1.16	1.7%
SUP balloon sticks	0.00	0.0%	0.00	0.0%
Total SUP items	**5.95**	**100.0%**	**69.88**	**100.0%**

Similar to hazardous items and plastic bags, the SUP items were found in very small quantities and as such make comparisons difficult between trial and non-trial households. This data is however provided in detail in **Appendix C.**

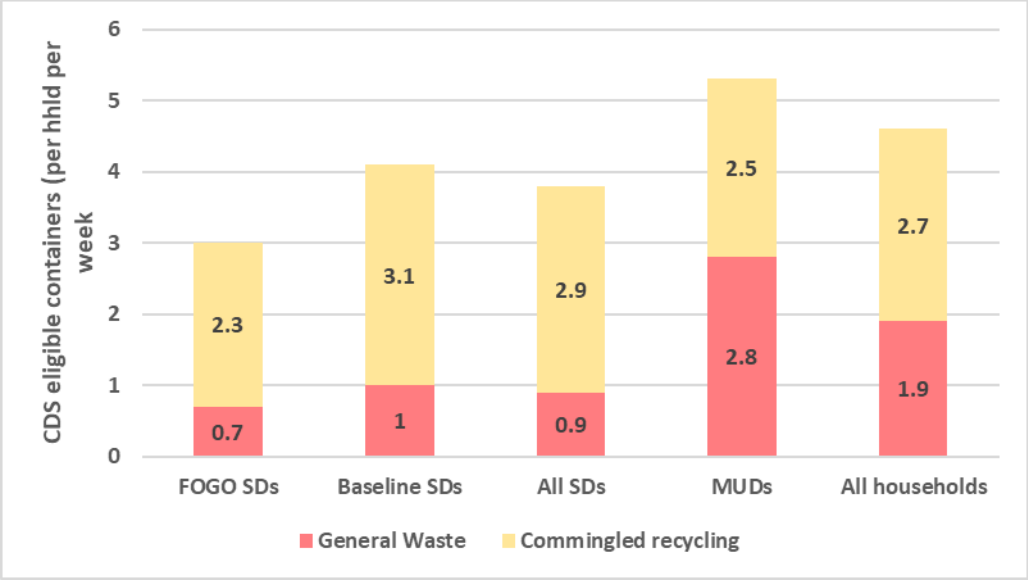
Image 17: Single-use plastics – takeaway containers, lids and balloons

Image 18: Medical and pharmaceutical items were weighed and counted

3.11 CDS containers

Figure 15 shows the average number of CDS-eligible beverage containers in the general waste and recycling streams at SDs, MUDs and overall per household per week. The average ACT dwelling places 4.6 eligible containers per week in the kerbside bins with 2.6 containers in the recycling bin and 2 containers in the general waste bin. Baseline SDs dispose of a total of 4 containers per household per week and 3 containers end up in the recycling stream whereas the trial households are placing 2.3 containers in the recycling stream per week. MUDs place 5.3 containers per household per week overall, with 2.5 containers going in the recycling.

Figure 15: CDS-eligible beverage containers by household type and waste stream



Assuming the number of households in the ACT[5] is 135,735 SDs and 32,669 MUDs, there is a total of 690,673 in the ACT kerbside bins every week. Of these, 472,967 are in the recycling bins and are potentially being recovered at the Material Recycling Facility. However, approximately 217,707 containers per week are ending up the landfill through general waste which could otherwise be eligible for a refund of 10c per container.

Table 23: Total eligible containers in the ACT kerbside bins per week

	General Waste	Recycling
SDs total eligible containers	126,234	392,274
MUDs total eligible containers	91,473	80,692
Total eligible containers	**217,707**	**472,967**

3.11.1 Eligibility

Of all the containers found in the kerbside bins, 79% of those found in SDs and 88% found in MUDs were eligible for return through the CDS system, as shown in Table 24 below. The number of eligible containers found in the trial SDs (88%) is slightly higher than those found in the baseline SDs (77%).

[5] Australian Bureau of Statistics 2021 Census Community Profile: ACT

Table 24: Total eligible containers in the ACT

Dwelling type	Average number of containers/household/week				
	FOGO trial SDs	Baseline SDs	Total SDs	MUD	All
General waste – CDS-eligible	0.67	1	0.93	2.8	1.87
General waste – excluded from CDS	0.01	0.04	0.03	0.18	0.11
Recycling – CDS-eligible	2.25	3.05	2.89	2.47	2.68
Recycling – excluded from CDS	0.39	1.15	1	0.56	0.78
Total beverage containers – waste and recycling	3.32	5.24	4.85	6.01	5.43
Total excluded from CDS – gen. waste and recycling	**0.4**	**1.19**	**1.03**	**0.74**	**0.885**
Total eligible for CDS – gen. waste and recycling	**2.92**	**4.05**	**3.82**	**5.27**	**4.545**
Total eligible for return through the CDS system	**88%**	**77%**	**79%**	**88%**	**83%**

Similarly, 95% of the containers in the general waste stream and 79% in the recycling bins were found to be eligible.

Figure 16: CDS-eligible beverage containers by household type and waste stream

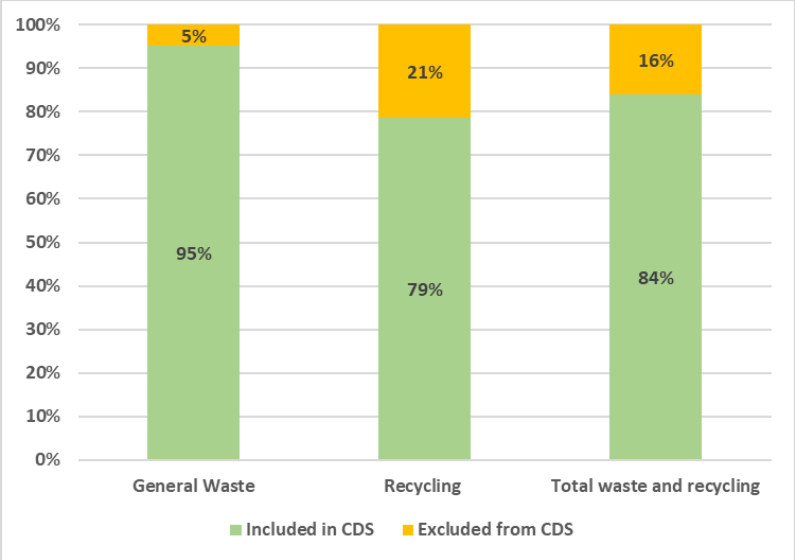


Image 19: Current eligible containers and potential future CDS wine containers

3.12 Recovery rates

Recovery rates can by calculated by specific material, as well as overall, and are useful for determining materials that should be the focus of education initiatives. Recovery rates are calculated as follows:

$$\text{Recovery rate} = \frac{\text{Weight of recyclables in recycling bin minus contamination}}{\text{(Weight of recyclables in recycling bins + weight of recyclables in general waste bin)}} \times 100$$

Recovery rates are assessed as follows:

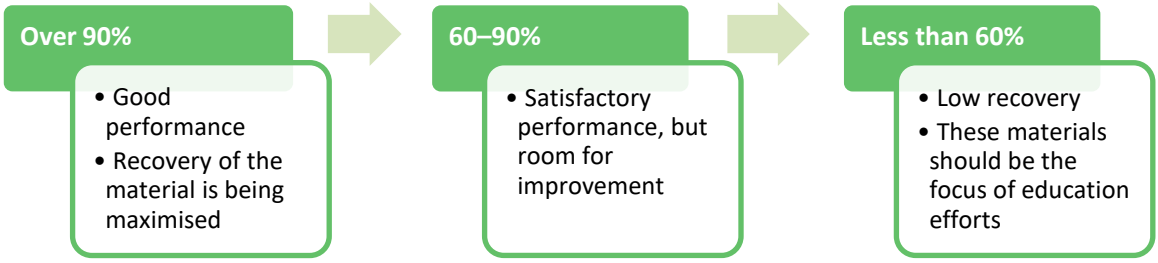


Figure 17 shows the recovery rates for each recyclable material and overall. The overall recovery rate is 70%. SDs achieve 82% and MUDs 57%.

