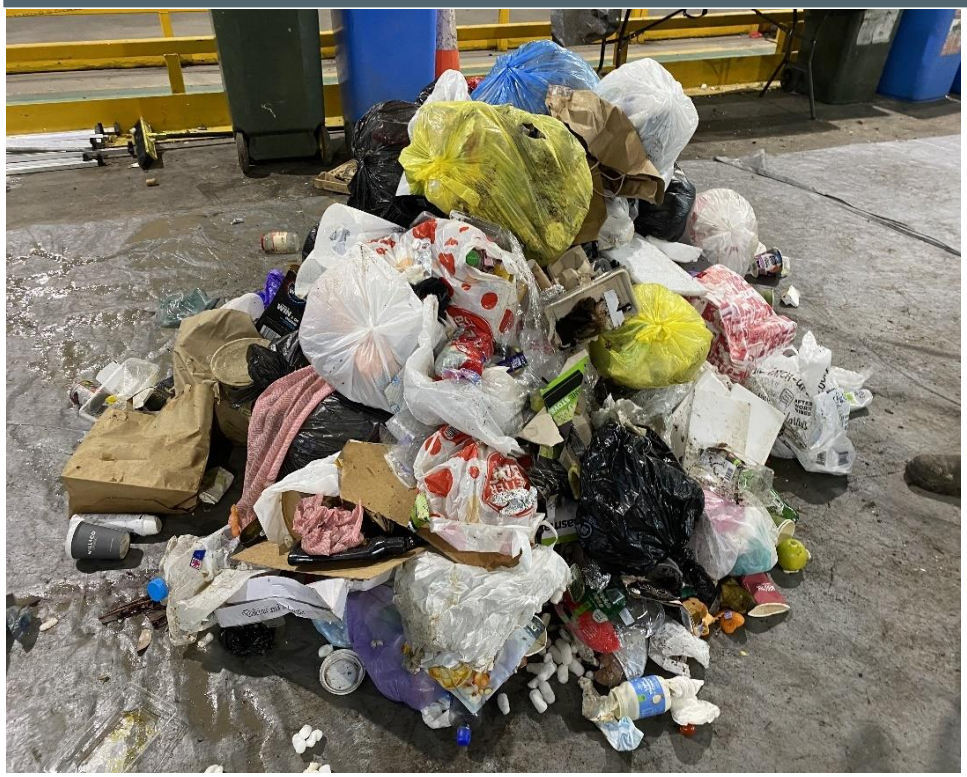
2023

SSROC Kerbside Waste Audit
Regional Report
including all participating councils



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EXECUTIVE SUMMARY

APC Waste Consultants (APC) conducted a regional kerbside domestic waste audit of 11 member councils of the Southern Sydney Regional Organisation of Councils (SSROC) between February and June 2023.

The 2023 audit was based on the *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008* and *Addendum 2010*. Samples were selected from both single dwellings (SUDs) and multi-unit dwellings (MUDs) in proportion to housing stock to provide a representative sample of each dwelling type in each council.

The participating councils' domestic waste stream was audited — general waste, recycling, garden organics and food and garden organics (FOGO), if a FOGO collection service was offered. As only two councils offer a FOGO service, calculation of a regional average excludes the food organics in these bins to ensure a consistent comparison across the region. Actual FOGO data can be obtained from the individual council reports. Bin configurations of two, three and four streams were audited.

This was the eighth (8th) regional audit for the SSROC over a 24-year period, providing the most comprehensive longitudinal data set available in Australia.

In total 8,235 bins were audited, representing 2,635 households and amounting to 46 tonnes of material. This comprised 21,319 kg of general waste, 14,043 kg of commingled recycling, 8,266 kg of garden organics and 2,727 kg of FOGO which were collected and delivered for sorting. One hundred and fifty-seven (157) individual loads were collected in an aggregated manner and sorted into 73 categories.

A separate count of beverage containers eligible under the NSW Container Deposit Scheme was undertaken, as well as wine and spirit bottles. In total 11,445 eligible containers and 3,899 wine/spirit bottles were counted. Individual hazardous items were also counted with 1,366 individual hazardous items presented.

Each council has been provided a report detailing its individual results. This report summarises the findings for the SSROC region, outlining individual council results against the regional average. Findings from previous regional audits have been used as a basis for longitudinal comparison.

The key findings of the 2023 audit, as well as trends, are summarised below.

About the audit

- An audit of kerbside domestic waste in 11 SSROC councils was undertaken from February to June 2023.
- This is the 8th regional waste audit for the Southern Sydney Regional Organisation of Councils (SSROC), providing a comprehensive longitudinal waste data set.
- General waste, commingled recycling and organics bins, representing 2,444 households, were collected and sorted into 73 waste categories.
- In total, 46 tonnes of waste were sorted comprising 21,319 kg of general waste, 14,043 kg of commingled recycling, 8,266 kg of garden organics and 2,727 kg of FOGO.
- A sub-sort of used beverage containers accepted under the NSW Container Deposit Scheme was also undertaken by count and weight. Textiles were also assessed by type, weight and count.
- Calorific assessment of general waste was undertaken by moisture-testing representative samples.
- The audit included single dwellings (SUDs) and multi-unit dwellings (MUDs) in proportion to the housing stock of the council areas as defined by the Australian Bureau of Statistics.

Bin presentation rates

- 97% of SUDs and 100% of MUD households presented a general waste bin for collection.
- 98% of SUDs and 99% of MUD households presented a commingled recycling bin for collection.
- 57% of SUDs and 48% of MUD households presented a garden organics bin for collection.
- In councils with separate paper/cardboard and container recycling bins, presentation rates were 100% for SUD containers and 87% for SUD paper/cardboard. MUDs present 100% for both bin types.
- In councils with FOGO service, SUDs and MUDs presented 88% and 89% of the bins, respectively.

Total waste and recycling

- The average SSROC household generated a total of 14.1 kg of general waste, commingled recycling and garden organics per week.
- The average single dwelling produced 47% more waste than the average multi-unit dwelling: 18.8 kg per week for SUDs and 10.0 kg per week for MUDs.
- Each SUD household generated more of each waste stream per week than each MUD household, i.e. 32% more general waste, 38% more recycling and 83% more garden organics.

General waste generation

- The average SSROC household produced 8.1 kg of general waste per household per week.
- Generation ranged from 5.3 kg to 11.2 kg per household per week.
- SUDs produced one-third more general waste per week (9.8 kg) than MUDs (6.7 kg).
- The largest difference in generation between the housing types is loose food waste. SUDs generated 41% more food waste at 3.2 kg per household per week compared to 1.9 kg at MUDs.

General waste composition

- The largest individual category is loose food waste at 30.6%, followed by other organics (14.4%), containerised food and liquid (12.0%), soft plastic film (7.4%), and nappies/hygiene (6.9%).
- 11.6% of general waste is material that should be in the recycling bins. This material comprises recyclable containers (7.3%) and recyclable paper/cardboard (4.3%).
- 2.5% of garden organics in the general waste stream are available for recovery.
- 1.2% of general waste is items that should diverted to e-waste or hazardous waste services provided. By weight, these items are mainly electrical items and peripherals and paint. E-waste was 0.9% of general waste and hazardous waste accounted for a low 0.3%.
- Up to 43% of general waste bin consists of loose food (30.6%) and containerised food and liquid (12%), if decanted, this could be diverted to a food and garden organics (FOGO) service.
- 86% of general waste is presented in bags.

General waste bin usage

- SUDs used an average of 74% of their general waste bin. MUDs averaged 81%.
- At SUDs, 35% of general waste bins are full or overflowing.
- At MUDs, 53% of presented general waste bins are full or overflowing.

Commingled recycling generation

- The average SSROC household produced 3.3 kg of commingled recycling per week.
- SUDs produced 4.2 kg per week; MUDs produced 2.6 kg a week.
- The generation ranged from 2.3 kg to 4.6 kg per household per week.

Commingled recycling composition

- The main components in the recycling stream were recyclable paper (42.5%) and recyclable containers (37.7%).
- Contaminants in the commingled recycling make up 19.7%, of which the largest proportion of single material was bagged material (4.7%) and contaminated paper (4.6%). All bagged material is considered contamination as it cannot be opened or separated at the MRF, regardless of whether the bagged material contents is recyclable or not.
- The next highest percentage of contaminants were other plastics and textile/carpet (both at 1.2%), composite materials, which were mostly paper, containerised food and liquid and plastic film (all at 0.9%).
- Recycling contamination ranged from 12.5% to 35.2%.
- MUDs had a higher proportion of contamination in the recycling (22.1%) than SUDs (18.7%).
- In terms of the level of contamination, however, both housing types generated comparable proportion of loose materials per household per week, while MUDs recorded almost twice as much bagged materials as SUDs.
- Bagged garbage/ recycling, contaminated paper, other plastics and textile/carpet were in the top four contaminants at both SUDs and MUDs, with the proportion of contaminated paper and textile/carpet higher at SUDs than MUDs. Bagged garbage/recyclables and other plastics were in greater proportion at MUDs compared with SUDs.

Commingled recycling bin usage

- SUDs used an average of 75% of their commingled recycling bin and MUDs used 82%.
- At SUDs, 35% of commingled bins were full or overflowing.
- At MUDs, 54% of presented commingled bins were full or overflowing.

Garden organics generation

- The average SSROC household produced 2.7 kg per week of garden organics.
- The majority of this was from SUDs at 4.8 kg, with MUDs generating 0.8 kg per household per week.
- Generation ranged from 0.3 kg to 7.3 kg per household per week.

Garden organics composition

- The majority of the organics stream was vegetation (96.2%).
- Contamination in the garden organics stream was reasonably low, at 3.8%.
- Contamination ranged from 0.1% to 9.1% for most councils, with one garden organics bin filled up with ceramics, dirt, dust, rock and inert materials increasing one council's result to 42.1%.
- Bagged material was present in six (6) councils ranging from 0.2% to 1.3%.
- The main contaminant was wood/timber, followed by ceramics, dirt, dust, rock, inert materials, bagged garbage, contaminated paper and cardboard.
- The contamination in the garden organics stream was higher at MUDs (7.1%) than at SUDs (3.9%).

Garden organics bin usage

- SUDs used an average of 61% and MUDs an average of 65% of their organics bin capacity.
- 24% of SUD organics bins were full or overflowing while 32% of MUD presented organics bins were full or overflowing.

E-waste and hazardous materials, including batteries

- On average, 0.47 e-waste and hazardous items were produced per household per week.
- The majority (82%) of e-waste and hazardous items were found in the general waste bins, with 18% in the recycling and none in the garden organics bins.
- The most common e-waste items found were electrical items/peripherals and non-rechargeable batteries. A smaller amount of rechargeable batteries, computer equipment, toner cartridges, power tool batteries, other batteries and mobile phones were also found. A small amount of hazardous materials were found including clinical (medical) waste, paint, other hazardous items, fluorescent tubes, household chemicals, and asbestos.
- The number of e-waste and hazardous items per household per week ranged from 0.1 item to 1.0 item.

Textile generation and composition

- Overall, a SSROC household generated 0.36 kg of textiles per week.
- SUDs generated more textiles at 0.38 kg per household per week compared with MUDs at 0.36 kg per household per week.
- By weight, most of the material generated was unwearable clothing at 23%, followed by other textiles at 20%, linens and towelling at 19%, wearable clothing at 14% and shoes at 12%.
- By count, an average of 310 items were counted per week for each council, dominated by unwearable clothing (42%), wearable clothing (18%), shoes (13%), other textiles (12%) and linens and towelling (10%).
- Weekly textile generation ranged from 0.18 kg to 0.64 kg per household.

Recovery of recyclable materials

- The overall recovery rate is 82%.
- SUDs achieved 86% and MUDs 73% recovery of materials.
- Paper and glass were well recovered, particularly at SUDs, with a more than 85% recovery rate.
- Vegetation was the best recovered at both housing types: 93% and 90% recovery at SUDs and MUDs, respectively.
- Plastic, steel and aluminium were not as well recovered, with recovery rates of less than 54% at both housing types.

Diversion from landfill

- Diversion from landfill from SSROC's municipal waste and recycling was 37%. This comprised 19% diversion achieved from the commingled recycling and 18% from garden organics recycling. Since the audit involves kerbside waste produced by households only, it is not able to quantify additional diversion of food waste when councils opt to process general waste via a Mechanical Biological Treatment (MBT) facility after collection.
- SUDs achieved 43% diversion and MUDs 26%.
- If all commingled recycling material and garden organics were put into the designated bins, theoretically an extra 8.6% diversion (7.1% recycling and 1.5% garden organics) would be achieved, lifting overall diversion to 46%.
- Replacement of the garden organics bin with a FOGO bin for food waste (loose and containerised) and optimum utilisation of alternative disposal pathways for acceptable items such as e-waste, hazardous waste and clean clothing/textiles could theoretically contribute to a further 29% diversion, raising the maximum potential diversion to 75%.

Calorific value of general waste stream

- The general waste generated by the average SSROC household has a calorific value (CV) of between 9 (wet) and 19 (dry) megajoules per kilogram. This equates to a CV of between 75 and 156 megajoules per household per week.
- The calorific value of the total general waste generated by all households in SSROC each year is estimated at a maximum of 5,184 terajoules per year (this is the upper, or dry, value). Theoretically, this is enough energy to supply electricity to approximately 279,802 homes for one year, which is approximately 44% of the households in SSROC, based on an average household usage of 14.1 kWh per day.
- The main contributors to CV in SSROC's general waste are kitchen organics (vegetables), other waste, mixed paper, plastic film and disposable nappies.

Beverage containers in the kerbside bins

- The average SSROC household puts 3.7 CDS-eligible containers into the kerbside bins each week.
- The average SSROC household puts 2.1 CDS-eligible containers per week into the recycling bin and 1.6 CDS-eligible containers per week into the general waste bin.
- Single dwellings averaged 4.5 containers per week (2.8 in the recycling and 1.7 in the general waste).
- Multi-unit dwellings averaged 3.1 containers per week (1.5 in the recycling and 1.6 in the general waste).
- Single dwellings generated more eligible containers per week than multi-unit dwellings in most councils, except for one council, where MUDs generated more eligible containers, and two councils, where comparable numbers of CDS-eligible containers were found in their kerbside bins for both housing types.
- Two councils had more CDS-eligible containers in the general waste stream than in the recycling.
- The average SSROC household puts 1.0 wine/spirit bottle per week into the domestic bins. Almost all of these are in the recycling bins. SUDs averaged 1.3 wine/spirit bottles per week and MUDs 0.8 bottles per week.

Trends

- Overall domestic waste generation is lower in 2023 than in previous audit years, with a steady decline in all waste streams from 2015.
- For general waste, the time series shows a general reduction in the amount of garden organics, food, recyclable material and other waste. In contrast, the amount of containerised food and liquid, non-recyclable paper and soft plastics has increased over the years. Of note, the quantity of general waste decreased in the last two audits. This trend is more prevalent at SUDs. The proportion of garden organics and food has also reduced over time since 2005.
- The overall weekly generation of commingled recycling is in a declining trend since 2011 but with only a slight decrease in 2023, which is more prevalent at SUDs. Recyclable paper has generally reduced over time at both housing types, except in the last two audits at MUDs where an increase was recorded. The generation of recyclable containers in the recycling stream decreased at SUDs since 2015, which in part coincides with the introduction of the Container Deposit Scheme in 2017. The decrease was not sustained at MUDs, however, with an increase in recyclable containers in 2023 compared with the 2019 level, which can be due to limited participation in waste drop-off events and access to CRCs.
- The proportion of total contamination (loose contamination and bagged material) has increased since 2011 but slightly decreased in 2023 by 1%. Bagged material consistently increased over the time series. This trend is more prevalent at MUDs.
- Generation of garden organics has fluctuated over time for both housing types. Contamination in the garden organics stream remained consistently low over time.
- Electrical items and batteries are consistently the most common household e-waste/hazardous items. The proportion of both items fluctuated over the years, with an increase in electrical items and a decrease in batteries in the last two audits.
- The overall recovery rates have been comparable over the years. Glass, paper and cardboard continued to be well recovered. Recovery of garden organics has been consistently high throughout the time series, with significant improvement in the last two audits. Aluminium cans and steel were the least recovered item.
- Landfill diversion from SSROC's municipal waste is declining, with a slight fluctuation, and remained the same in the last two audits. The potential diversion has also decreased as the amount of food waste, recyclable materials and garden organics available for recovery has declined over time.

Discussion of key findings

- The general waste stream contains 11.6% of materials that should be in recycling bins and 2.5% garden organics. An ongoing community-wide education campaign could assist with diverting these materials to the recycling and garden organic streams, to lift both recovery and diversion rates. Materials to target include recyclable paper and cardboard, plastic, glass and metals.
- 1.2% of general waste were items that should be diverted to e-waste or hazardous waste services. Continued education for correct disposal of household e-waste and hazardous waste may assist in removing these from the general waste stream.
- At 31% of general waste, food waste is SSROC's single largest opportunity for increasing landfill diversion. Options for organics diversion from landfill are through a combined food and garden organics (FOGO) or food only (FO) service and/or encouraging initiatives such as avoiding food waste, home composting and/or worm farming. An additional 12% is containerised food and liquid which can be decanted from packaging. Maximum recovery of food waste could theoretically raise diversion by a further 25%.
- Contamination in the commingled recycling stream has continued to increase although it slightly decreased in this year's audit, particularly at MUDs. The 'top four' contaminants listed in this report include: bagged material, contaminated paper, textile/carpet and other plastics.
- With an average 3.7 CDS-eligible containers presented in the general and recycling waste streams, this represents an estimated annual value of $12,295,483.
- The findings of this audit indicate that SSROC will not meet the new state government recovery target of 80% based on current kerbside services, including FOGO.
- There is good potential for energy recovery from general waste with a maximum of 5,184 terajoules likely to be generated.