Paper/cardboard (89%), glass (89%) and plastic containers (59%) are reasonably well recovered by SDs, however SDs have room for improvement in the recycling of steel (65%) and aluminium (42%).

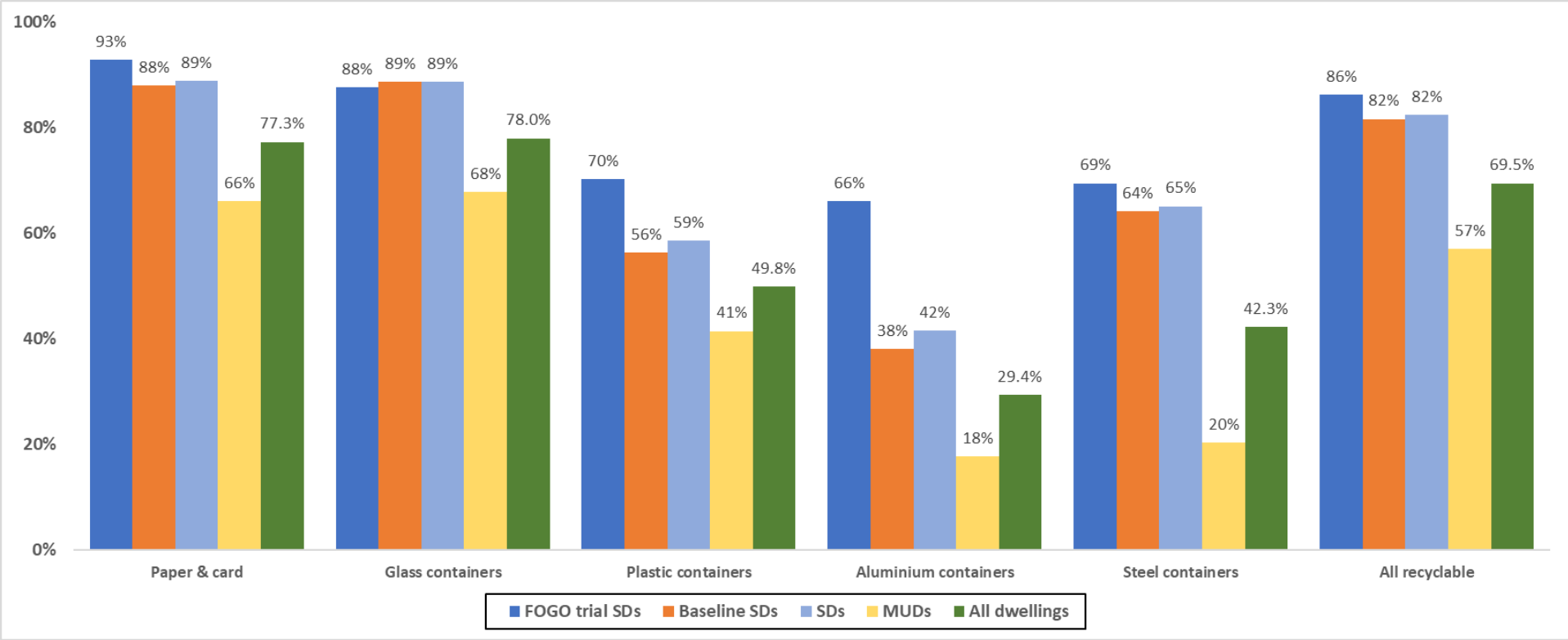
The differences in recovery between the trial SDs and baseline SDs are small and presented in Table 25 below.

MUDs recover paper/cardboard (66%) and glass containers (68%) reasonably well but recycle less than half of all other materials.

Table 25: Recovery rates by housing type

Material	FOGO trial SDs	Baseline SDs	SDs	MUDs	All dwellings
Paper & card	93%	88%	89%	66%	7%
Glass containers	88%	89%	89%	68%	78%
Plastic containers	70%	56%	59%	41%	50%
Aluminium containers	66%	38%	42%	18%	29%
Steel containers	69%	64%	65%	20%	42%
All recyclable	**86%**	**82%**	**82%**	**57%**	**69.5%**

Figure 17: Recovery rates – SDs vs. MUDs



3.12.1 MUDs – Recovery rate by bin type

The different bin types were compared for their effectiveness in terms of recovery. MUDs with MGBs were the best at recovering all recyclables, at 85%. MUDs with hoppers and MGBs, similarly to MUDs with hoppers only, had much lower recovery rates, at 53% and 52%. MUDs are the most successful at recovering glass containers (68%) and paper and cardboard (66%) and least successful at recovering aluminium containers, at 18%.

Table 26: Recovery rates by bin type in MUDs

Material	MUDs MGBs	MUDS hoppers MGBs	MUDS hoppers	Total
Paper and cardboard	90%	54%	63%	66%
Glass containers	92%	59%	54%	68%
Plastic containers	54%	39%	37%	41%
Aluminium containers	68%	52%	21%	18%
Steel containers	69%	50%	25%	20%
All recyclable	**85%**	**53%**	**52%**	**57%**

Image 20: Glass containers are the best recovered material

3.13 Landfill diversion – current and potential

The diversion rates are helpful for understanding the total amount of waste diverted from landfill. This is calculated as follows:

$$\text{Diversion rate (proportion of waste diverted from landfill)} = \frac{\text{Weight of recyclables in recycling bins minus contaminants}}{\text{(Weight of the contents of the general waste bins + recycling bins)}} \times 100$$

The diversion rate may be slightly different to that calculated using the annual overall tonnages. This is because the audit is conducted as a snapshot of that particular time period and does not factor in seasonal fluctuations or other annual trends. The analysis provides an indication of the additional diversion potential through either modified collection or processing systems, or by changing household behaviour through education.

It should be noted, however, that maximum diversion rates are based on 100% participation rates, 100% correct presentation of materials and 100% recovery of the materials at the processing facilities. These, therefore, are maximum theoretical diversion rates. Governments may realistically aim to achieve 60% of the additional potential diversion for any of the targeted streams.

Current landfill diversion of the waste produced by ACT households is 24% based on this audit. This is achieved primarily by the recovery of paper/cardboard and glass in the commingled recycling bins. Landfill diversion could increase by 9% if all currently accepted recyclables were placed into the commingled bin. This would lift diversion to 33%.

Recovery of soft plastics, including plastic film and plastic bags, would add another 5%.

ACT NoWaste are piloting a FOGO service to selected households. The acceptable and non-acceptable items are shown below.

Figure 18: Acceptable and non-acceptable materials in FOGO pilot

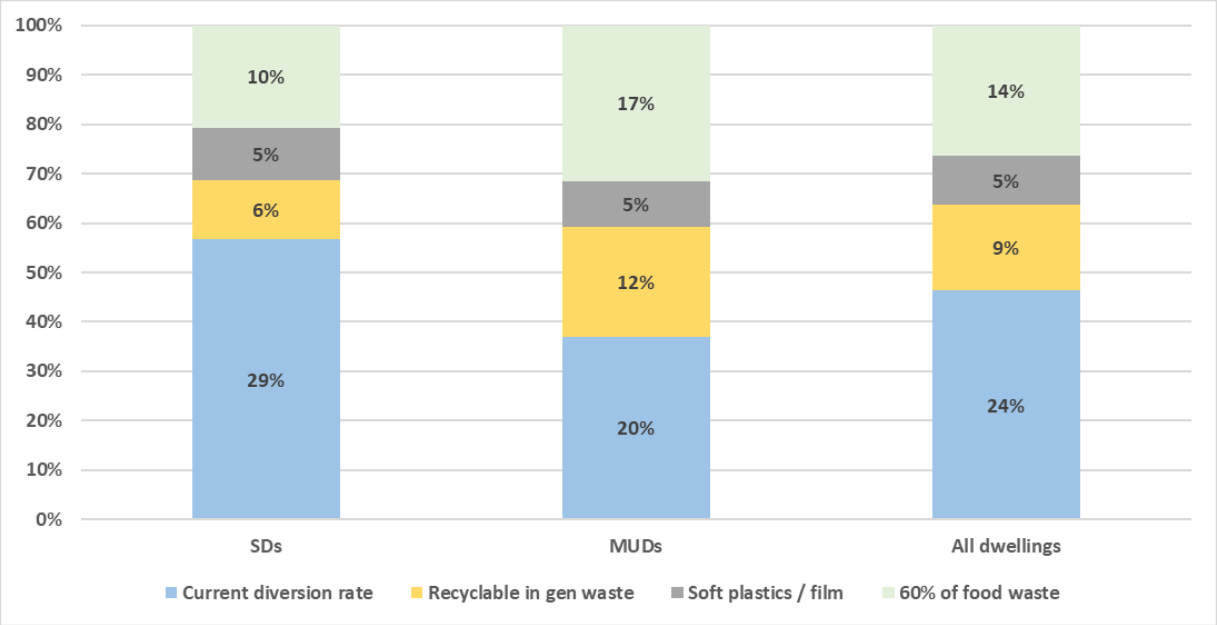
Based on performance of FOGO programs in NSW, we have assumed a 60% recovery of the loose food and all garden organics in the current **general waste bins** are diverted to the new FOGO service. Diversion could increase by another 10% in SDs and overall and 17% at MUDs.

Table 27: Detailed diversion potential

Category	FOGO trial SDs	Baseline SDs	SDs	MUDs	All dwellings
Current diversion rate	34%	27%	29%	20%	24%
Diverting all recyclables in general waste	6%	6%	6%	12%	9%
Diverting soft plastics/film	5%	6%	5%	5%	5%
Diverting 60% of food waste	6%	12%	10%	17%	14%

Note: Slight differences in totals are due to rounding

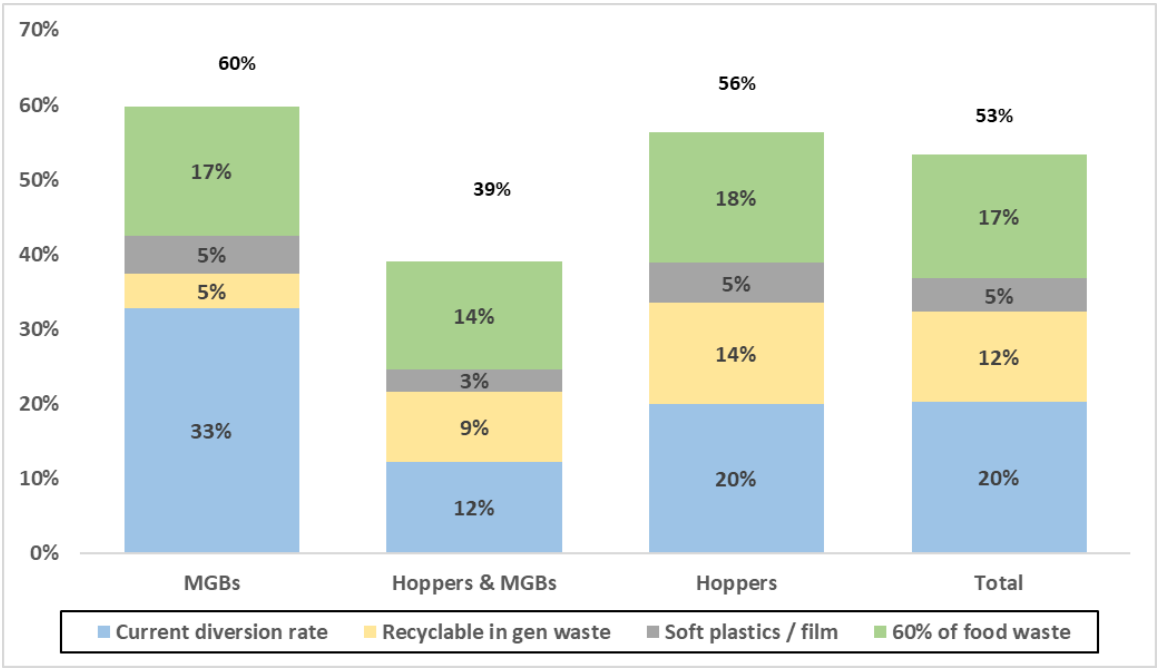
Figure 19: Potential landfill diversion



3.13.1 MUD diversion rate by bin type

The current diversion rate is highest in MUDs with MGBs and lowest in MUDs with MGBs and hoppers. However, there is potential to increase the diversion rate from 20% to 53% if all recyclables, soft plastics and food waste is recovered from the general waste bins.

Figure 20: Potential landfill diversion – MUDs



4 KEY FINDINGS

4.1 Waste generation in the general waste and commingled recycling system

- The average ACT household generates 10.3 kg per household per week comprising 7.7 kg of general waste per week and 2.6 kg of commingled recycling.
- Baseline SDs generate 11.6 kg per week with 8.2 kg of general waste and 3.4 kg recycling.
- SDs within the FOGO trial area generate 7.2kg per week with 4.2kg of waste and 3kg of recycling.
- MUDs generate 9 kg per week with 7.2 kg general waste and 1.8 kg recycling.

4.2 Composition of the general waste stream

Single dwellings

- Overall, for SDs, the largest material category is loose food (26.3%) and containerised food (12.5%), followed by other organics – contaminated paper, animal waste and compostable cups (19%), nappies (6.9%), recyclable containers (9.4%) and textiles (4.8%), garden organics (3.1%).
- On average, 9.4% of general waste in SDs is material that should be in the commingled recycling bin. This comprises mainly paper/cardboard, glass and plastic containers.
- Based on the current FOGO pilot acceptable materials, loose food and garden organics these account for 29.4% of the current general stream and could be diverted. If residents decanted packaged and containerised food an additional 12.5% of food and used packaging could also be diverted to FOGO and recycling.

Trial vs Baseline SDs

- The total general waste generated by the trial SDs (4kg per week) is half that of Baseline SDs at 8kg per week
- The total among of nappies and hygiene waste is exactly the same at 0.5kgs/hhld/week
- Food organics are reduced to 0.7kgs/hhld/week in trial SDs which is less than a third of those found in Baseline SDs indicating that the trial households are using the bins.
- Recyclable materials and non-recyclable plastic show negligible differences between trial and non-trial areas.

Multi-unit dwellings

- For MUDs, food comprising loose food (20.8%) and containerised food (13.8%) are the largest single materials
- Recyclables account for 13.4% and should be diverted to the recycling stream
- Soft plastic made up 5.7% of the overall material by weight, which is a significant amount given soft plastics are light. This would represent a significant quantity by volume of the bin.
- Hazardous materials are very low at 0.1%.
- Based on the current FOGO pilot acceptable materials, loose food and garden organics account for 23%. If residents decanted packaged and containerised food, an additional 13.8% of food and used packaging could also be diverted to FOGO and recycling streams.