1. INTRODUCTION

1.1 The SSROC Region

The Southern Sydney Regional Organisation of Councils (SSROC) represents 12 councils in the Southern Sydney metropolitan area, with approximately 1.9 million residents. The region is characterised by high population density (2,548 persons km^2) with cultural and socio-economic diversity.

SSROC engaged APC Waste Consultants (APC) to conduct regional waste audits of general waste, recycling, garden organics or FOGO streams for member councils. Previous audits undertaken by APC include 1999, 2001, 2005, 2008, 2011, 2015 and 2019. The 2023 regional audit is the eighth (8th) in the series and builds on the most comprehensive longitudinal study of domestic waste arisings in Australia, spanning 24 years. Eleven councils have participated in the 2023 regional waste audit.

1.2 The project

SSROC awarded APC Waste Consultants (APC) a contract to conduct domestic waste audits of 11 of its member councils. The agreed methodology for the domestic waste audits is the *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008* including the audit *Guidelines Addendum 2010.*

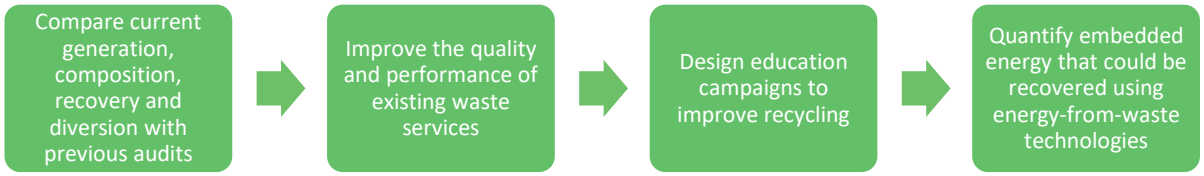
Additional auditing was undertaken for hazardous items, beverage containers and textiles.

The project also requires reporting on calorific values of eligible material as specified under the Commonwealth's Office of Renewable Energy Regulator (ORER) *Guideline for Determining the Renewable Components in Waste for Electricity Generation* (2001).

1.3 Project objectives

The audit aims to establish the following information:

SSROC can use the audit results to:



1.4 Current collection systems

Table 1 (single dwellings) show the details of the general waste, recycling, and garden organics collection systems in place at single dwellings in participating councils. Most of the councils offer general waste collection service on a weekly basis while recyclables and garden organics are usually collected fortnightly.

Table 1 SSROC waste collection systems: single dwellings

Council	General waste		Recyclables		Garden organics	
	Bin size	Frequency	Bin size	Frequency	Bin size	Frequency
Eight councils	120L/240L	Weekly	140L/240L	Fortnightly	140L/240L	Fortnightly
One council	50 L/70 L/ 80 L/ 120 L/240 L	Weekly	50 L/70 L/80 L/ 120 L/240 L	Weekly	120 L/240 L	Fortnightly
One council	240 L/140 L	Fortnightly	240 L	Fortnightly	240 L	Weekly
One council	120L	Weekly	240L	Weekly	240 L	Weekly

For multi-unit dwellings, most of the councils have either a combination of weekly/twice-weekly/bi-weekly general waste collection, weekly recycling connection and fortnightly garden organics collection or a weekly general waste and fortnightly recycling and garden organics collection services as shown in Table 2. The bins are usually shared among unit owners.

Table 2 SSROC waste collection systems: multi-unit dwellings

Council	General waste		Recyclables		Garden organics	
	Bin size	Frequency	Bin size	Frequency	Bin size	Frequency
Five councils	80L/120L/ 240L/660L/ 1100L	Weekly/ twice weekly/ bi-weekly	80 L/120L/ 240 L/660L/ 1100L	Weekly	120L/240L/ 660L/ 1100L	Fortnightly
Four councils	120L/240L	Weekly	240L	Fortnightly	120L/240L	Fortnightly
One council	240L	Weekly	240 L	Fortnightly	240 L	Weekly
One council	240L	Weekly	240L	Weekly	240L	Weekly

1.5 Previous waste audits

APC has conducted multiple previous kerbside waste audits for SSROC and member councils. The number of households sampled in each of the audits is shown in Table 3 below.

Table 3 Sample numbers in previous audits

	1999	2001	2005	2008	2011	2015	2019	2023	Total
Region	**2,366**	**1,888**	**1,677**	**3,824**	**4,115**	**3,427**	**2,926**	**2,635**	**22,858**

The table above is provided for historical information. Some of the previous audit data has been used for historical trend analysis later in this report.

1.6 Reporting

This report shows the method used and results for all councils that participated in the 2023 audit. The standard unit of measurement for reporting is usually by weight presented as generation and composition. Charts are generally based on consolidated categories while tables list details of individual material categories.

Each council has also received an individual report detailing their individual results, comparisons with previous audits and recommendations. The results from 2023 have been compared with previous audit data for the region as a whole.

2. METHODOLOGY

2.1 Overview of the audit methodology

A summary of how this audit was conducted is presented in this section. The detailed methodology can be found in Appendix D.

The methodology for the kerbside waste audits, is based on the *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008,* including the audit *Guideline Addendum 2010.*

Two sub-audits occurred by both count and weight, including:

- eligible CDS containers (list provided in Appendix F) based on the NSW EPA and Exchange for Change sampling protocol.
- textile-based categories and classifications as agreed with SSROC.

Calorific assessment of general waste was conducted based on the Commonwealth's Office of Renewable Energy (ORER) *Guideline for Determining the Renewable Components in Waste for Electricity Generation* (2001)[1]. The calorific calculations are provided in section 3 and Appendix H.

It was agreed that an aggregated collection methodology would be followed, as had occurred in both 2019 and 2015. All SSROC councils were analysed based on the Visy Material Recycling Facility (MRF) acceptance standards to enable direct comparison and aggregation in this regional reporting.

Over the SSROC region, the sample was made up of 43% SUD households and 57% MUD households. In total, 8,235 kerbside bins were audited comprising 3,515 bins from SUDs and 4,720 from MUDs. Details of samples audited for each council are shown in the detailed methodology in Appendix D. A separate high-rise MUD audit was undertaken for six councils that participated in this audit which are reported separately.

APC's crew collected bins only from those SUDs and MUDs presenting a 'matched pair' of a general waste and a commingled recycling bin (in most of the councils). In some councils where a FOGO

[1] ORER, now known as the Commonwealth's Clean Energy Regulator

collection service is offered, the general waste and FOGO comprised a 'matched pair', while in councils where recyclables are collected separately, i.e. containers and paper/cardboard, the 'matched pair' consisted of general waste and container bins. For purposes of consistency in regional reporting, only garden organics were considered across the councils.

Image 1 Matched pairs of bins – general waste and recycling

Data collection included the date of collection, dwelling type, waste stream, address, bin size, capacity used (bin fullness percentage), presentation rate and a confirmation of the number of MUD households at each MUD property.

Each collected stream (general waste, recycling and garden organics) was sorted using a list of 73 sorting categories and definitions for each stream (as specified and agreed between SSROC and APC). Refer to Appendix C.

Separated materials were placed in appropriate containers, labelled by category, weighed on electronic scales and the weight recorded. All electronic scales were calibrated prior to commencing the SSROC audit. Images of some key categories are provided in Appendix D.

Sorting of waste was conducted at the following locations:

- Veolia Port Botany – garden organics
- Veolia Banksmeadow - FOGO
- Visy Taren Point – general waste and commingled recycling.

A number of techniques and procedures were used to check and verify data. APC has invested in a computer model to assist with the analysis of audits. This allows systematic error checking at the data-entry stage and ensures consistency in the layout and the design of charts and tables. Raw data is presented in Appendix E.

A summary of the classification and consolidation of all waste categories of materials deemed contamination is provided in Appendix G.

Image 2 Sorting site at Visy Taren Point

2.2 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, summarised on the next page.

Time frame	• This audit was carried out over 6 months, taking samples randomly distributed over the recycling zone coinciding with the audit week. The data was then used as being representative of the whole council. • Seasonal trends (e.g. warmer weather leading to increased consumption of beverages and garden growth) and weather events (e.g. high rainfall leading to grass growth) may change waste generation over time. • The results of this audit should be treated with caution when comparing 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 audits are carried out using strict random sampling, stratified by geographic area, to minimise the chance of this situation occurring. • Slightly different sampling methods are used for SUDs than for MUDs. In accordance with the NSW Guidelines, SUD sampling requires the matched-pair approach, which distorts waste generation data in favour of households presenting both a general waste and recycling bin. As MUD households are sampled by block, waste generation is calculated as an average per number of households in the block, regardless of occupancy and use of the bins provided. MUD generation therefore tends to be calculated as being lower than SUD generation and the two average estimates are not strictly comparable.
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. •Audit samples are only taken from kerbside bins. It does not necessarily quantify the weighbridge tonnages as well as the materials recovered for processing after collection through the different arrangements organised by individual councils which may affect diversion data, e.g., food recovery from general waste stream which is sent to an MBT facility for composting. •The generation rates reflect what was found in a small representative sample of households but are unlikely to match annual tonnages.
Weight-based analysis	• The data for this audit was recorded by weight as weight-based is a standard procedure and the most accurate way to collect data on a number of different types of materials. •This data may cause some materials to appear to be present in quite small proportions due to their comparatively low densities (e.g. plastic beverage containers). They can, however, consume large amounts of volume.

3. RESULTS

3.1 Samples collected

In total, 8,235 bins (Table 4) were sampled representing 2,635 households (Table 3).

Table 4 Number of bins sampled by housing type

Dwelling Type	General waste	Commingled recycling	Containers	Paper and cardboard	Garden organics	Food and garden organics (FOGO)	Total number of samples
SUD	1157	1077	80	80	927	194	3515
MUD	1478	1135	343	343	1175	246	4720
Overall	2635	2212	423	423	2102	440	8235

3.2 Presentation rates

Presentation rates are calculated as follows:

The total number of households passed during the collection is divided by the number of households recorded as presenting bins.

The *Guidelines* specify that only matched-pair bins (garbage and recycling) are collected from a household, so if a household presented no bins it is a non presenter and if only one bin, the bin is were recorded as presented but not collected.

As per the *Guidelines,* there are no substitute bins included in the audit outside the matched-pair household sample. However, non-matched bins are recorded to calculate the participation rate for each stream.

It should be noted that the accurate calculation of participation rates should be made by sampling a large number of households over several weeks of the general waste, recycling and organics collection cycles. The presentation rates in this report are based on bins presented at the time of sample collection for each stream and may not reflect the true presentation or participation rates.

Presentation rates for general waste bins, recycling and garden organics/FOGO bins are shown below.

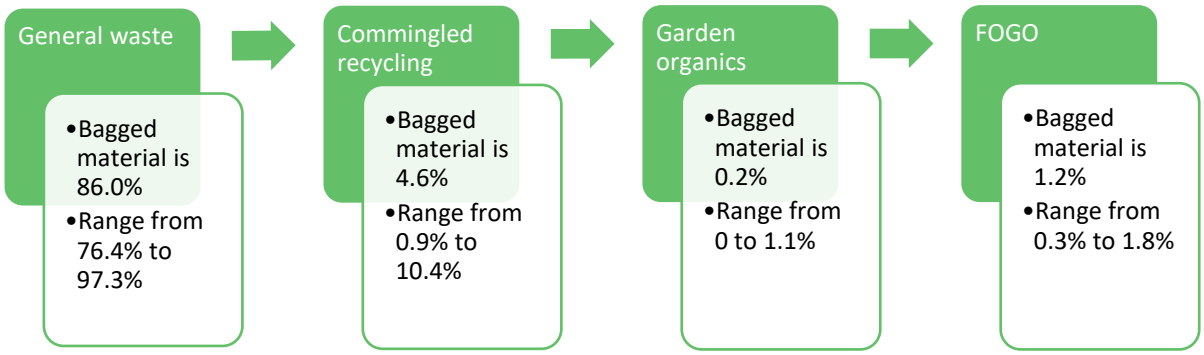
Table 5 Proportion of households presenting a bin for collection

Stream	SUD	MUD
General waste	97%	100%
Commingled recycling	98%	99%
Garden organics	57%	48%
Containers	100%	100%
Paper and cardboard	87%	100%
FOGO	88%	89%

3.3 Amount of bagged material

Figure 1 shows the proportion of material in each waste stream that is presented in bags. As expected, most general waste is bagged. A percentage of the material in the commingled recycling bins is presented in bags and is deemed contamination. A very small amount of bagged material was also found in the garden organics and FOGO streams. Bagged material reported in the FOGO stream are only those which are not in the acceptable AS 4736 compostable bags. The ranges shown are from reported bin presentations of individual councils.

Figure 1 Proportion of bagged material in each waste stream



The reason and method for measuring the amount of bagged material is shown below:

The *Guidelines* require that bagged material is pre-sorted to determine the weight of items in each stream that are bagged.

Bagged material is defined as any items that are in a tied shopping bag or garbage bag. It does not include items in plastic wrap, bread bags or other smaller bags.

The purpose of pre-sorting bagged waste is to determine the component of each waste stream that would need pre-treatment in a waste processing facility. For example, in a mechanical and biological treatment (MBT) facility, bagged material may need to be processed through a bag opener. In an organics composting operation or MRF, bagged material would be treated as a contaminant and removed.

3.4 Weekly waste generation

The average SSROC weekly household generation of all waste streams (garbage, recycling and garden organics/FOGO combined) is shown in Figure 2. SUD households generated 47% more waste, in total, than MUDs.

Figure 2 Waste generation total of all waste streams

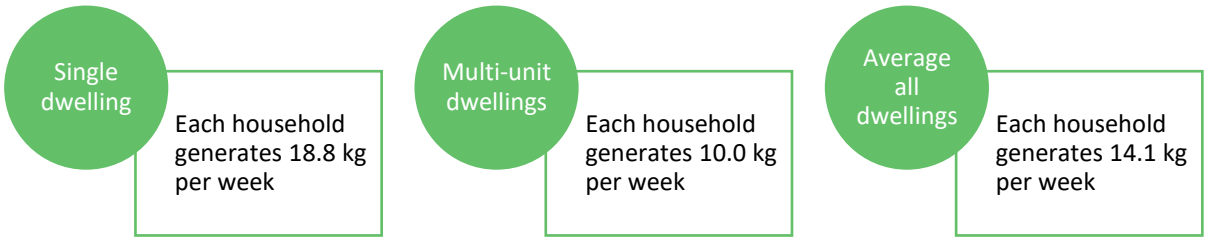


Figure 3 provides further details of the amount of each waste stream generated by the different housing types. Each SUD household generated more of each waste stream per week than each MUD household, i.e. 32% more general waste, 38% more recycling and 83% more garden organics. The average household total waste generation by housing type was based on the three-waste (general waste, commingled recycling and garden organics) kerbside collection system common in most councils in the region. For councils with a separate paper/cardboard and container services, the streams were combined as commingled recycling stream. For councils with a FOGO stream, the food component was separated and included in the general waste stream and the garden organics component was considered in the calculation of the average garden organics stream. This approach is used in order to have a more representative average across the region.

Figure 3 Overall waste generated by housing type

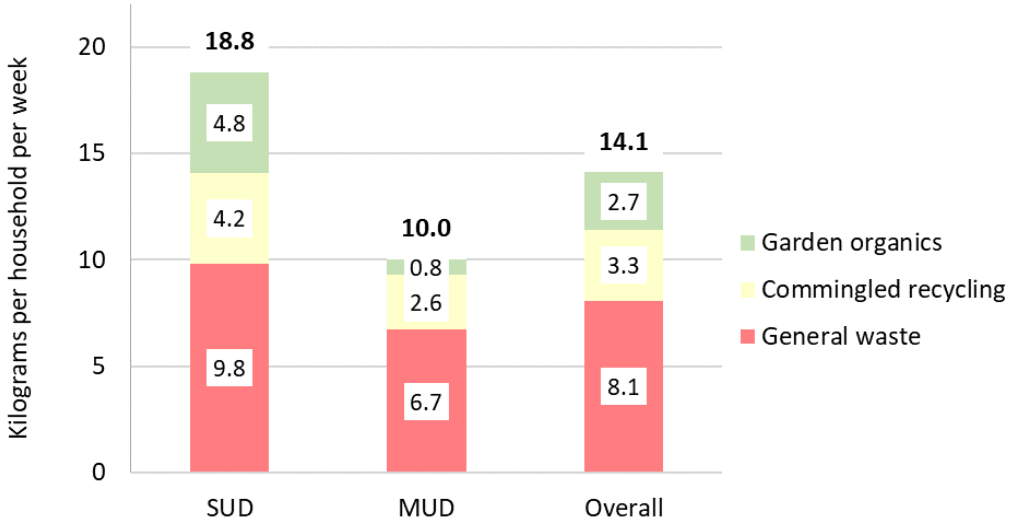


Figure 4 shows the generation of waste per household per week for each council, for all dwelling types combined. Generation ranged from 7.9 kg to 18.8 kg per household per week. It should be noted that this may not necessarily be reflective of the actual waste tonnage across the council areas due to limitation in sampling size as highlighted in Section 2.2. Most of the councils have total weekly waste generation above the regional average of 14.1 kg per household, with only four (4) councils generating waste below that average.

Figure 4 Overall waste generation by council, all dwelling types

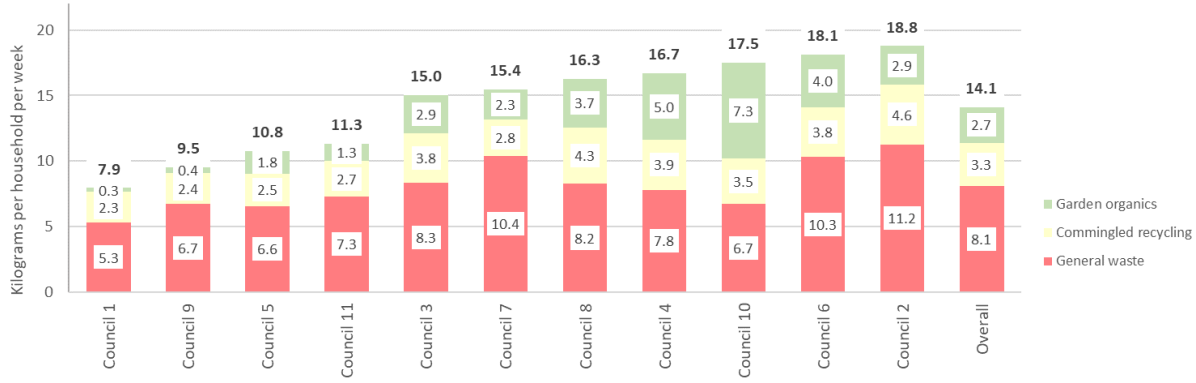


Figure 5 shows the generation of waste per SUD household per week for each council. Generation ranges from 13.6 kg to 25.1 kg per household per week. Six (6) of the 11 councils had SUDs generating more waste than the regional average of 18.8 kg per week.

Figure 5 Overall waste generation in SUDs by council

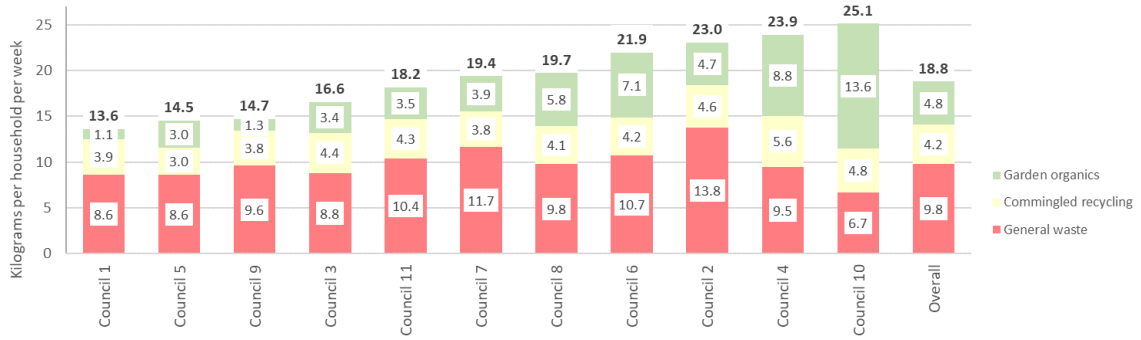
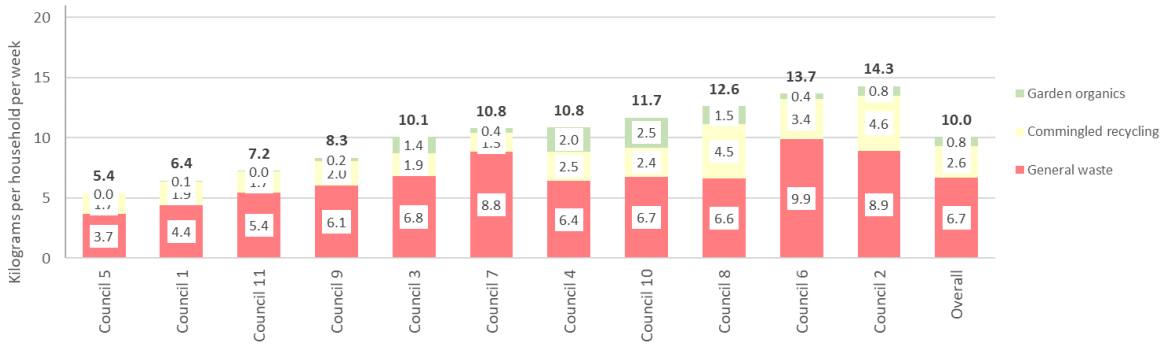


Figure 6 shows the generation of waste per MUD household per week for each council. Generation ranges from 5.4 kg to 14.3 kg per household per week, with most of the councils presenting more waste than the regional weekly average of 10.0 kg.

Figure 6 Overall waste generation in MUDs by council



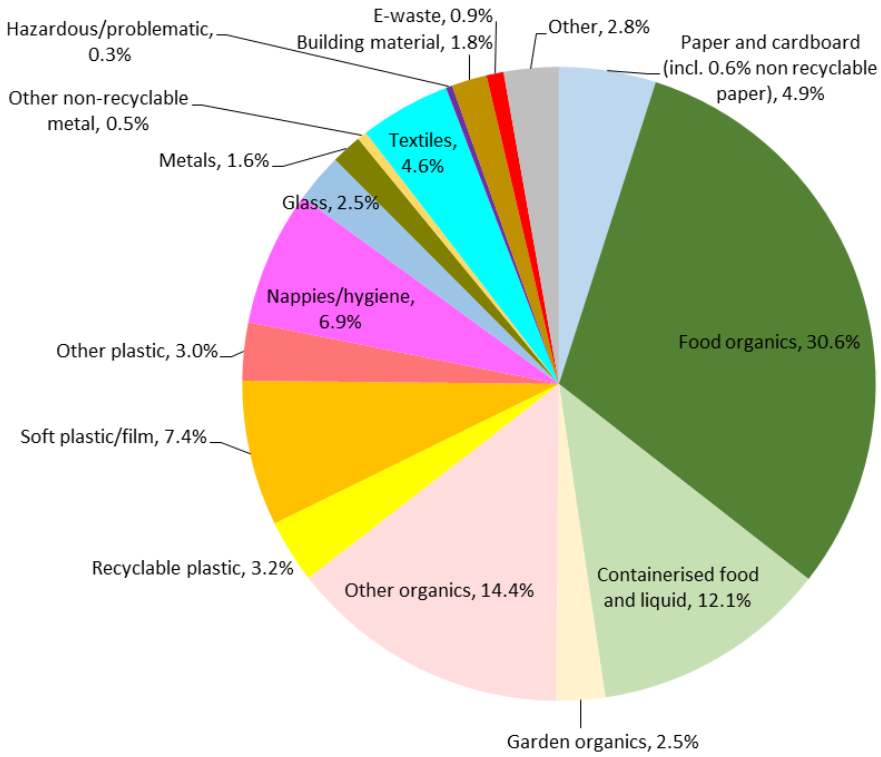
3.5 The general waste stream

3.5.1 General waste composition

Figure 7 shows the composition of the general waste. The largest individual category is loose food waste at 30.6%, followed by other organics* (14.4%), containerised food and liquid (12.1%), soft plastic film (7.4%), and nappies/hygiene (6.9%). The remaining categories have proportions less than 5%. A detailed composition list is provided in Table 6.

Material that should be diverted to the existing recycling and garden waste streams accounts for 14.1% of the general waste stream. This includes 11.6% of recyclables comprising, containers (7.3%) and recyclable paper/cardboard (4.3%). With 95% of the council areas servicing collection of garden organics, 2.5% of these materials are still in the general waste stream. If all areas received a garden organics collection service, this can be reduced to an estimated 1.7%.

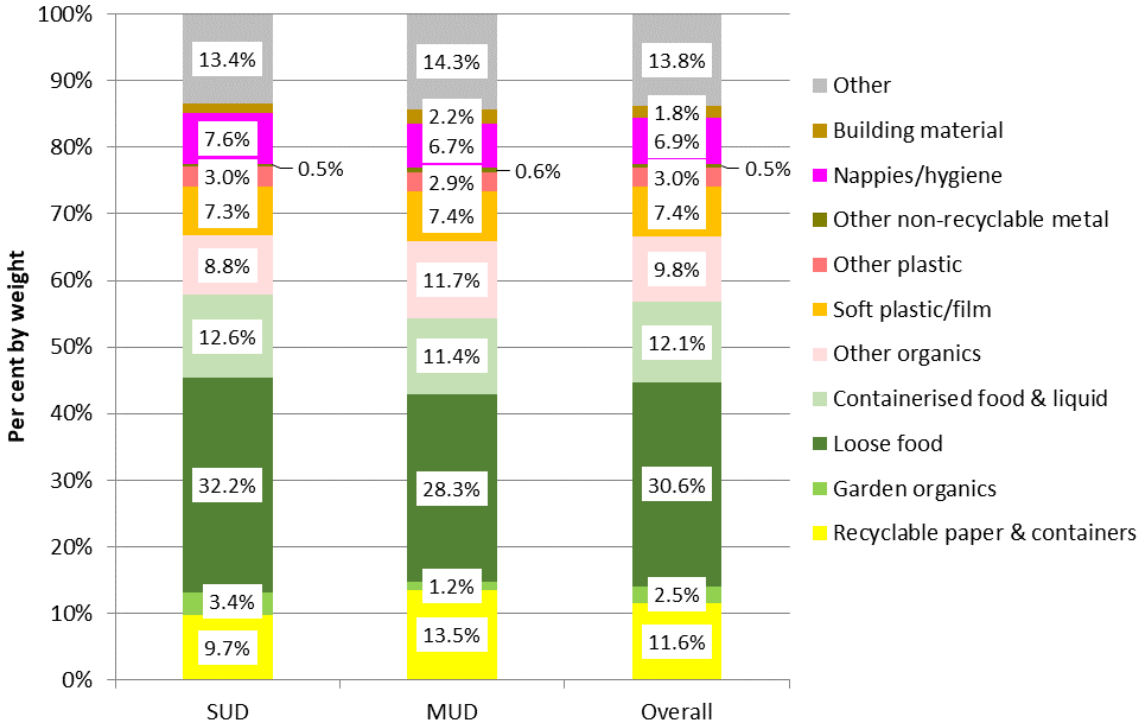
Figure 7 Overall generation waste composition



*Other organics include disposable paper products, contaminated paper, other putrescibles and wood/timber based on agreed consolidation categories

Figure 8 compares the composition of the general waste stream between dwelling types. For ease of reading, some categories have been further consolidated from those shown in Figure 7 MUDs had a greater proportion of most materials such as recyclable materials, other organics, textile/carpet, building material and other waste, while SUDs had more loose food, containerised food and liquid and nappies/hygiene products. Soft plastic/film, other plastic and other metal are comparable in both dwelling types. A more detailed breakdown is provided in the following section and all data is provided in Appendix E.

Figure 8 General waste composition by housing type



* The category 'other' in this chart combines the categories 'hazardous', 'e-waste' and 'other', shown separately in Figure 7. The category 'recyclable (paper, containers and garden organics)' combines all material that should be in the commingled recycling and garden organic bins.

3.5.2 General waste generation

As summarised in Figure 9, the average SSROC household produces 8.1 kilograms per week of general waste. The average SUD generation is 9.8 kilograms per week while average MUDs generate 6.7 kilograms per week.

Figure 9 General waste generation

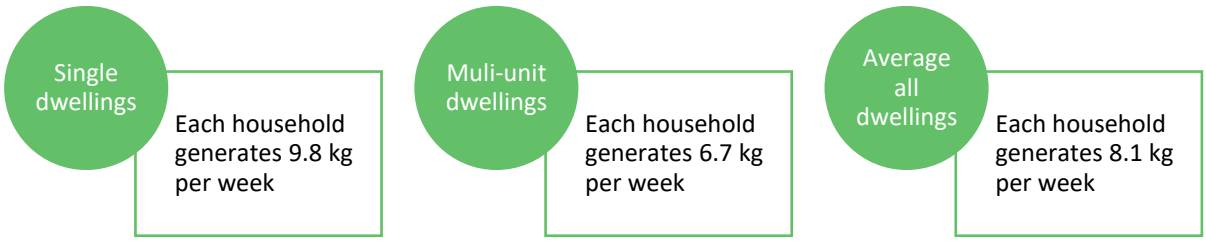
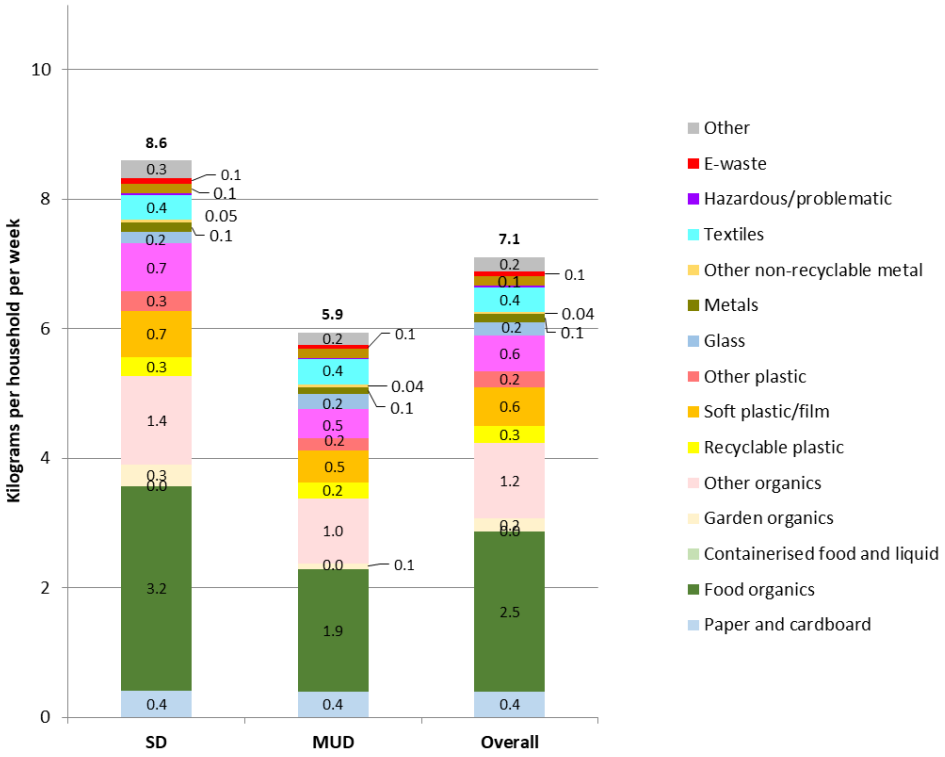


Figure 10 compares general waste generation by housing type in the region. SUDs generated one-third more general waste at 9.8 kg per household per week when compared with MUDs at 6.7 kg. SUDs produced a higher amount of most of the categories than MUDs. The largest difference between the housing types is loose food waste.

Figure 10 General waste generation by housing type



Detailed sorting category data is provided in Appendix E and is summarised below in Table 6.

Table 6 General waste generated and composition details – average all dwellings

Material	Kilograms per household per week	Percentage of general waste
Non-meat	2.3	29.0%
Containerised food and liquid	1.0	12.1%
Contaminated paper	0.7	8.5%
Nappies/hygiene	0.6	6.9%
Plastic film	0.5	6.1%
Textile/carpet	0.4	4.6%
Other putrescible	0.3	3.8%
Garden organics	0.2	2.5%
Cardboard	0.2	2.3%
Building materials	0.1	1.8%
Other plastics	0.1	1.7%
Meat	0.1	1.6%
Glass drink containers	0.1	1.4%
PP packaging	0.1	1.4%
Wood/timber	0.1	1.4%
Other	0.1	1.3%
Plastic bags	0.1	1.3%
Recyclable paper	0.1	1.2%
Ceramics, dust, dirt, rock, inert	0.1	1.2%
Other packaging glass	0.1	1.1%
Composite (mostly plastic)	0.1	1.0%
Less than 1%	0.6	7.6%
Total	**8.1**	**100.0%**

Image 3 Loose food is the dominant material in the general waste stream

3.5.3 Material that should or could be in another service

This section details materials in general waste that should be in the currently available recycling, garden organics or FOGO stream (if available) or should be disposed of via alternative pathway (hazardous and e-waste drop-off services). An overview is provided in Figure 11 below.

Figure 11 Material that should or could be in another bin or service

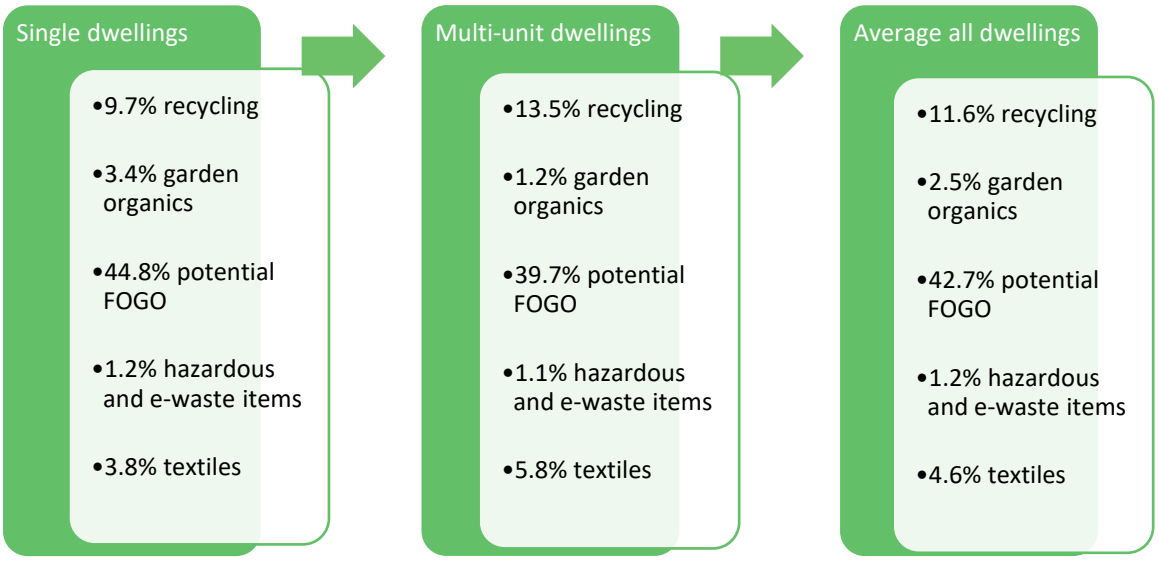


Table 7 lists materials that should be in the recycling stream. Cardboard comprised the highest percentage of the dry recyclables that should be placed in the commingled recycling bin.