4.3 General waste bin usage

Single dwellings

- For SDs, general waste bin fullness averaged 70% for the trial areas and 62% for the baseline SDs.
- 34% of the GW bins in the FOGO trial area were full or overflowing and 24% were less than 50% full. The trend is reversed for baseline SDs where 25% of the bins are full or overflowing and 34% are less than 50% full.

Multi-unit dwellings

- For general waste bins, average fullness ranged from 52% to 89%.
- No over-full general waste bins were found at MUDs.
- The 240 litre bins were less full on average than the hoppers.
- More than half of the **240L MGBs** were less than half full or only 24% full.
- Of those with **hoppers,** 50% were full or overflowing and none were less than half full.
- Only five blocks were assessed with **both MGBs and hoppers** and most of these were between 75% to full.

4.3 Composition of commingled recycling stream

Single dwellings

- Overall, for SDs recyclable containers (48%), recyclable paper and cardboard (43%) and contamination 9.7%.
- Overall, for bagged material at 4% is the single largest category of contamination.
- There is little difference in the quantity of paper and cardboard between the trial SDs (45%) and baseline SDs (42%).
- The biggest difference is between bagged material which is 11% in trial areas and 2% in baseline SDs. Detailed analysis shows that 10% of the bagged material in the trial SDs is bagged general waste indicating that some of the general waste in trial SDs is ending up as bagged material in the recycling bins.

Multi-unit dwellings

- Recyclable containers (41.3%), recyclable paper and cardboard (37%) and contamination 21.7%.
- Bagged material is the largest single category of contamination at 10.6%.

SDs vs. MUDs

- The contamination in MUDs, at 21.7%, is more than twice that of SDs (9.7%).
- Bagged material at SDs is 4% and at MUDs 10.6%.
- Loose contamination forms 5.7% of SDs and 11% in MUDs.
- MUDs have double the contamination of SDs, both loose and bagged.
- Common to both SDs and MUDs are four key materials – bagged waste, organics, textiles and plastic film.

4.4 Commingled recycling bin fullness

Single dwellings

- For SDs, commingled bin usage at single dwellings averaged 74% for baseline SDs and 71% for the trial SDs.
- About 30% were full or over-full for both, and 17% were less than half full for the baseline SDs and 20% were less than half full for the trial area SDs.

Multi-unit dwellings

- The bin fullness ranges, on average, from 58% to 82%.
- Almost half of the blocks with **MGBs** were less than half full and 20% were full or overflowing.
- For MUD blocks with **MGBs and hoppers**, almost 45% were full or overflowing and 15% had less than 50% material in them.
- For MUD blocks **with hoppers** only, 50% of the hoppers were full or overflowing and only one had less than 50% material in it.

4.5 Plastic bags

- Despite the ACT-wide ban, lightweight single-use plastic bags are 0.18% of the general waste stream.
- In the domestic waste and recycling, lightweight single-use plastic bags are 0.02 kg per household per week.
- High-density plastic bags, which are not banned, are more common in the general waste than lightweight bags and are also found in the recycling stream.
- Barrier bags, usually used for fresh fruits and vegetables and for deli and butchers, form 0.24% of the overall waste stream.

4.6 Hazardous, problematic and e-waste items

- In total, 1,279 items were found or an average of 1.77 items per household per week.
- 97% of the hazardous items found were in the general waste stream and only 3% were in the commingled recycling.
- The most common hazardous items were electrical items (excluding computer equipment), household chemicals, batteries, fluorescent bulbs, toner cartridges and medical items.
- In 2022, hazardous items included rapid antigen tests (RAT) kits.

4.7 Single-use plastic (SUP) items

- SUP items make up 0.7% of the overall waste stream.
- More SUP items were found in the general waste of SDs then MUDs.
- Only 15% SUP were found in SD recycling bins and 20% in the MUD recycling bins.
- By count, takeaway containers (37%) and container lids (57%) are the most common items in the kerbside bins
- By weight, takeaway containers (67%) and container lids (30%) are most common.
- Balloons (1.7%), cutlery/stirrers (1.2%) are the next most found material in the kerbside bins by weight.

4.8 Beverage containers

- The average ACT dwelling places 4.6 eligible containers per week in the kerbside bins with 2.6 containers in the recycling bin and 2 containers in the general waste bin.
- Baseline SDs dispose of a total of 4 eligible containers per household per week and 3 containers end up in the recycling stream whereas the trial households are placing 2.3 eligible containers in the recycling stream per week.
- MUDs place 5.3 eligible containers per household per week overall, with 2.5 eligible containers going in the recycling.
- Assuming the number of households in the ACT is 135,735 SDs and 32,669 MUDs, there is a total of 690,673 in the ACT kerbside bins every week. Of these, 472,967 are in the recycling bins and are potentially being recovered at the Material recycling Facility. However, approximately 217,707 containers per week are ending up the landfill through general waste which could otherwise be eligible for a refund of 10c per container.
- Of all the containers found in the kerbside bins, 79% of those found in SDs and 88% found in MUDs were eligible for return through the CDS system. The number of eligible containers found in the trial SDs (88%) is slightly higher than those found in the baseline SDs (77%).
- Overall, 95% of the containers in the general waste stream and 79% in the recycling bins were found to be eligible.

4.9 Recovery rates

- The overall recovery rate is 70%. SDs achieve 82% and MUDs 57%.
- Paper/cardboard (89%), glass (89%) and plastic containers (59%) are reasonably well recovered by SDs, however SDs have room for improvement in the recycling of steel (65%) and aluminium (42%).
- The differences in recovery between the trial SDs and baseline SDs are negligible.
- MUDs recover paper/cardboard (66%) and glass containers (68%) reasonably well, but recycle less than half of all other materials. MUDs achieve 57% recovery, with glass containers (68%), paper/cardboard (66%), plastic containers (41%), steel (20%) and aluminium (18%).
- MUDs by bin infrastructure – MUDs with MGBs (85%), MUDs with hoppers and MGBs (53%) and MUDs with hoppers (52%).

4.10 Landfill diversion

- Current landfill diversion of the waste produced by ACT households is 24% based on this audit. This is achieved primarily by the recovery of paper/cardboard and glass in the commingled recycling bins.
- Landfill diversion could increase by 9% if all currently accepted recyclables were placed into the commingled bin. This would lift diversion to 33%.
- If 60% of FOGO material from general waste is diverted, diversion could increase by another 10% in SDs and overall and 17% at MUDs.

APPENDIX A: LETTER FOR RESIDENT ENQUIRIES

ACT Government
Transport Canberra and City Services

4 April 2022

TO WHOM IT MAY CONCERN

RE: Household Waste Audit

The ACT Government is currently conducting a waste audit project to determine our community's waste composition which will provide valuable data to examine future resource recovery opportunities.

The waste audits will be focusing on examining landfill waste and mixed recycling bins to determine the composition of material in the waste stream to get a better understanding of potential landfill diversion initiatives. The audit also provides information on contamination within each bin, this enables ACT NoWaste to tailor our education programs to the community.

The ACT Government is auditing the landfill (red) and mixed recycling (yellow) bins of approximately 700 randomly selected households across all of Canberra over two weeks prior to the normal waste collection. The methodology which we are required to use has been developed by the NSW EPA to provide robust and reliable data. Individual property addresses are not reported at any point in the audit process.

We engage highly experienced consultants who have collected and sorted waste from over 100,000 households nationally over the past twenty-five years. We have confidence in their staff, approach, and ability to deliver high quality data. All waste will be collected on residents usual collection days in separate collection vehicles. The waste will then be transported to a secure indoor facility to be audited and then transported to the normal processing or disposal site.

Should you be concerned about privacy please consider the following points.

- When sorted and recorded, all collected materials are either disposed to landfill or recycled as per the normal collection service.
- In the course of similar audits over 24 years there has never been a breach of privacy.
- All staff are required to sign a confidentiality agreement which is legally binding.