Table 7 General waste that should be in a recycling bin

Material	Kilograms per household per week	Percentage of general waste
Cardboard	0.19	2.3%
Glass drink containers	0.12	1.4%
PP packaging	0.11	1.4%
Recyclable paper	0.10	1.2%
Other packaging glass	0.09	1.1%
Less than 1%*	0.3	4.1%
Total	**0.9**	**11.6%**

**This includes PET packaging, other steel, steel packaging, HDPE packaging, liquid paperboard, etc.*

Table 8 lists materials that would ideally be disposed of via alternate pathways. Section 3.8 contains more detail on hazardous waste items in the waste stream.

Table 8 General waste that should be in the e-waste or hazardous services

Material	Kilograms per household per week	Percentage of general waste
Electrical items and peripherals	0.066	0.8%
Paint	0.014	0.2%
Clinical (medical)	0.006	0.1%
Computer equipment	0.003	0.0%
Non-rechargeable batteries	0.003	0.0%
Household chemicals	0.001	0.0%
Toner cartridges	0.001	0.0%
Less than 0.01%	0.002	0.0%
Total	**0.097**	**1.2%**

Table 9 shows the material that should be in the garden organics bin with 95% of the council areas in the region receiving garden organics collection service.

Table 9 General waste that should be in a garden organics bin

Material	Kilograms per household per week	Percentage of general waste
Garden organics	0.20	2.5%
Total	**0.20**	**2.5%**

Table 10 lists material that could potentially be in a FOGO bin, with 30.6% loose food and 12% containerised food and liquid. Almost half, or 43% of the general waste bin could be diverted to FOGO.

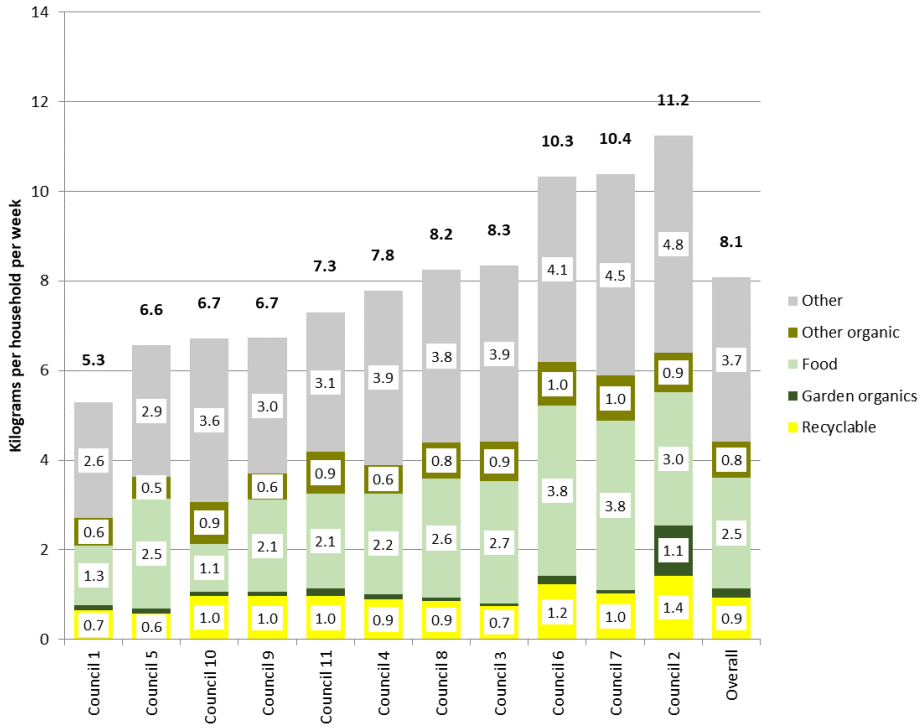
Table 10 General waste that could be in a FOGO bin

Material	Kilograms per household per week	Percentage of general waste
Non-meat	2.34	29.0%
Containerised food and liquid	0.98	12.1%
Meat	0.13	1.6%
Total	**3.45**	**42.7%**

3.5.4 General waste generation by council

Figure 12 shows the generation of general waste per household per week, for all dwelling types. Across the region, an average of 8.1 kg per household of general waste was generated. It ranges from 5.3 kg to 11.2 kg.

Figure 12 General waste generation by council – all dwellings



Note: 'Other' combines bagged material, composites, leather, rubber, oils, non-recyclable plastic/glass/metal, inert, e-waste and hazardous materials.

Image 4 General waste sample ready to be sorted

Figure 13 shows the generation of general waste at SUDs by council, showing a range from 6.7 kg to 13.8 kg per household per week. The average generation across SUDs in the region is 9.8 kg of general waste per household.

Figure 13 General waste generation by council – SUDs

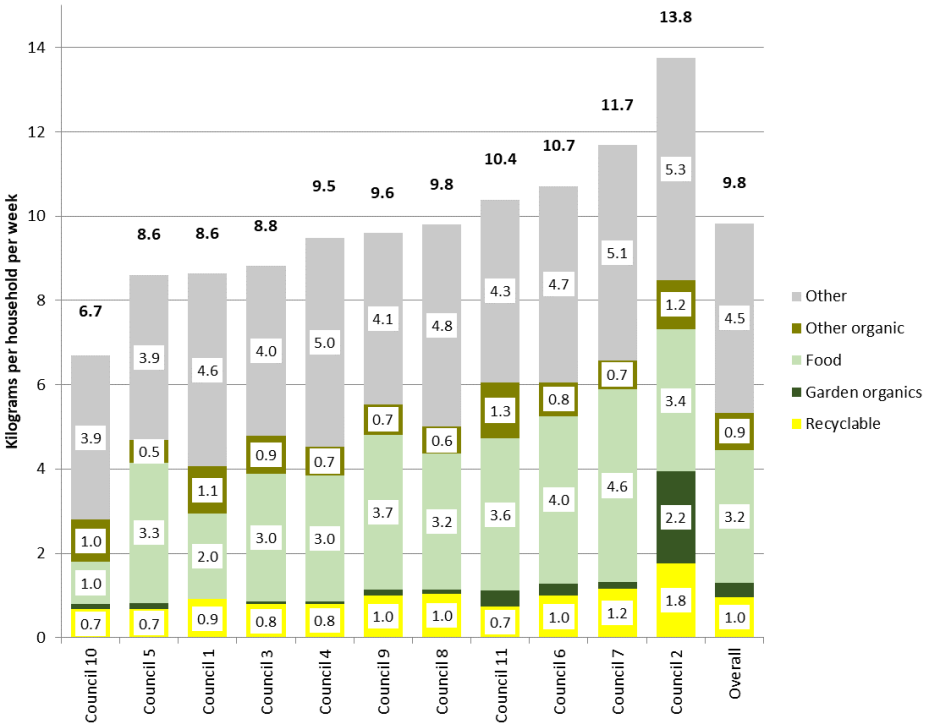
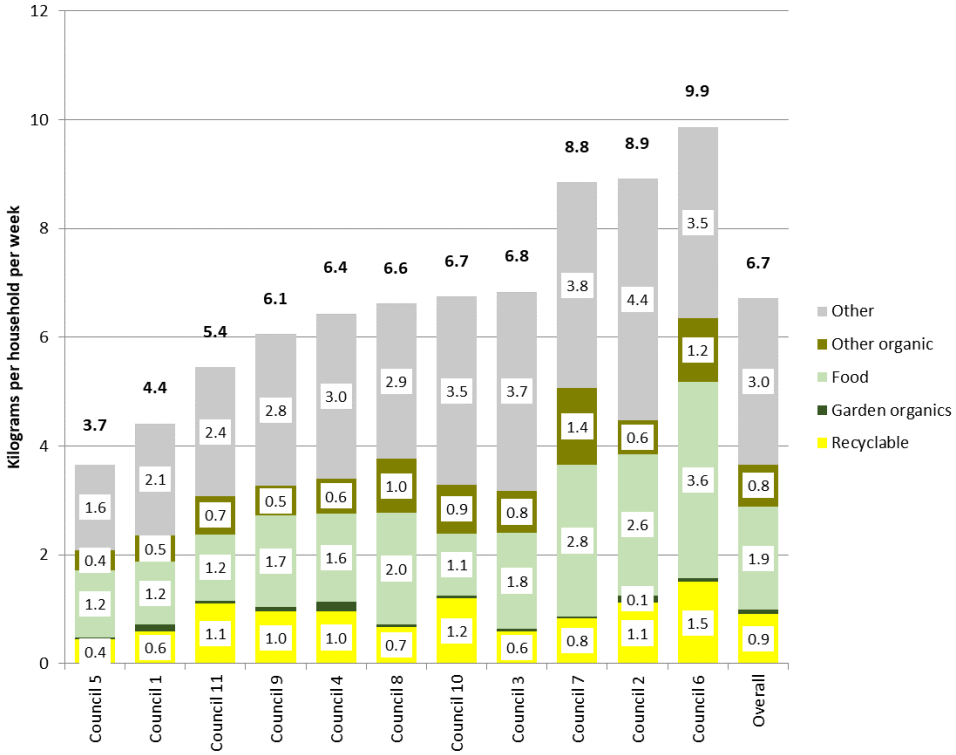


Figure 14 shows the generation of general waste at MUDs by council. Generation ranges from 3.7 kg to 9.9 kg per household per week. Across the MUDs in the region, generation of general waste averaged 6.7 kg per household per week.

Figure 14 General waste generation by council – MUDs



3.6 The commingled recycling stream

3.6.1 Composition of commingled recycling

Figure 15 shows the composition of the commingled recycling stream. The main components are recyclable paper (42.5%), recyclable containers (37.7%) and contamination at 19.7%.

The largest categories in the contamination are bagged material (4.7%) and contaminated paper (4.6%). The auditing team observed that a significant amount of this category comprised paper towel and other disposable paper products. All bagged material is considered as contamination as it cannot be opened or separated at the MRF, regardless of whether the material in the bags is recyclable or not.

The next largest contaminants are other plastics and textile/carpet, both at 1.2%, composite (mostly paper), containerised food and liquid and plastic film all at 0.9% and a range of other materials, present in small quantities, comprising the remaining 5.3% of the commingled recycling stream which mostly include electrical items and peripherals (0.6%), wood/timber (0.5%), disposable paper products (0.4%), ceramics (0.4%), composite - mostly plastic (0.4%), building materials (0.4%), etc. Detailed data is available in Appendix E.

Figure 15 Composition of commingled recycling

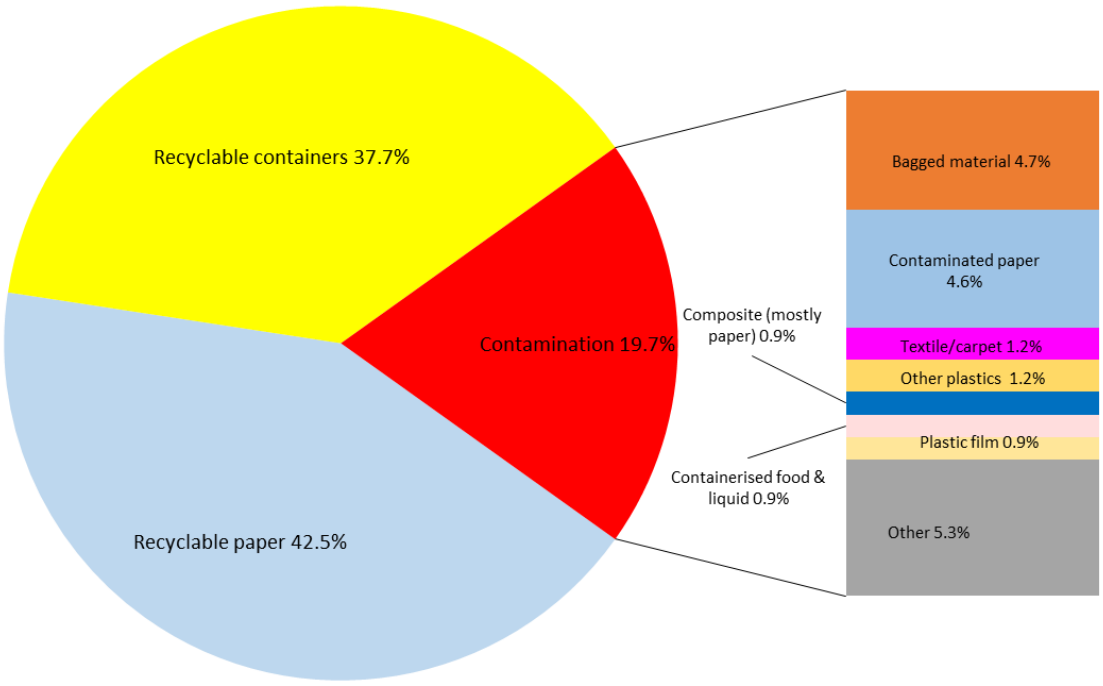


Figure 16 compares the composition of commingled recycling across all housing types and shows comparable proportion of recyclable paper and loose contamination between housing types. SUDs had a higher proportion of recyclable containers while MUDs had more bagged material.

Figure 16 Commingled recycling composition by housing type

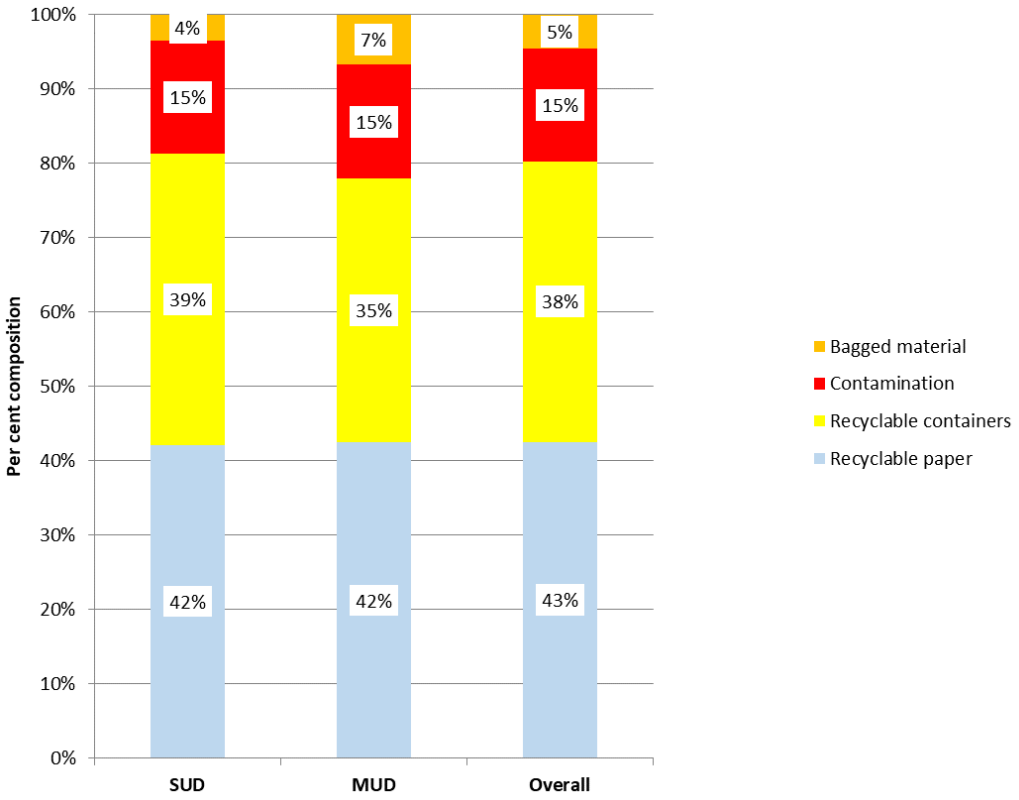


Image 5 Commingled recycling dominated by cardboard

Table 11 below lists the commingled recycling generation and composition by individual material. The main materials in the commingled recycling are cardboard (27.3%), glass drink containers (18.1%), recyclable paper (7.3%) and other packaging glass (5.9%). Detailed data is available by housing type in Appendix E.

Table 11 Commingled recycling generation and composition details – all dwellings

Material	Kilograms per household per week	Percentage of commingled recycling
Cardboard	0.9	27.3%
Glass drink containers	0.6	18.1%
Recyclable paper	0.2	7.3%
Other packaging glass	0.2	5.9%
Contaminated paper	0.2	4.6%
Newspapers	0.1	3.8%
Magazines	0.1	3.3%
Glass fines	0.1	3.3%
Bagged garbage	0.1	2.7%
Bagged recyclables	0.1	2.0%
PET packaging	0.1	1.7%
Steel packaging	0.1	1.7%
PP packaging	0.1	1.7%
HDPE drink containers	0.0	1.5%
HDPE packaging	0.0	1.4%
PET drink containers	0.0	1.2%
Textile/carpet	0.0	1.2%
Other plastics	0.0	1.2%
Less than 1%	0.3	10.0%
Total	**3.3**	**100.0%**

3.6.2 Commingled recycling generation by housing type

Figure 17 shows that the average SSROC household produced 3.3 kilograms per week of commingled recycling. SUD households produced one-third more commingled recycling than MUDs, i.e. 4.2 kilograms per week at SUDs compared with 2.6 kg at MUDs. It should be noted that in councils with separate paper/cardboard and container recycling collection services, these materials have been combined to represent 'commingled recycling'.

Figure 17 Commingled recycling generation

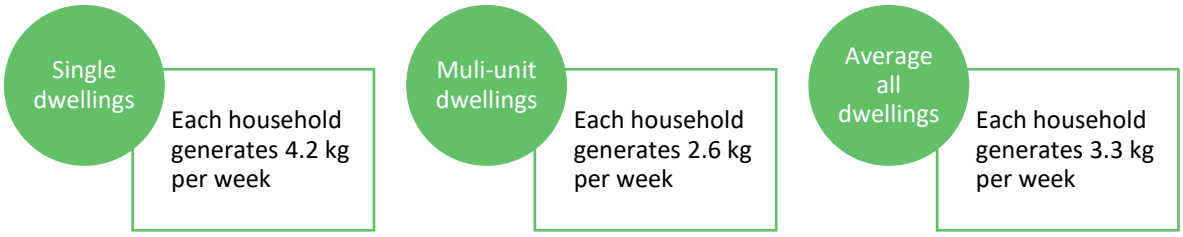
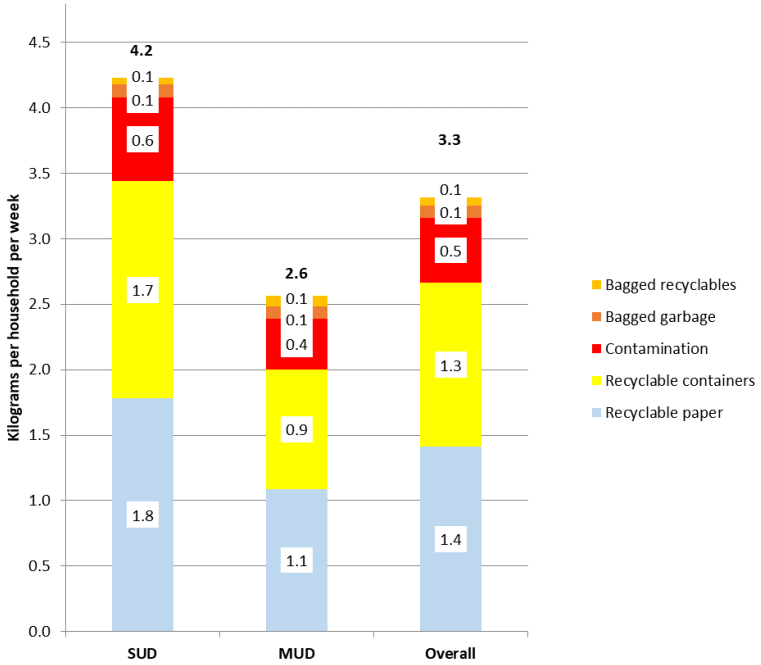


Figure 18 shows the amount of each waste stream produced by the two housing types. SUDs presented more recyclable materials and loose contamination in the recycling stream. Bagged materials were comparable between both housing types.

Figure 18 Commingled recycling generation by housing type



NB: There are slight differences in reported totals due to rounding.

3.6.3 Commingled recycling generation by council

Figure 19 shows the generation of commingled recycling per household per week for all councils. The generation ranged from 2.3 kg to 4.6 kg per household per week. The average generation of commingled recycling across the region was 3.3 kg per household per week.

Figure 19 Commingled recycling generation by council – all dwellings

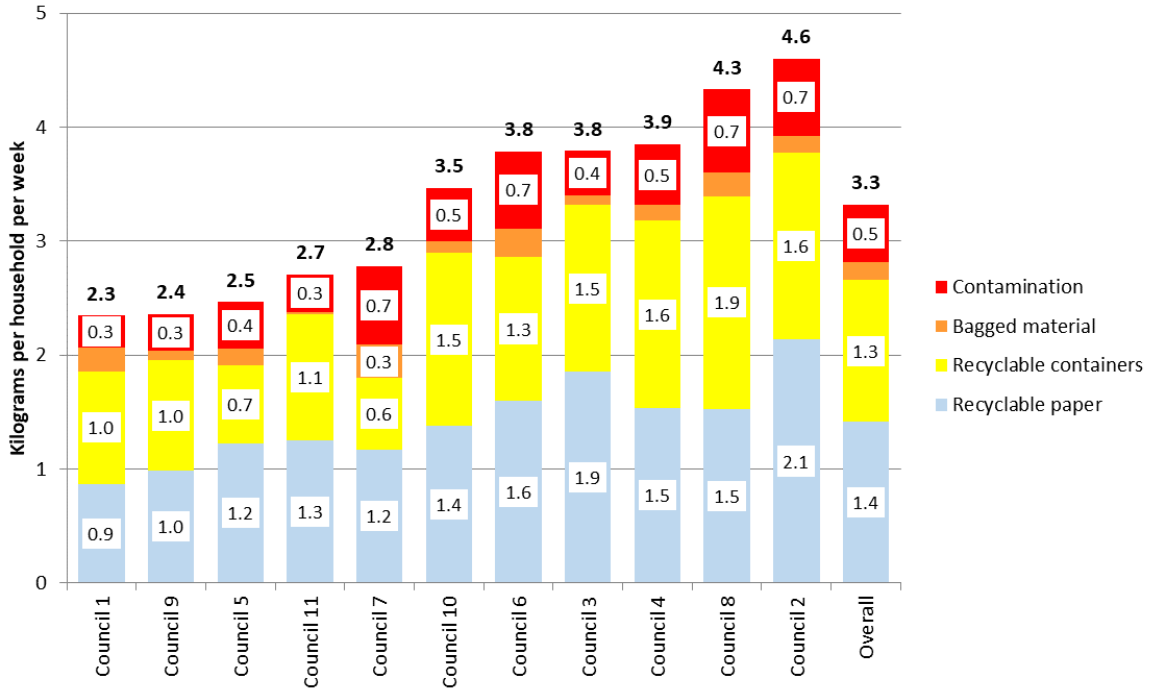


Figure 20 shows the generation of commingled recycling at SUDs for all councils. The results ranged from 3.0 kg to 5.6 kg per household per week. An average of 4.2 kg per household per week of commingled recycling were generated by SUDs across the region.

Figure 20 Commingled recycling generation by council – SUDs

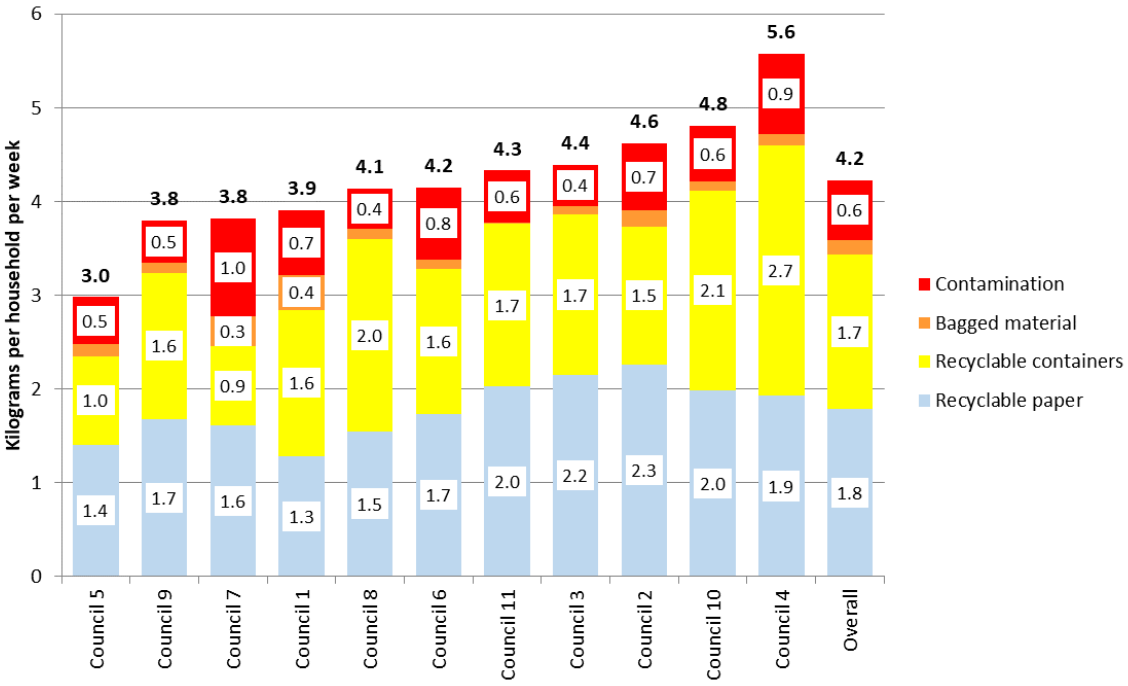
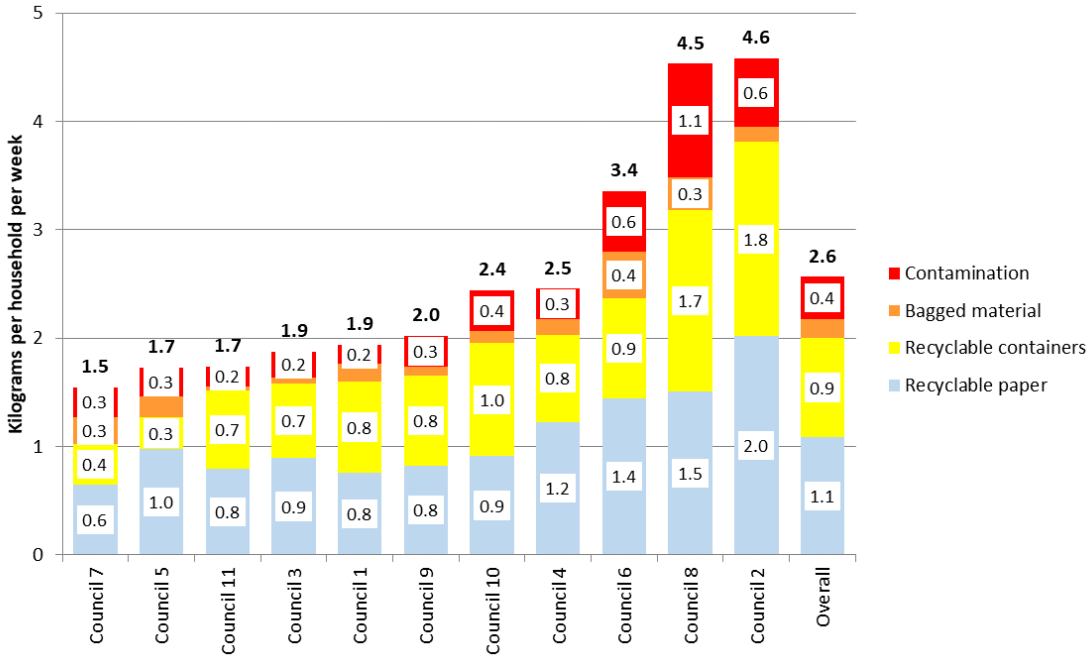


Figure 21 shows the generation of commingled recycling at MUDs across all councils. The results vary widely, ranging from 1.5 kg to 4.6 kg per household per week. The MUDs across the region generated an average of 2.6 kg per household per week of commingled recycling.

Figure 21 Commingled recycling generation by council – MUDs



3.6.4 Commingled recycling contamination by housing type

Table 12 shows that MUDs across the region had a higher proportion of contamination in the recycling stream at 22.1% compared to SUDs at 18.7%. MUDs generated less recyclables compared with SUDs. Bagged material was present in both housing types, but was more prevalent at MUDs. The amount of bagged garbage and recyclables was comparable between the two dwelling types although the proportion of these materials in the MUD bins was greater than SUDs.

Table 12 Commingled recycling contamination by housing type and day

Bagged content scenario	Category	SUD		MUD		Overall	
		kg/hhld/ week	%	kg/hhld/ week	%	kg/hhld/ week	%
Bagged material as a separate category and considered as a contaminant	**Loose contamination**	**0.64**	**15.2%**	**0.39**	**15.3%**	**0.50**	**15.1%**
	Bagged garbage	*0.10*	*2.3%*	*0.09*	*3.6%*	*0.09*	*2.7%*
	Bagged recyclables	*0.05*	*1.2%*	*0.08*	*3.2%*	*0.06*	*2.0%*
	Bagged material	**0.15**	**3.5%**	**0.17**	**6.8%**	**0.15**	**4.7%**
	Total contamination	**0.79**	**18.7%**	**0.57**	**22.1%**	**0.65**	**19.7%**

Figure 22 shows the top four contaminants in the recycling (from highest to lowest percentage) for single and multi-unit dwellings. MUDs generated almost twice as much bagged materials (with both garbage and recyclables) and slightly more other plastics than SUDs. SUDs generated more contaminated paper and textile/carpet than MUDs. Overall, the main contaminants were bagged garbage/ recycling, contaminated paper, other plastics and textile/carpet. These key materials should be the focus of future, region-wide education efforts.

Figure 22 Top four commingled recycling contaminants – by housing type

Top four contaminants: SUDs

- Contaminated paper, 5.3%
- Bagged garbage/ recycling, 3.5%
- Textile/carpet, 1.4%
- Other plastics, 1.3%

Top four contaminants: MUDs

- Bagged garbage / recycling, 6.5%
- Contaminated paper, 3.3%
- Other plastics, 1.5%
- Textile/carpet, 1.1%

Top four contaminants: overall

- Bagged garbage / recycling, 4.6%
- Contaminated paper, 4.5%
- Other plastics, 1.2%
- Textile/carpet, 1.2%

3.6.5 Commingled recycling contamination by council

Figure 23 shows the contamination recorded in the commingled recycling for each council, for all dwelling types. Contamination ranged from 12.5% to 35.2%. Contamination averaged 19.7% across all councils and more than half of the councils have contamination below the regional average.

Figure 23 Commingled recycling contamination by council – all dwellings

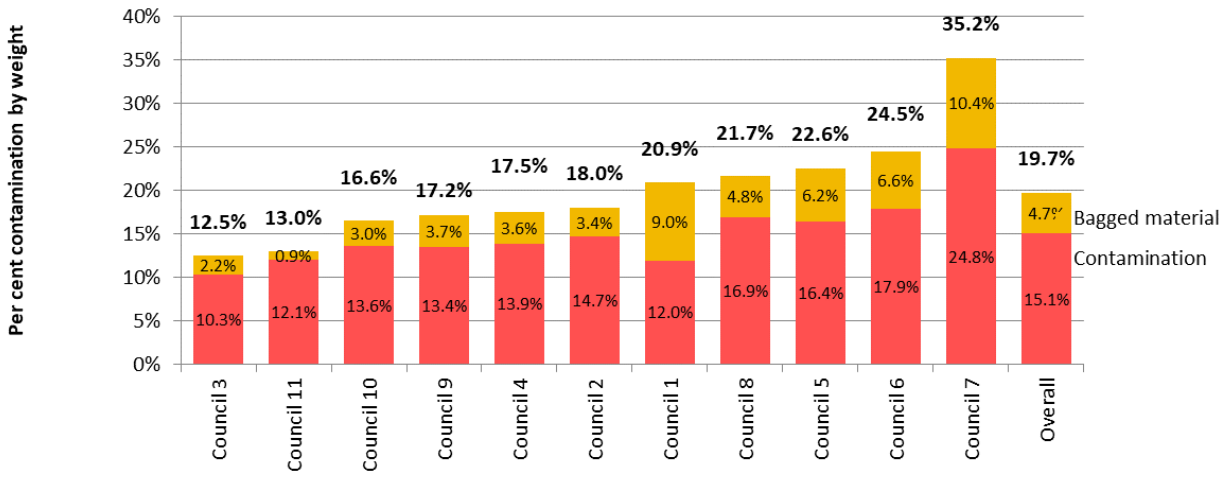


Figure 24 shows the contamination recorded in the commingled recycling at SUDs for each council. Contamination ranged from 12.1% to 35.6%. SUDs recorded a regional average of 18.7% contamination in the commingled recycling stream.

Figure 24 Commingled recycling contamination by council – SUDs

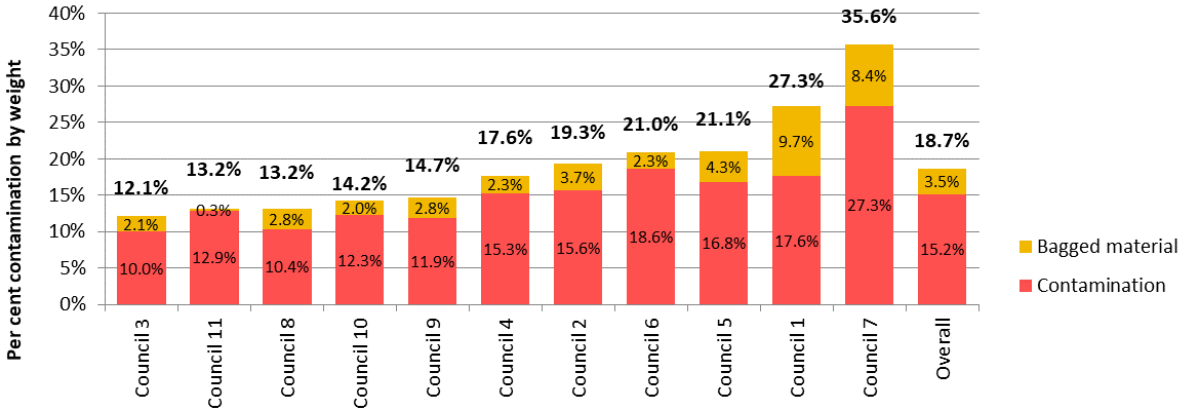


Figure 25 shows the contamination recorded in the commingled recycling for each council for MUDs. Contamination ranged from 12.7% to 34.1%. MUDs in the region presented an average of 22.1% contamination in the commingled recycling stream.