We apologise for any inconvenience this project may cause to you or your household. Should you have any concerns or wish to discuss the project further, please contact the ACT NoWaste customer service number: 6205 9521 or email no_waste@act.gov.au

Michael Trushell

Michael Trushell
Executive Branch Manager ACT NoWaste

GPO Box 158 Canberra ACT 2601 | phone: 132281 | www.act.gov.au

APPENDIX B: SORTING CATEGORIES

Table 28: Domestic waste and recycling sorting categories

Date	General waste aggregation class (not the same as the recycling aggregation)	Recycling aggregation class 1 (not the same as the general waste aggregation)	Recycling aggregation class 2 i.e. method to add non-recyclable items to components of what might be considered as contamination
Cardboard	Recyclable paper & cardboard	paper & cardboard	Recyclable
Paper	Recyclable paper & cardboard	paper & cardboard	Recyclable
Paper- LPB - non-CDS	Recyclable paper & cardboard	paper & cardboard	Recyclable
Paper- LPB - CDS	Recyclable paper & cardboard	paper & cardboard	Recyclable
Composite (mostly paper)	Other organics	organics	Contamination
Food organics – unpackaged / loose	Food organics	organics	Contamination
Food organics – containerised / packaged	Other food	other	Contamination
Garden organics	Garden organics	organics	Contamination
Other putrescible *Domestic animal waste	other organics	organics	Contamination
Paper – contaminated	other organics	organics	Contamination
Option compostable containers	other organics	organics	Contamination
Timber	other organics	organics	Contamination
Textiles – clothing, shopping bags	textiles	textiles	Contamination
Leather / rubber – footwear	textiles	textiles	Contamination
Glass – CDS	Recyclable glass	glass	Recyclable
Glass – non-CDS	Recyclable glass	glass	Recyclable
Glass – wine and spirit	Recyclable glass	glass	Recyclable
Glass – containers (fines) /plate / non-pack	Recyclable glass	glass	Recyclable
PET CDS containers	Recyclable plastic	Plastic	Recyclable
HDPE CDS containers	Recyclable plastic	Plastic	Recyclable
P1, P2, P3, P4, P5 - packaging	Recyclable plastic	Plastic	Recyclable
P5 LDPE film	soft plastic / film	soft plastic / film	Contamination
P6 EPS containers / transport packaging	other plastic	other	Contamination
P7 Other plastic	other plastic	other	Contamination
Composite mostly plastic	other plastic	other	Contamination
Single-use plastic (SUP) cutlery/stirrers	SUP	SUP	Contamination
SUP straws	SUP	SUP	Contamination
SUP takeaway containers	SUP	Non-recyclable plastic *	Contamination
SUP takeaway container lids	SUP	Non-recyclable plastic *	Contamination
SUP balloons	SUP	SUP	Contamination
SUP balloon sticks	SUP	SUP	Contamination
Barrier bags (fresh/veggie/deli/butcher)	soft plastic / film	soft plastic / film	Contamination
Shopping bags <5 microns (not garbage bags)	soft plastic / film	soft plastic / film	Contamination
Shopping bags – over 35 microns	soft plastic / film	soft plastic / film	Contamination
Plastic – other	other plastic	other	Contamination
Steel cans – CDS	*Recyclable metals	steel	Recyclable
Steel – packaging non-beverage	*Recyclable metals	steel	Recyclable
Steel – non-packaging	*Recyclable metals	steel	Recyclable

Date	General waste aggregation class (not the same as the recycling aggregation)	Recycling aggregation class 1 (not the same as the general waste aggregation)	Recycling aggregation class 2 i.e. method to add non-recyclable items to components of what might be considered as contamination
steel – composite (mostly ferrous)	*Recyclable metals	other	Contamination
Aluminium cans – CDS	*Recyclable metals	aluminium	Recyclable
Aluminium – packaging non-beverage	*Recyclable metals	aluminium	Recyclable
Aluminium – non-packaging	*Other metals	aluminium	Contamination
Aluminium – Composite	other	other	Contamination
Paint, resins, inks, organic sludges	hazardous /problematic	hazardous /problematic	Contamination
Asbestos	hazardous /problematic	hazardous /problematic	Contamination
Solar Panels	Other	hazardous /problematic *	Contamination
Batteries – household	hazardous /problematic	hazardous /problematic	Contamination
Batteries – used lead acid	hazardous /problematic	hazardous /problematic	Contamination
Gas bottles	hazardous /problematic	hazardous /problematic	Contamination
Fluorescent tubes / bulbs	hazardous /problematic	hazardous /problematic	Contamination
Chemicals	hazardous /problematic	hazardous /problematic	Contamination
Clinical/pharmaceuticals/cotton buds	hazardous /problematic	hazardous /problematic	Contamination
Oil – motor / cooking	hazardous /problematic	hazardous /problematic	Contamination
Smoke detector	hazardous /problematic	hazardous /problematic	Contamination
Concrete/bricks/tiles/ceramics/plasterboard	building waste	building	Contamination
Soil /dirt/dust	inert	inert	Contamination
Mobile phones	E-waste	E-waste	Contamination
TVs / computers/peripherals	E-waste	E-waste	Contamination
Toner cartridges	E-waste	E-waste	Contamination
Other with cord or battery	E-waste	E-waste	Contamination
Other specify	Other	Other	Contamination
Nappies / hygiene products	nappies	nappies	Contamination
Bagged waste in recycling	Other (not applicable to general waste)	Bagged waste in recycling*	Contamination
Bagged recycling in recycling	Other (not applicable to general waste)	Bagged recycling in recycling*	Contamination

APPENDIX C DETAILED DATA FOR DOMESTIC WASTE AUDIT

Table 29: General waste single dwellings – detailed composition

Collection frequency	Weekly	Weekly	Weekly	Fortnightly	Weekly	Weekly	Weekly
Number of dwellings audited	70	70	70	70	70	70	280
Date	4/04/2022	5/04/2022	6/04/2022	7/04/2022	8/04/2022	FOGO trial SDs	Baseline SDs
Cardboard	8.36	10.68	10.90	9.54	8.30	4.77	9.56
Paper	4.70	2.94	2.16	4.18	3.94	2.09	3.44
Paper- LPB - NON CDS	0.56	0.52	0.42	0.62	0.68	0.31	0.54
Paper- LPB - CDS	0.18	0.60	0.06	0.22	0.44	0.11	0.32
Composite (mostly paper)	1.92	3.72	3.32	2.06	2.26	1.03	2.81
Food organics – unpackaged / loose	164.41	143.08	167.04	93.98	158.42	46.99	158.24
Food organics - containerised / packaged	65.82	67.84	79.67	70.90	74.00	35.45	71.83
Garden organics	43.48	10.24	15.86	5.16	7.46	2.58	19.26
Other putrescible *Domestic animal waste	92.46	12.50	49.26	63.46	19.80	31.73	43.51
Paper – contaminated	44.96	36.10	55.84	60.66	62.12	30.33	49.76
Option compostable containers	2.26	0.78	0.30	0.36	0.06	0.18	0.85
Timber	4.26	11.14	4.72	3.42	7.38	1.71	6.88
Textiles – clothing, shopping bags	13.58	22.64	29.50	30.56	29.04	15.28	23.69
Leather / rubber – footwear	0.92	0.52	1.00	4.52	9.82	2.26	3.07
Glass – CDS	2.86	0.28	4.12	3.28	1.44	1.64	2.18
Glass – NON CDS	5.62	8.96	3.06	7.44	4.92	3.72	5.64
Glass – wine and Spirit	1.18	2.30	0.00	0.52	1.10	0.26	1.15
Glass – containers (fines) / plate / non-pack	0.00	0.00	6.94	1.38	2.48	0.69	2.36
PET CDS containers	1.08	0.58	0.46	1.26	0.16	0.63	0.57
HDPE CDS containers	0.02	0.00	0.14	0.02	0.06	0.01	0.06
P1, P2, P3, P4, P5 - packaging	14.90	16.02	18.12	17.12	15.24	8.56	16.07
P5 LDPE film	37.60	31.26	37.00	39.22	48.26	19.61	38.53
P6 EPS containers / transport packaging	0.68	0.30	1.66	1.30	1.06	0.65	0.93
P7 Other plastic	3.86	0.00	0.00	0.00	0.00	0.00	0.97
Composite mostly plastic	2.68	2.18	5.42	6.42	2.92	3.21	3.30
Single Use Plastic (SUP) cutlery/stirrers	0.16	0.00	0.00	0.00	0.02	0.00	0.05
SUP Straws	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUP takeaway containers	0.88	1.70	1.60	1.28	1.30	0.64	1.37
SUP takeaway container lids	0.76	0.62	0.54	0.18	0.76	0.09	0.67
SUP Balloons	0.00	0.00	0.14	0.00	0.12	0.00	0.07
SUP Balloon sticks	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barrier bags (fresh/vege/deli/butcher)	1.10	1.56	9.42	1.08	1.08	0.54	3.29
Shopping bags <5 microns (not garbage bags)	0.32	1.96	1.14	1.50	2.44	0.75	1.47
Shopping bags – over 35 microns	3.00	2.30	3.06	4.24	2.26	2.12	2.66
Plastic – other	3.06	7.72	7.26	15.02	12.24	7.51	7.57
steel cans- CDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Collection frequency	Weekly	Weekly	Weekly	Fortnightly	Weekly	Weekly	Weekly
Number of dwellings audited	70	70	70	70	70	70	280
Date	4/04/2022	5/04/2022	6/04/2022	7/04/2022	8/04/2022	FOGO trial SDs	Baseline SDs
steel - packaging non-beverage	6.22	3.28	3.52	6.60	3.92	3.30	4.24
Steel – non-packaging	0.66	5.22	0.62	5.44	1.36	2.72	1.97
steel –composite (mostly ferrous)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aluminium cans - CDS	0.62	0.64	0.38	0.26	0.64	0.13	0.57
Aluminium - packaging non-beverage	2.10	1.60	2.20	1.16	0.82	0.58	1.68
Aluminium – non-packaging	0.00	0.84	0.00	0.90	2.34	0.45	0.80
Aluminium – Composite	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint, resins, inks, organic sludges	0.00	0.00	0.00	0.54	4.12	0.27	1.03
Asbestos	0.00	0.00	17.86	0.00	0.00	0.00	4.47
Solar Panels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batteries – household	0.30	0.98	0.32	0.48	0.78	0.24	0.60
Batteries – used lead acid	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas bottles	0.00	0.76	0.00	0.00	0.00	0.00	0.19
Fluorescent tubes / bulbs	0.01	0.14	0.22	0.00	0.16	0.00	0.13
Chemicals	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Clinical/pharmaceuticals/cotton buds	0.22	0.61	0.46	0.46	0.22	0.23	0.38
Oil – motor / cooking	0.00	0.00	0.56	0.00	0.00	0.00	0.14
Smoke detector	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete/bricks/tiles /ceramics/plasterboard	10.90	36.18	24.42	24.34	25.69	12.17	24.30
Soil /dirt/dust	0.00	3.16	0.80	2.96	9.66	1.48	3.41
Mobile Phones	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TVs / computers/peripherals	0.00	0.00	0.00	6.96	0.00	3.48	0.00
Toner cartridges	0.00	0.28	0.04	0.00	0.02	0.00	0.09
Other with cord or battery	3.88	16.98	5.84	7.06	16.40	3.53	10.78
Other specify	2.18	0.00	0.00	5.48	0.00	2.74	0.55
Nappies / hygiene products	30.16	29.56	32.82	76.72	48.24	38.36	35.20
Bagged waste in recycling	0	0	0	0	0	0	0
Bagged recycling in recycling	0	0	0	0	0	0	0
Total	**584.9**	**501.3**	**610.2**	**590.3**	**596.0**	**295.1**	**573.1**
Total per household per week	**8.4**	**3.6**	**8.7**	**4.2**	**8.5**	**4.2**	**7.3**

Table 30: General waste multi-unit dwellings – detailed composition

Dwelling waste collection type	MGBs weekly	MGBs & hoppers weekly	Hoppers weekly	Total MUDs
Date	**11/04/2022**	**12/04/2022**	**13/04/2022**	**All dates**
Number of dwellings audited	**115**	**84**	**165**	**364**
Cardboard	7.04	26.24	52.18	85.46
Paper	0.00	16.56	16.32	32.88
Paper- LPB - NON CDS	0.70	0.86	2.80	4.36
Paper- LPB - CDS	0.22	0.26	1.86	2.34
Composite (mostly paper)	1.40	4.78	5.28	11.46
Food organics – unpackaged / loose	141.34	128.20	274.60	544.14
Food organics – containerised / packaged	63.92	114.00	184.20	362.12
Garden organics	11.42	20.30	12.84	44.56
Other putrescible *Domestic animal waste	53.30	42.88	136.26	232.44
Paper – contaminated	42.28	39.20	103.32	184.80
Option compostable containers	0.02	0.36	3.40	3.78
Timber	6.12	1.20	9.86	17.18
Textiles – clothing, shopping bags	33.38	54.94	69.06	157.38
Leather / rubber – footwear	3.34	7.60	6.26	17.20
Glass – CDS	0.42	2.42	21.86	24.70
Glass – NON CDS	4.70	10.48	18.08	33.26
Glass – wine and Spirit	0.68	11.16	16.76	28.60
Glass – containers (fines) / plate / non-pack	1.52	2.64	3.64	7.80
PET CDS containers	0.38	2.86	6.24	9.48
HDPE CDS containers	0.04	0.40	0.34	0.78
P1, P2, P3, P4, P5 packaging	13.28	16.88	38.80	68.96
P5 LDPE film	31.52	24.38	68.90	124.80
P6 EPS containers / transport packaging	0.70	0.00	2.18	2.88
P7 Other plastic	3.50	19.16	14.02	36.68
Composite mostly plastic	2.42	7.52	5.48	15.42
Single-use plastic (SUP) cutlery/stirrers	0.02	0.00	0.00	0.02
SUP Straws	0.00	0.00	0.00	0.00
SUP takeaway containers	1.12	0.86	3.62	5.60
SUP takeaway container lids	0.34	0.48	1.80	2.62
SUP Balloons	0.00	0.00	0.14	0.14
SUP Balloon sticks	0.00	0.00	0.00	0.00
Barrier bags (fresh/veggie/deli/butcher)	0.88	0.38	1.74	3.00
Shopping bags <5 microns (not garbage bags)	0.90	0.92	3.98	5.80
Shopping bags – over 35 microns	2.18	3.50	9.16	14.84
Plastic – other	0.00	0.00	2.46	2.46
Steel cans – CDS	0.00	0.00	0.00	0.00
Steel - packaging non-beverage	4.46	4.06	14.58	23.10
Steel – non-packaging	0.98	3.06	11.56	15.60
Steel – composite (mostly ferrous)	0.00	0.00	0.42	0.42
Aluminium cans – CDS	0.36	1.64	6.06	8.06
Aluminium – packaging non-beverage	0.78	0.90	2.24	3.92
Aluminium – non-packaging	0.92	0.64	4.34	5.90