Figure 25 Commingled recycling contamination by day – MUDs

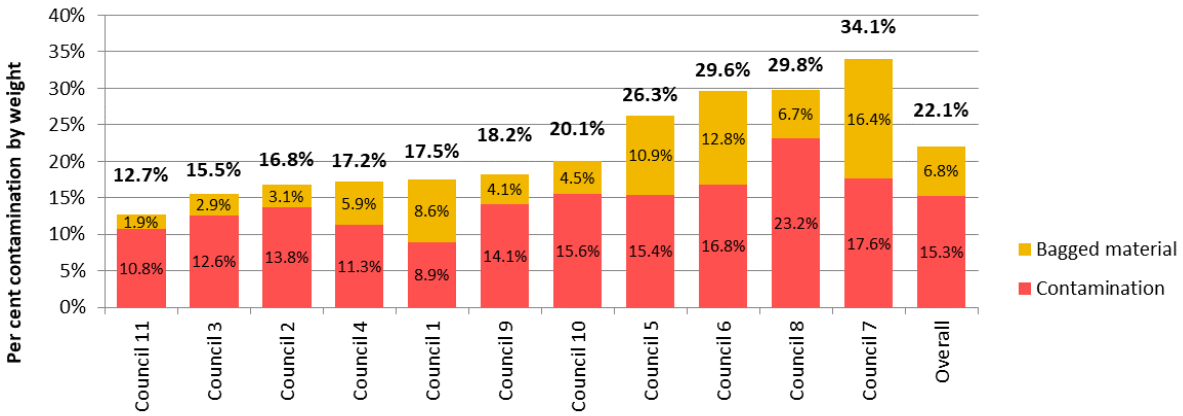


Image 6 Commingled recycling stream contaminated by bagged materials

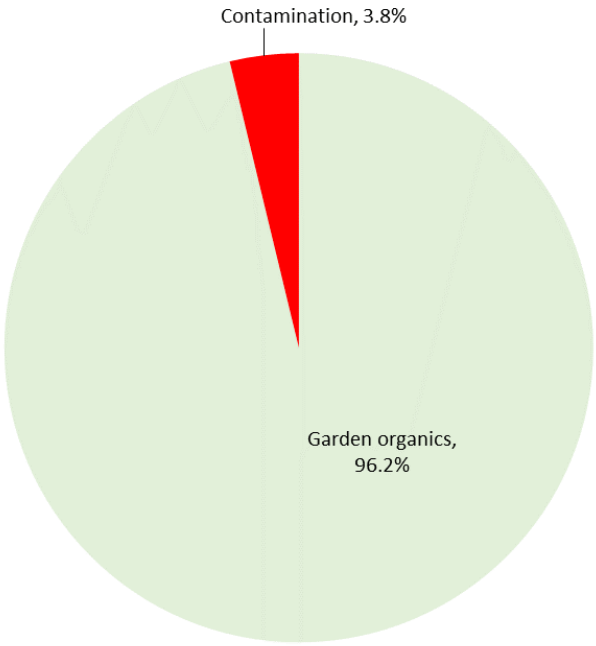
3.7 The garden organics stream

The collection of garden organics varies among councils, with the majority offering the service. For purposes of calculating the regional average, the results in this section only considered the garden organics in the organics stream for all councils. Food organics from the FOGO bins were excluded from the average to achieve consistency in the inputs from the member councils into the regional results.

3.7.1 Composition of garden organics

Figure 26 shows the composition of the garden organics stream. Vegetation makes up 96.2%. Contamination in the garden organics stream is 3.8%. The contamination comprises small amounts of different materials, each with 1.1% or less proportion in the garden organics stream. The main contaminants were wood/timber, and ceramics/dust/dirt/rock/inert. Detailed data can be seen on Table 13 on the next page.

Figure 26 Composition of garden organics



3.7.2 Garden organics generated by household type

Figure 27 shows that the average SSROC household produced 2.7 kilograms per week of garden organics. Single dwellings generated 4.8 kg of garden organics while MUDs generated a minimal 0.8 kg. This equates to 83% more materials generated at SUDs compared with MUDs.

Figure 27 Garden organics generation

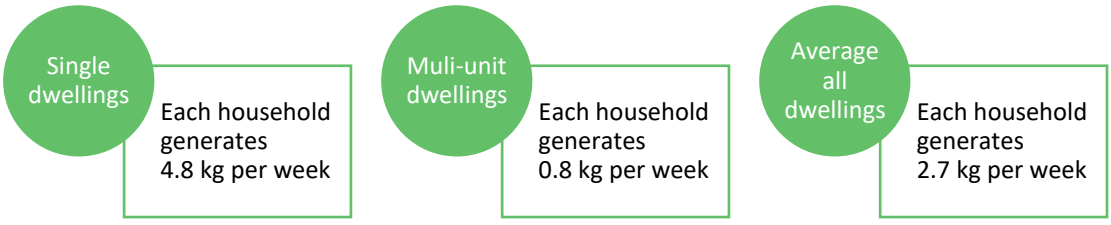


Table 13 shows detail of the garden organics generation and composition for all dwelling types combined.

Table 13 Garden organics generation and composition details

Material	Kilograms per household per week	Percentage of garden organics
Garden organics	2.6	96.2%
Contamination		
Wood/timber	0.03	1.1%
Ceramics, dust, dirt, rock, inert	0.03	0.9%
Bagged garbage	0.01	0.5%
Contaminated paper	0.01	0.3%
Cardboard	0.01	0.2%
Other	0.01	0.2%
Other putrescible	0.003	0.1%
Less than 0.1%	0.01	0.4%
Total	**2.7**	**100.0%**

3.7.3 Garden organics generation by council

Figure 28 shows the generation of garden organics per household per week at all dwelling types. Generation ranged from 0.3 kg to 7.3 kg per household per week. Across all councils, the regional average amount of garden organics stream was 2.7 kg per household per week. Most of the councils produced more than the regional average of garden organics. It should be noted that this average does not include the food organics that was found and is accepted in some council's garden organics services.

Figure 28 Garden organics generation by council, all dwelling types

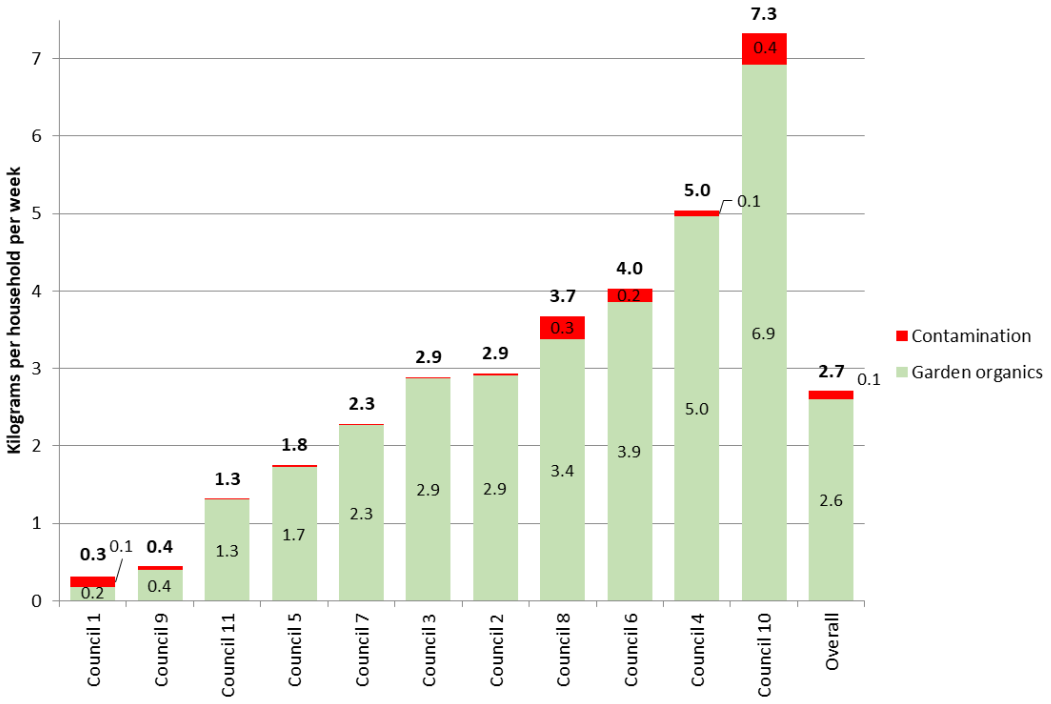


Figure 29 shows the generation of garden organics at single dwellings, by council. Values ranged widely, from 1.1 kg to 13.6 kg per household per week. Most SUDs generated lower amounts of garden organics than the regional average of 4.8 kg per household per week.

Figure 29 Generation of garden organics at SUDs, by council

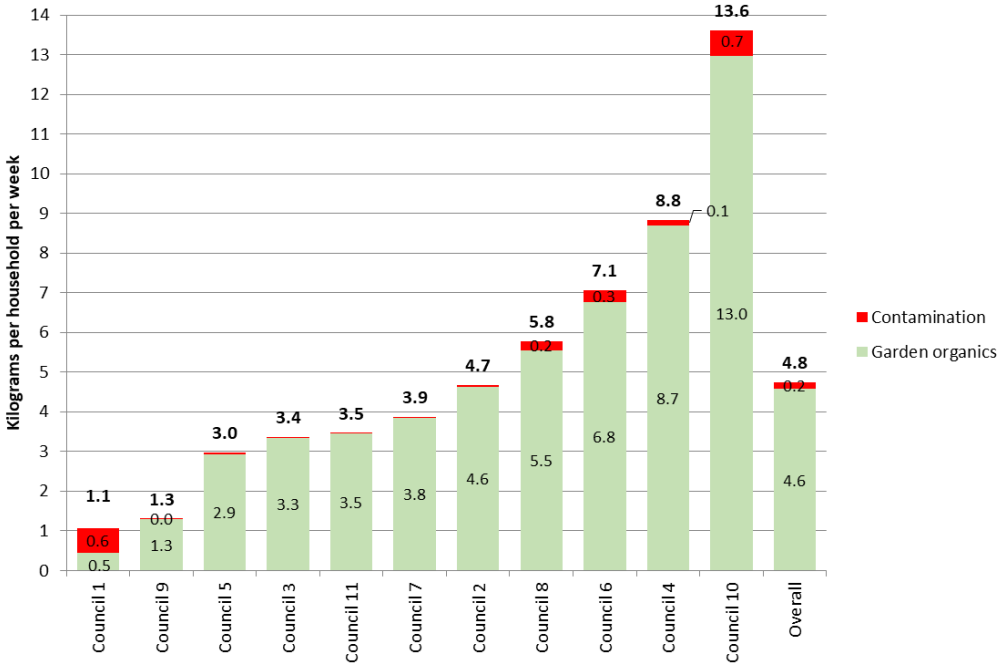
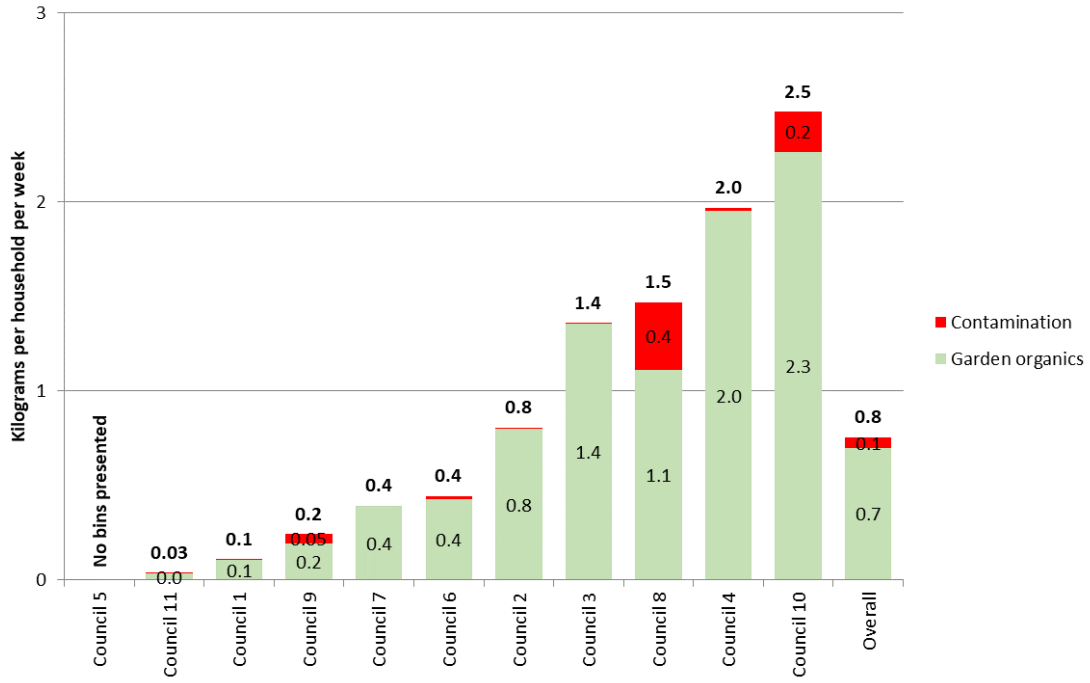


Figure 30 shows the generation of garden organics at MUDs, by council. Values ranged from zero (where no bins were presented) to 2.5 kg per household per week. Six (6) councils had garden organics lower than the regional average of 0.8 kg per household per week.

Figure 30 Generation of garden organics at MUDs, by council



3.7.4 Garden organics contamination by housing type

Table 14 shows the contamination levels for garden organics/FOGO stream. SUDs generated higher contamination than MUDs although the proportion of contamination at MUDs was higher than at SUDs. The same pattern is observed with loose contamination, where despite higher amounts generated at SUDs, the proportion is lower than MUDs. No bagged recyclables were recorded at either housing type. MUDs had more bagged garbage in the garden organics stream than SUDs, although slightly more materials were recorded at SUDs.

Table 14 Garden organics contamination by housing type

Bagged content scenario	Category	SUD		MUD		Overall	
		kg/hhld /week	%	kg/hhld /week	%	kg/hhld /week	%
Bagged material as a separate category and considered as a contaminant	**Loose contamination**	**0.16**	**3.4%**	**0.05**	**6.5%**	**0.09**	**3.3%**
	Bagged garbage	*0.02*	*0.5%*	*0.00*	*0.6%*	*0.01*	*0.5%*
	Bagged recyclables	*0.00*	*0.0%*	*0.00*	*0.0%*	*0.00*	*0.0%*
	Bagged material	**0.02**	**0.5%**	**0.00**	**0.6%**	**0.01**	**0.5%**
	Total contamination	**0.18**	**3.9%**	**0.05**	**7.1%**	**0.10**	**3.8%**

Figure 31 lists the top five contaminants at each housing type. Wood/timber, ceramics, dust, dirt, rock and inert materials, bagged garbage, contaminated paper and cardboard comprised the top five contaminants, overall.

Figure 31 Top five garden organics contamination by housing type

Top five contaminants: SDs

- Ceramics, dust, dirt, rock, inert, 1.3%
- Wood/timber, 1.0%
- Bagged garbage, 0.5%
- Contaminated paper, 0.4%
- Cardboard, 0.2%

Top five contaminants: MUDs

- Ceramics, dust, dirt, rock, inert, 2.7%
- Wood/timber, 1.5%
- Bagged garbage, 0.7%
- Other putrescible, 0.4%
- Cardboard, 0.3%

Top five contaminants: overall

- Wood/timber, 1.1%
- Ceramics, dust, dirt, rock, inert, 0.9%
- Bagged garbage, 0.5%
- Contaminated paper, 0.3%
- Cardboard, 0.2%

3.7.5 Garden organics contamination by council

Figure 32 shows the contamination in the garden organics stream by council for all dwelling types. Contamination ranged from 0.1% to 9.1% for most councils, with one garden organics bin filled up with ceramics, dirt, dust, rock and inert materials increasing one council's result to 42.1%. Six (6) councils had lower contamination than the regional average of 3.8% in the garden organics stream.

Figure 32 Garden organics contamination by council – all dwelling types

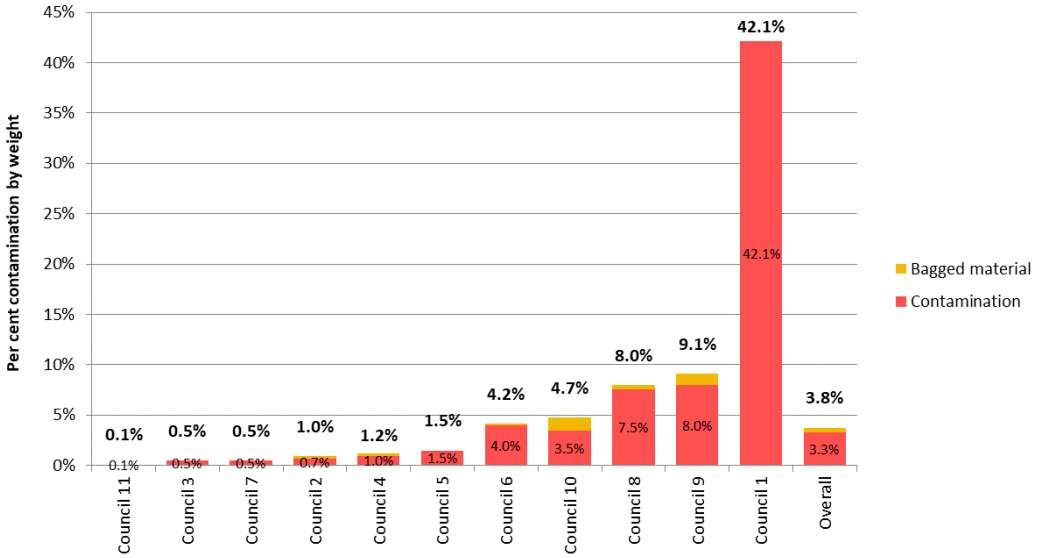


Figure 33 shows the contamination in the garden organics stream for SUDs by council. Contamination ranged from 0.1% to 4.5%, with one garden organics bin filled up with ceramics, dirt, dust, rock and inert materials increasing one council's result to 42.1%. Bagged material was a very small proportion of the contamination across the region, i.e., only 0.5%. Most of the contaminants at SUDs were loose materials. Regional contamination in the garden organics stream at SUDs was 3.9% and the majority of councils had a contamination level lower than this regional average level.

Figure 33 Garden organics contamination by council - SUDs

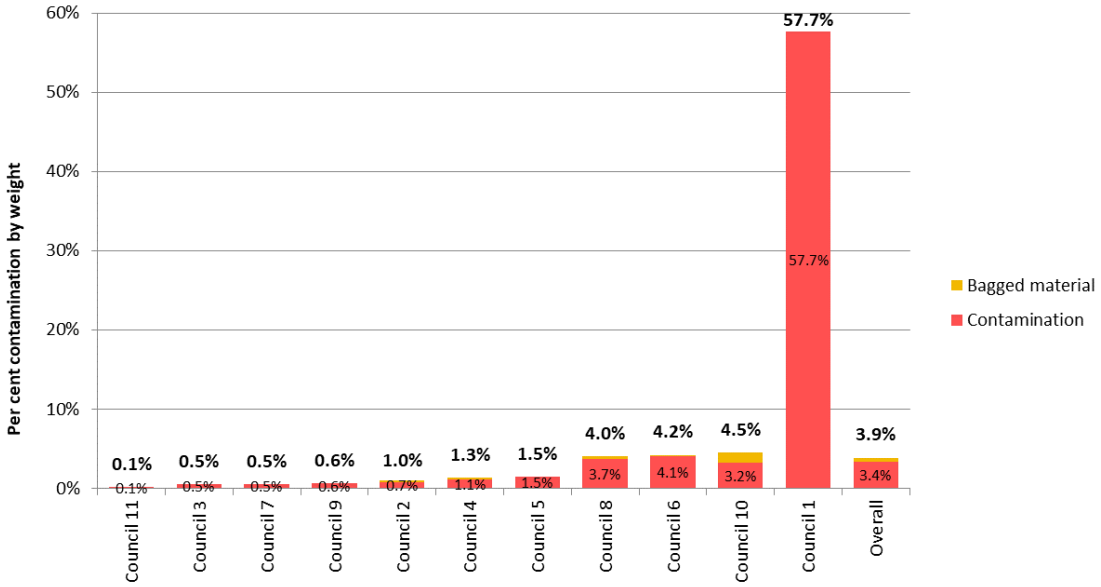
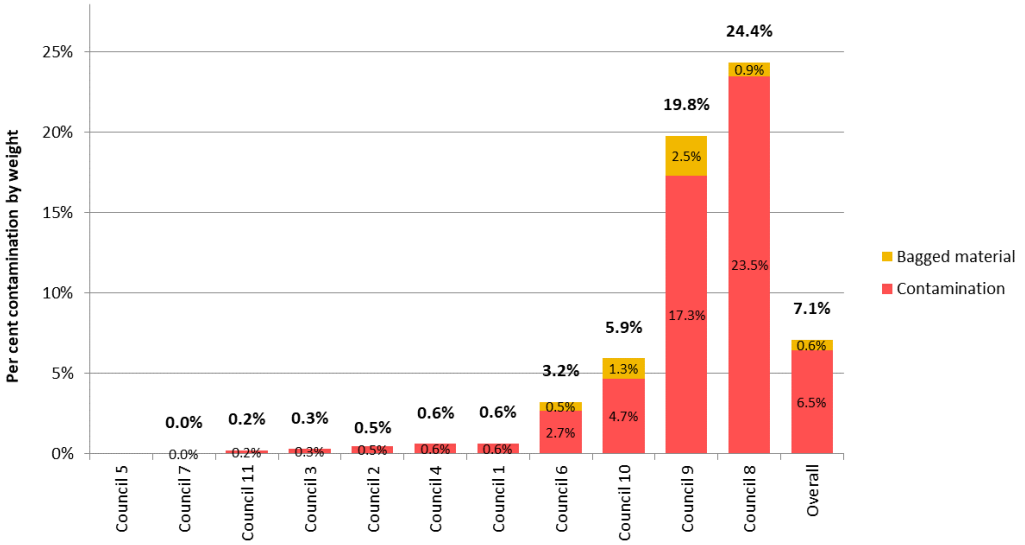


Figure 34 shows the contamination in the garden organics stream for MUDs by council. Contamination ranged from zero (no bins presented) to 24.4%. Bagged material was only found in very small proportion at 0.6% across the region. Most of the contamination at MUDs was loose materials. The regional contamination level for MUDs was 7.1% and only two (2) councils had contamination higher than this regional average level.

Figure 34 Garden organics contamination by council – MUDs



3.8 E-waste and hazardous materials

Table 15 identifies the quantity of e-waste and hazardous items found per household. On average, 0.47 e-waste and hazardous items were produced per household per week, which equates to an estimated 15.0 million items per year across the entire SSROC area. The majority (82%) of e-waste and hazardous items were found in the general waste bins, with 18% in the recycling and none in garden organics bins. The most common e-waste items found were electrical items/peripherals and non-rechargeable batteries. A smaller amount of rechargeable batteries, computer equipment, toner cartridges, power tool batteries, other batteries and mobile phones were found. A small amount of hazardous items including clinical (medical) waste, paint, other hazardous items, fluorescent tubes, household chemicals and asbestos were also found.

Table 15 E-waste and hazardous materials per household

Material	Number of items per household per week				Total items per year
	General waste	Recycling	Garden organics	Total	
Electrical items and peripherals	0.21	0.03	-	0.24	8,003,380
Non-rechargeable batteries	0.08	0.02	-	0.11	3,557,313
Clinical (medical)	0.03	0.01	-	0.03	1,094,617
Paint	0.02	0.002	-	0.02	157,416
Rechargeable batteries	0.02	0	-	0.02	13,694
Computer equipment	0.005	0.001	-	0.007	13,602
Hazardous other	0.005	0.001	-	0.006	791,149
Toner cartridges	0.005	0.001	-	0.006	213,856
Fluorescent tubes	0.004	0.001	-	0.006	187,172
Household chemicals	<0.01	<0.01	-	<0.01	194,288
Power tool batteries	<0.01	<0.01	-	<0.01	546,653

Material	Number of items per household per week				Total items per year
	General waste	Recycling	Garden organics	Total	
Other batteries	<0.01	<0.01	-	<0.01	217,849
Mobile phones	<0.01	<0.01	-	<0.01	21,217
Asbestos	<0.01	<0.01	-	<0.01	6,755
Total	**0.38**	**0.08**	**0.00**	**0.47**	**15,018,961**

Figure 35 shows the average number of e-waste and hazardous items found in the domestic waste bins per council. The results ranged from 0.1 item to 1.0 item per household per week. Only two of the councils generated e-waste and hazardous items more than the regional average of 0.5.

Figure 35 E-waste and hazardous items per household per week, by council

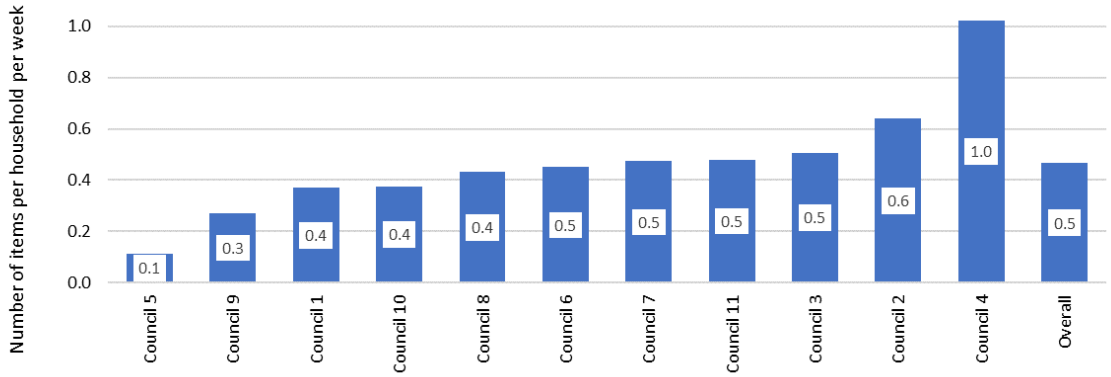


Image 7 Common e-waste and hazardous items in the kerbside waste stream

3.9 Textiles

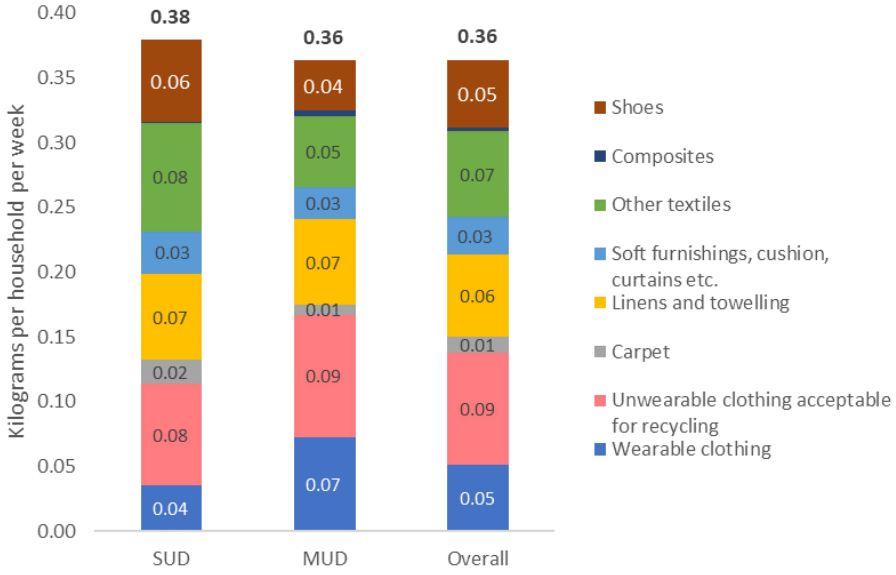
Textiles represent 4.6% of the general waste and 1.2% of the commingled recycling. Textiles found in the kerbside general waste and recycling bins were further sorted into six (6) categories by weight and count, as shown below:

1. Wearable clothing (clean, no rips or broken parts) – can easily be worn again
2. Unwearable clothing acceptable for recycling (e.g. damaged, stained or broken but relatively clean and suitable for recycling).
3. Carpet
4. Linens and towelling
5. Soft furnishings, cushion, curtains, etc.
6. Other textiles (includes all textiles that cannot be allocated to the other above categories).

3.9.1 Textile generation and composition by weight

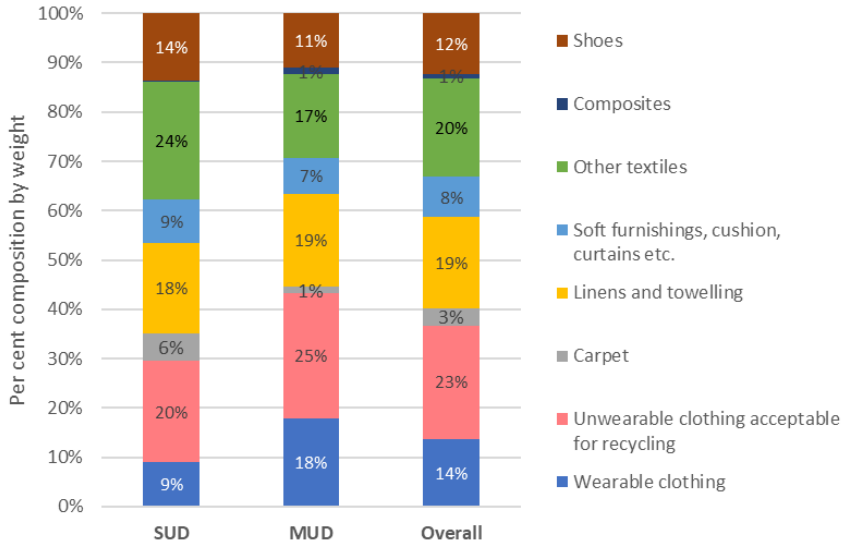
Overall, a SSROC household generated 0.36 kg of textiles per week, as shown in Figure 36. SUDs generated more textiles at 0.38 kg per household per week compared with MUDs at 0.36 kg per household per week.

Figure 36 Textile generation by weight and housing type



At SUDs, the most generated textile items by weight were other textiles, unwearable clothing, linens and towelling and shoes. Unwearable clothing was also prevalent at MUDs as well as linens and towelling, wearable clothing, and other textiles. This is also evident in the composition by weight presented in Figure 37. Overall, most of the material generated (by weight) was unwearable clothing at 23%, followed by other textiles at 20%, linens and towelling at 19%, wearable clothing at 14% and shoes at 12%. The remaining materials had less than 10% proportion of the textile stream.

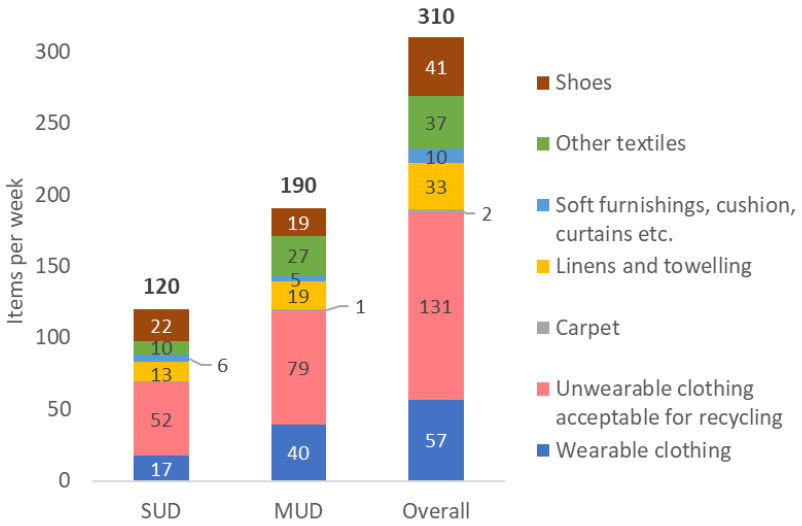
Figure 37 Textile composition by weight and housing type



3.9.2 Textile generation and composition by count

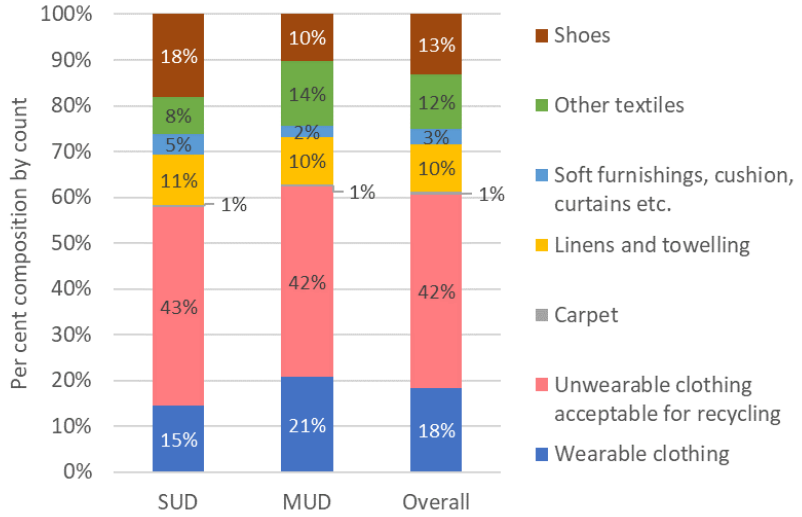
All textiles were weighed and counted and the results by count are presented below in Figure 38. On average, 310 items were counted weekly per council across the region, with unwearable clothing the most prevalent item. MUDs generated more quantity of textiles per week than SUDs, with unwearable clothing the most prevalent item for both housing types. Wearable clothing and other textiles also dominated the textile stream at MUDs. SUDs generated more shoes and slightly more soft furnishings, cushions and curtains, while MUDs had more of the remaining items such as unwearable and wearable clothing, linens and towelling, and other textiles.

Figure 38 Textile generation by count and housing type by council



By count, Figure 39 shows that the textile waste stream was also dominated by unwearable clothing (42%) and wearable clothing (18%). The proportions of linens and towelling and unwearable clothing were comparable, with slightly more quantity at SUDs compared with MUDs. Carpet in both housing types was the same but in a very small quantity. MUDs had a greater proportion of wearable clothing and other textiles than SUDs, while more shoes and soft furnishings, cushion and curtains were presented by SUDs.