Dwelling waste collection type	MGBs weekly	MGBs & hoppers weekly	Hoppers weekly	Total MUDs
Date	**11/04/2022**	**12/04/2022**	**13/04/2022**	**All dates**
Aluminium – Composite	0.00	0.00	0.00	0.00
Paint, resins, inks, organic sludges	0.00	0.00	0.00	0.00
Asbestos	0.00	0.00	0.00	0.00
Solar Panels	0.00	0.00	0.00	0.00
Batteries – household	0.50	0.58	0.38	1.46
Batteries – used lead acid	0.00	0.00	0.00	0.00
Gas bottles	0.00	0.00	0.00	0.00
Fluorescent tubes / bulbs	0.08	0.04	0.00	0.12
Chemicals	0.00	0.00	0.00	0.00
Clinical/pharmaceuticals/cotton buds	0.16	0.04	0.62	0.82
Oil – motor / cooking	0.00	0.00	0.00	0.00
Smoke detector	0.00	0.00	0.00	0.00
Concrete/bricks/tiles/ceramics/plasterboard	31.14	237.08	2.10	270.32
Soil /dirt/dust	1.44	4.10	1.94	7.48
Mobile Phones	0.00	0.00	0.00	0.00
TVs / computers/peripherals	0.00	7.28	9.96	17.24
Toner cartridges	0.00	0.02	0.10	0.12
Other with cord or battery	5.14	13.62	6.72	25.48
Other specify	0.00	14.54	5.72	20.26
Nappies / hygiene products	0.00	35.40	91.82	127.22
Bagged waste in recycling	0.00	0.00	0.00	
Bagged recycling in recycling	0.00	0.00	0.00	
Total	**475.04**	**884.42**	**1,256.00**	**2,615.47**
Average amount (kg/household/week)	**4.13**	**10.53**	**7.61**	**7.19**

Table 31: Commingled recycling single dwellings– detailed composition

Date	4/04/2022	5/04/2022	6/04/2022	7/04/2022	8/04/2022	Total SDs
Number of dwellings audited	70	70	70	70	70	350
Cardboard	121.36	109.80	117.00	108.84	107.36	564.36
Paper	102.10	102.98	65.68	77.92	71.18	419.86
Paper- LPB - NON CDS	3.58	3.64	5.10	3.78	3.68	19.78
Paper- LPB - CDS	0.10	0.60	0.16	0.06	0.14	1.06
Composite (mostly paper)	0.06	1.26	1.68	0.22	0.52	3.74
Food organics – unpackaged / loose	0.24	0.18	0.02	0.22	0.78	1.44
Food organics - containerised / packaged	2.14	6.16	0.78	7.60	0.76	17.44
Garden organics	0.00	8.14	0.32	0.18	0.02	8.66
Other putrescible *Domestic animal waste	0.00	0.00	0.00	0.00	0.00	0.00
Paper – contaminated	3.00	2.32	3.96	6.34	4.48	20.10
Option compostable containers	0.00	0.02	0.04	0.10	0.10	0.26
Timber	0.00	0.12	5.22	0.00	0.42	5.76
Textiles – clothing, shopping bags	2.14	7.50	0.00	3.78	1.04	14.46
Leather / rubber – footwear	0.00	0.00	0.00	0.00	0.24	0.24
Glass – CDS	17.38	27.56	22.44	17.60	38.66	123.64
Glass – NON CDS	38.46	35.86	39.08	32.44	37.62	183.46
Glass – wine and Spirit	98.68	91.24	65.92	29.26	111.84	396.94
Glass – containers (fines) / plate / non-pack	17.60	30.18	21.68	9.96	19.44	98.86
PET CDS containers	4.86	4.44	4.66	3.60	4.98	22.54
HDPE CDS containers	0.14	0.10	0.34	0.04	0.40	1.02
P1, P2, P3, P4, P5 - packaging	39.66	47.26	43.98	41.90	38.50	211.30
P5 LDPE film	3.32	3.30	1.82	5.28	1.46	15.18
P6 EPS containers / transport packaging	0.56	0.18	0.08	0.62	0.06	1.50
P7 Other plastic	0.52	3.78	0.00	0.00	0.00	4.30
Composite mostly plastic	0.02	0.00	0.12	0.10	0.00	0.24
Single-use plastic (SUP) cutlery/stirrers	0.04	0.02	0.02	0.00	0.06	0.14
SUP straws	0.02	0.02	0.02	0.02	0.00	0.08
SUP takeaway containers	0.44	0.62	0.78	1.02	0.64	3.50
SUP takeaway container lids	0.22	0.40	0.54	0.42	0.38	1.96
SUP balloons	0.00	0.00	0.02	0.00	0.00	0.02
SUP balloon sticks	0.00	0.00	0.00	0.00	0.00	0.00
Barrier bags (fresh/vege/deli/butcher)	0.02	0.02	0.02	0.02	0.02	0.10
Shopping bags <5 microns (not garbage bags)	0.02	0.02	0.02	0.06	0.02	0.14
Shopping bags – over 35 microns	0.34	0.02	0.18	0.40	0.02	0.96
Plastic – other	0.00	0.00	2.00	2.28	2.64	6.92
Steel cans- CDS	0.00	0.00	0.00	0.12	0.18	0.30
Steel - packaging non-beverage	12.16	15.00	0.00	14.60	14.98	56.74
Steel – non-packaging	0.48	1.04	4.14	0.30	0.38	6.34
Steel –composite (mostly ferrous)	0.72	1.60	1.06	0.52	0.96	4.86
Aluminium cans - CDS	1.98	2.86	1.22	1.62	2.04	9.72
Aluminium - packaging non-beverage	0.52	0.54	0.14	0.58	0.36	2.14
Aluminium – non-packaging	0.26	0.60	0.00	0.56	0.26	1.68
Aluminium – Composite	0.00	0.00	0.00	0.00	1.38	1.38
Paint, resins, inks, organic sludges	0.00	0.00	0.00	0.00	0.00	0.00

Date	4/04/2022	5/04/2022	6/04/2022	7/04/2022	8/04/2022	Total SDs
Number of dwellings audited	70	70	70	70	70	350
Asbestos	0.00	0.00	0.00	0.00	0.00	0.00
Solar Panels	0.00	0.00	0.00	0.00	0.00	0.00
Batteries – household	0.00	0.12	0.00	0.02	0.00	0.14
Batteries – used lead acid	0.00	0.00	0.00	0.00	0.00	0.00
Gas bottles	0.00	0.00	0.00	0.00	0.00	0.00
Fluorescent tubes / bulbs	0.00	0.00	0.10	0.10	0.00	0.20
Chemicals	0.00	0.00	0.00	0.00	0.00	0.00
Clinical/pharmaceuticals/cotton buds	0.02	0.00	0.00	0.02	0.00	0.04
Oil – motor / cooking	0.00	0.00	0.00	0.00	0.00	0.00
Smoke detector	0.00	0.00	0.00	0.00	0.00	0.00
Concrete/bricks/tiles/ceramics/plasterboard	0.04	6.84	2.04	1.02	0.36	10.30
Soil /dirt/dust	0.00	0.00	0.00	0.00	0.00	0.00
Mobile phones	0.00	0.00	0.00	0.00	0.00	0.00
TVs / computers/peripherals	0.00	0.56	0.00	0.00	0.00	0.56
Toner cartridges	0.00	0.00	0.00	0.00	0.00	0.00
Other with cord or battery	1.26	0.00	0.00	0.40	0.20	1.86
Other specify	0.00	0.78	0.46	2.34	0.10	3.68
Nappies / hygiene products	0.00	0.00	0.76	0.16	0.00	0.92
Bagged waste in recycling	2.72	9.90	6.38	44.32	21.30	84.62
Bagged recycling in recycling	0.00	1.94	2.64	3.22	3.10	10.90
Total	**477.18**	**529.52**	**422.62**	**423.96**	**493.06**	**2,346.34**
Average amount (kg / household / week)	**3.41**	**3.78**	**3.02**	**3.03**	**3.52**	**3.35**

Table 32: Commingled recycling multi-unit dwellings – detailed composition

Dwelling waste collection type	MGBs fortnightly	MGBs & hoppers fortnightly	Hoppers weekly	Total MUDs (transformed to weekly basis)
Date	11/04/2022	12/04/2022	13/04/2022	
Number of dwellings audited	115	84	165	364
Cardboard	77.36	64.88	87.62	158.74
Paper	56.28	36.44	34.34	80.70
Paper- LPB - NON CDS	2.76	2.64	1.38	4.08
Paper- LPB - CDS	0.02	0.32	0.06	0.23
Composite (mostly paper)	0.24	0.12	0.22	0.40
Food organics – unpackaged / loose	0.46	0.36	0.18	0.59
Food organics - containerised / packaged	5.96	3.24	13.44	18.04
Garden organics	0.00	0.00	2.86	2.86
Other putrescible *Domestic animal waste	0.00	0.00	0.00	0.00
Paper – contaminated	12.82	1.18	9.56	16.56
Option compostable containers	0.00	0.02	0.56	0.57
Timber	0.00	0.00	0.00	0.00
Textiles – clothing, shopping bags	4.84	1.12	0.06	3.04
Leather / rubber – footwear	0.12	0.00	1.08	1.14
Glass – CDS	32.24	19.46	13.16	39.01
Glass – non-CDS	25.24	16.82	13.94	34.97
Glass – wine and spirit	98.68	31.38	35.94	100.97
Glass – containers (fines) /plate/non-pack	23.32	10.74	6.54	23.57
PET CDS containers	6.46	0.00	9.02	12.25
HDPE CDS containers	0.42	0.54	0.18	0.66
P1, P2, P3, P4, P5 – packaging	25.84	25.42	17.52	43.15
P5 LDPE film	3.11	0.66	1.76	3.65
P6 EPS containers/transport packaging	0.40	0.12	0.00	0.26
P7 Other plastic	0.00	0.00	0.00	0.00
Composite mostly plastic	0.22	0.00	9.64	9.75
Single-use plastic (SUP) cutlery/stirrers	0.02	0.00	0.00	0.01
SUP straws	0.00	0.00	0.00	0.00
SUP takeaway containers	0.30	0.44	0.54	0.91
SUP takeaway container lids	0.14	0.12	0.22	0.35
SUP balloons	0.00	0.00	0.00	0.00
SUP balloon sticks	0.00	0.00	0.00	0.00
Barrier bags (fresh/veggie/deli/butcher)	0.02	0.00	0.00	0.01
Shopping bags <5 microns (not garbage bags)	0.10	0.00	0.04	0.09
Shopping bags – over 35 microns	0.06	0.02	0.08	0.12
Plastic – other	6.58	3.62	1.48	6.58
Steel cans - CDS	0.00	0.00	0.14	0.14
Steel – packaging non-beverage	12.20	7.12	5.34	15.00
Steel – non-packaging	0.00	0.00	3.08	3.08
Steel – composite (mostly ferrous)	0.00	2.16	0.84	1.92
Aluminium cans - CDS	2.38	2.06	1.92	4.14
Aluminium - packaging non-beverage	0.06	0.70	0.28	0.66
Aluminium – non-packaging	0.10	0.04	0.06	0.13

Dwelling waste collection type	MGBs fortnightly	MGBs & hoppers fortnightly	Hoppers weekly	Total MUDs (transformed to weekly basis)
Date	**11/04/2022**	**12/04/2022**	**13/04/2022**	
Aluminium – Composite	0.00	0.00	0.00	0.00
Paint, resins, inks, organic sludges	0.00	0.00	0.00	0.00
Asbestos	0.00	0.00	0.00	0.00
Solar Panels	0.00	0.00	0.00	0.00
Batteries – household	0.00	0.00	0.00	0.00
Batteries – used lead acid	0.00	0.00	0.00	0.00
Gas bottles	0.00	0.00	0.00	0.00
Fluorescent tubes / bulbs	0.00	0.00	0.00	0.00
Chemicals	0.00	0.00	0.00	0.00
Clinical/pharmaceuticals/cotton buds	0.08	0.00	0.00	0.04
Oil – motor / cooking	0.00	0.00	0.00	0.00
Smoke detector	0.00	0.00	0.00	0.00
Concrete/bricks/tiles/ceramics/plasterboard	1.52	0.74	2.00	3.13
Soil /dirt/dust	0.00	0.00	0.00	0.00
Mobile phones	0.00	0.00	0.00	0.00
TVs / computers/peripherals	0.00	0.60	0.00	0.30
Toner cartridges	0.00	0.00	0.00	0.00
Other with cord or battery	0.00	0.34	0.44	0.61
Other specify	0.86	2.10	1.14	2.62
Nappies / hygiene products	0.00	0.00	0.00	0.00
Bagged waste in recycling	63.10	7.44	26.08	61.35
Bagged recycling in recycling	0.00	1.32	8.48	9.14
Total	**464.31**	**244.28**	**311.22**	**665.52**
Average amount (kg / household / week)	**2.02**	**1.45**	**1.89**	**1.83**

Table 33: Plastic bags in the waste stream – detailed composition

	Recycling FOGO trial SDs count/hhld/week	Recycling Baseline SDs Count/hhld/week	Recycling total SDs	GW FOGO trial SDs count/hhld/week	GW Baseline SDs Count/hhld/week	GW total SDs
Barrier bags (fresh/vege/deli/butcher)	0.01	0.03	0.02	0.96	1.60	1.47
Shopping bags <5 microns (not garbage bags)	0.04	0.02	0.02	0.35	0.73	0.66
Shopping bags – over 35 microns	0.06	0.04	0.04	0.65	0.90	0.85
Total	**0.11**	**0.08**	**0.09**	**1.96**	**3.23**	**2.97**

Table 34: SUP in the waste stream – detailed composition

	Recycling FOGO trial SDs count/hhld/week	Recycling Baseline SDs Count/hhld/week	Recycling total SDs	GW FOGO trial SDs count/hhld/week	GW Baseline SDs Count/hhld/week	GW total SDs
Single Use Plastic (SUP) cutlery/stirrers	0.00	0.03	0.02	0.01	0.14	0.12
SUP Straws	0.01	0.04	0.03	0.02	0.01	0.02
SUP takeaway containers	0.49	0.29	0.33	0.34	0.83	0.73
SUP takeaway container lids	0.54	0.52	0.52	0.63	1.02	0.94
SUP Balloons	0.00	0.00	0.00	0.00	0.09	0.07
SUP Balloon sticks	0.00	0.00	0.00	0.00	0.00	0.00

Table 35: Hazardous materials in the waste stream – detailed composition

	Recycling FOGO trial SDs count/hhld/week	Recycling Baseline SDs Count/hhld/ week	Recycling total SDs	GW FOGO trial SDs count/hhld/week	GW Baseline SDs Count/hhld/ week	GW total SDs
Paint, resins, inks, organic sludges	0.000	0.000	0.000	0.01	0.05	0.05
Batteries – household	0.021	0.011	0.013	0.17	0.30	0.28
Fluorescent tubes / bulbs	0.029	0.002	0.007	0.00	0.04	0.03
Clinical/pharmaceuticals/cotton buds	0.007	0.002	0.003	0.89	0.74	0.77
TVs / computers/peripherals	0.000	0.002	0.001	0.01	0.00	0.00
Toner cartridges	0.000	0.000	0.000	0.00	0.04	0.03
Other with cord or battery	0.000	0.004	0.003	0.11	0.26	0.23
Total	**0.06**	**0.02**	**0.03**	**1.20**	**1.43**	**1.39**