Figure 39 Textile composition by count and housing type



3.9.3 Textile generation by council

By weight, weekly textile generation ranged from 0.18 kg to 0.64 kg per household. Six (6) of the councils generated textiles above the regional average of 0.36 kg per household. Five (5) councils had textile generation below the regional average, as shown in Figure 40.

Figure 40 Generation of textile by weight, by council – all dwellings

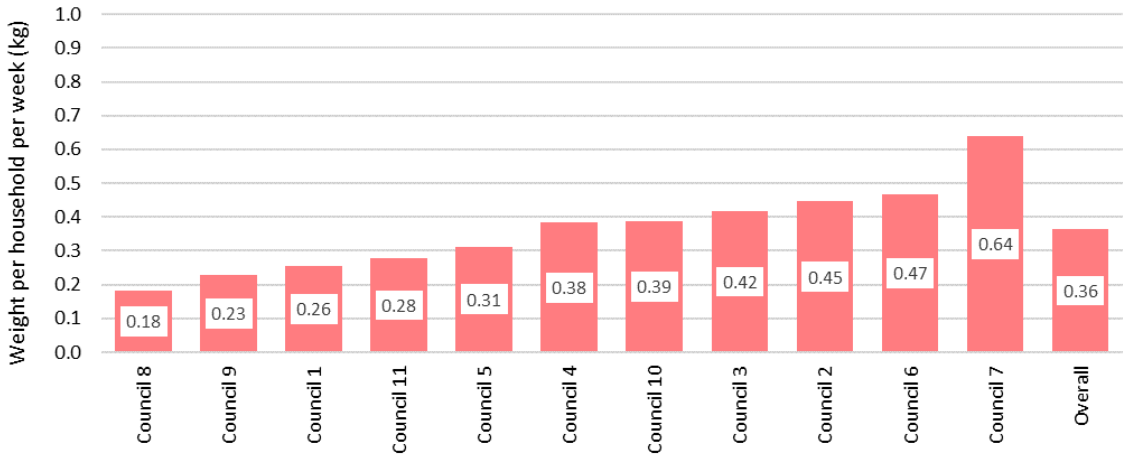
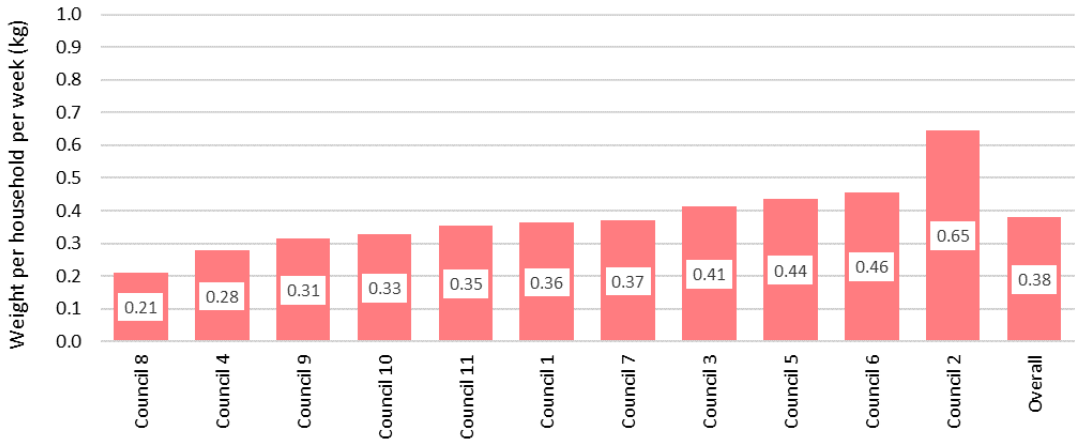


Figure 41 and Figure 42 present the weekly textile generation by weight for the different housing types for each council. For SUDs, the range of textile generation was from 0.21 kg to 0.65 kg per household per week. Seven (7) councils had SUDs generating textiles below the regional average of 0.38 kg, while the remainder presented textiles more than the regional average.

Figure 41 Generation of textile by weight, by council - SUDs



It ranged from 0.14 kg to 0.96 kg at MUDs, with five (5) councils presented more textiles than the regional average of 0.36 kg, while six (6) had lesser textiles than the regional average.

Figure 42 Generation of textile by weight, by council - MUDs

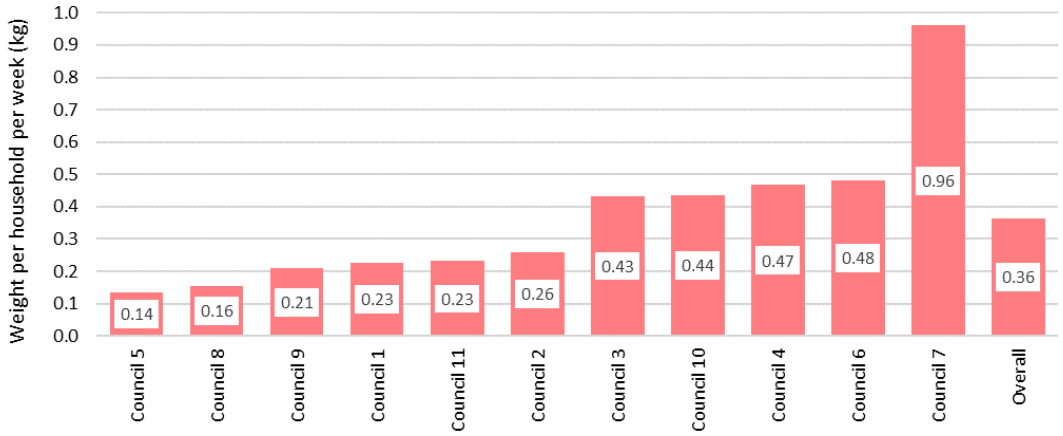
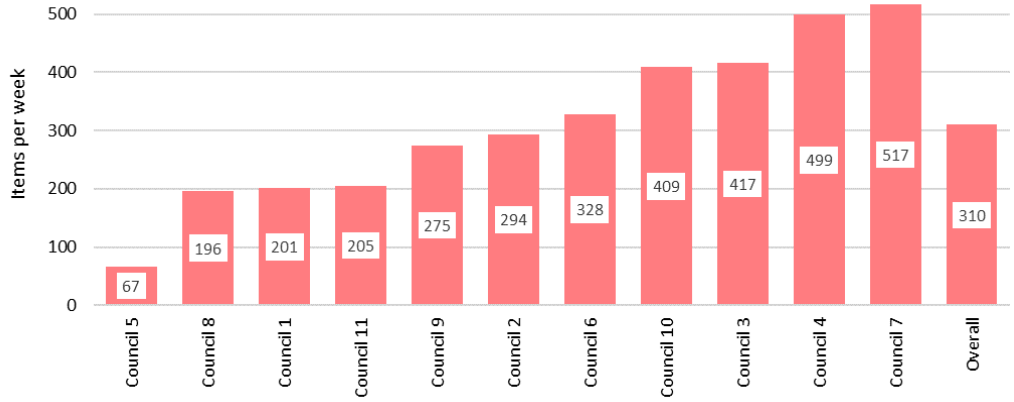


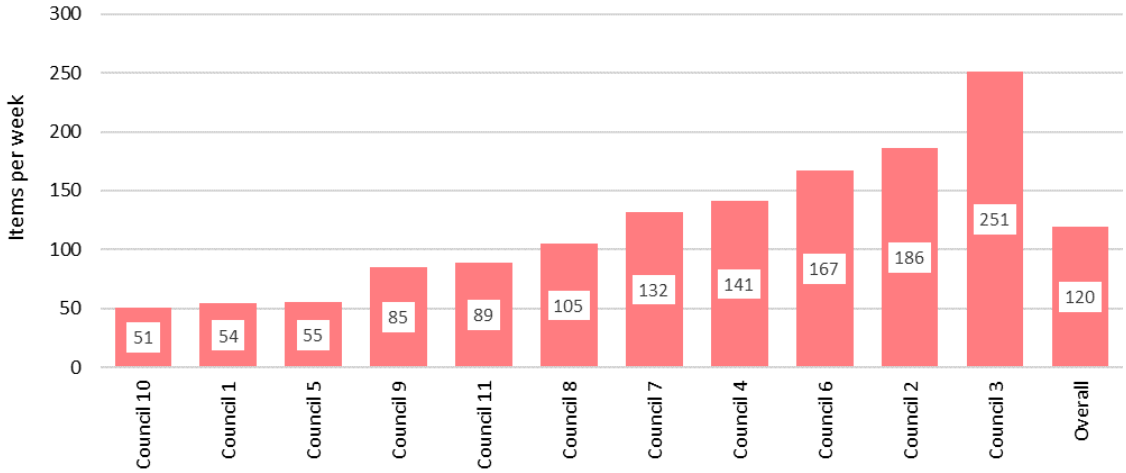
Figure 43, Figure 44 and Figure 45 present the weekly textile generation by housing type for each of the councils by count. Overall, the number of textiles generated per week ranged from 67 to 517, with the regional average of 310.

Figure 43 Generation of textile by count at all dwellings, by council



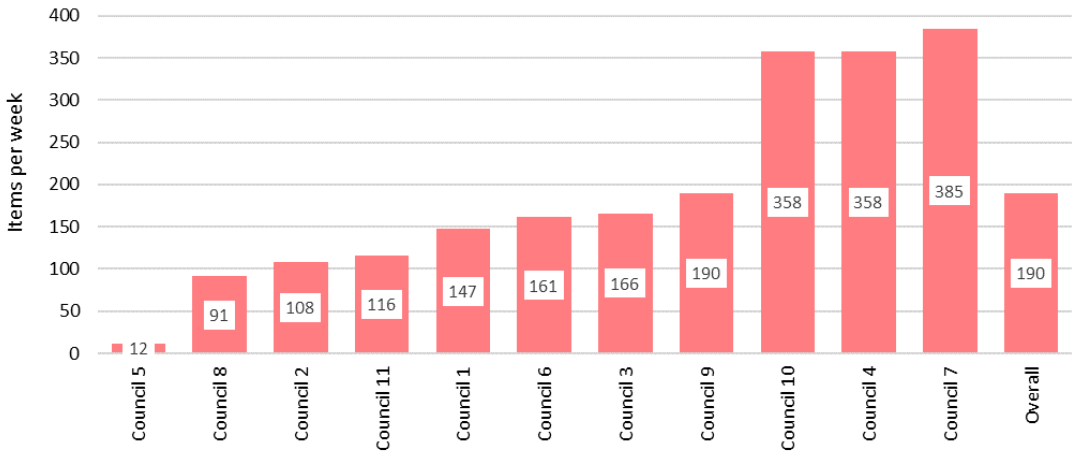
For SUDs, the generated number of textiles ranged from 51 to 251, with the average of 120 items.

Figure 44 Generation of textile by count at SUDs, by council



The range for MUDs was from a low of 12 to a high of 385, with an average of 190 items.

Figure 45 Generation of textile by count at MUDs, by council



Unwearable clothing

Wearable clothing

Linens and towelling

Shoes

Image 8 Textile materials segregated from the waste stream for auditing

3.10 Recovery rates

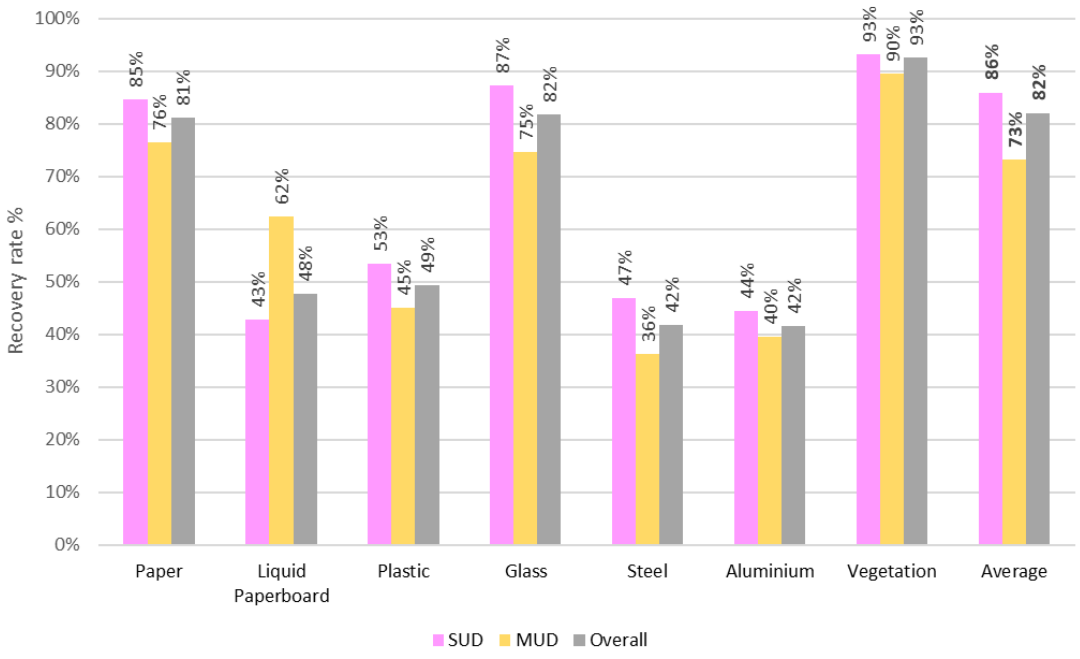
Recovery rates can by calculated by specific material, as well as overall — for example the number of aluminium cans found in the recycling bin, divided by the total amount of aluminium cans found in both the general waste and recycling bins. Recovery rates are useful for determining performance by material and which materials warrant increased focus for education initiatives. Recovery rates are calculated as follows:

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

Recovery rates of more than 90% are considered good performance. Rates of 60% to 90% have room for improvement and recovery rates below 60% are considered low and indicate further resident education is required.

Figure 46 shows the SSROC recovery rates for each dwelling type and all dwellings combined. The overall recovery rate is 82%. SUDs achieved 86% and MUDs 73% recovery of materials. Vegetation was the best recovered material at both housing types with SUDs (93%) and MUDs (90%). Paper and glass were well recovered, particularly at SUDs, with more than 85% recovery rate. Plastic, steel and aluminium were not as well recovered, with recovery rates of less than 54% at both housing types.

Figure 46 Recovery rates



3.11 Landfill diversion – current and potential

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

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

The diversion rate may be slightly different to that calculated by individual councils using the overall general waste, recycling and organics tonnages generated during the year. This is because the audit is conducted as a snapshot of that particular time period, and it does not factor in seasonal fluctuations or other annual trends. Moreover, some councils recover food organics from general waste after kerbside collection via an MBT facility, when available, which is not quantified in the high-level analysis of this audit and, therefore, not included in the calculation of diversion rate. For planning purposes, councils may consider a more detailed landfill audit to supplement this kerbside audit and estimate actual diversion rate across the LGAs via recycling and treatment processes in material recovery facilities for commingled recycling stream; and MBT facilities to capture food from general waste stream.

The analysis provides an indication of overall system performance and highlights the additional diversion potential through either modified collection or processing systems and/or changing household behaviour. 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. Therefore, these are maximum theoretical diversion rates. Councils may realistically aim to achieve 60% of the additional potential diversion for any of the targeted streams.

The *NSW Waste and Sustainable Materials Strategy 2041* sets an 80% average recovery rate for all waste streams. APC has modelled three scenarios.

- Scenario 1 – Current diversion
- Scenario 2 – Maximum use of existing bin services, i.e. 100% recovery of commingled recycling and garden organics[2]
- Scenario 3 - Introduction of a FOGO service to the remaining councils and maximum use of the existing FOGO services, and optimum use of alternative disposal pathways for acceptable items such as e-waste, hazardous waste and clean clothing/textiles with the assumption that 100% of the available materials can be recovered through these pathways

The current diversion rate from landfill from SSROC's municipal waste and recycling is in 2023 is 37% based on this kerbside audit of recyclables, garden organics or FOGO streams only. This comprises 19% diversion achieved from the commingled recycling and 18% from garden organics/FOGO recycling. SUDs performed better than MUDs, due mainly to the amount of garden organics recycled by SUDs. The current recovery rate estimated in this audit does not include any additional recovery achieved by councils which opt to process mixed general waste through the MBT.

[2] In the case of councils which have existing FOGO bins, the food materials were excluded from the regional average calculation for consistency across the region. These materials were included in the calculation for Scenario 3.

Figure 47 2023 landfill diversion rates

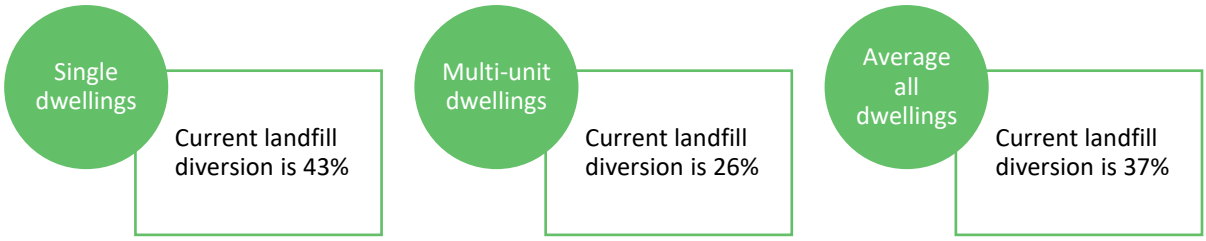


Table 16 sets out the details of potential diversion rates for each housing type and each waste stream across three different recovery scenarios described earlier. These results are based on the assumption that 100% of the available materials in the waste stream are potentially recovered.

Scenario 2 can provide an additional maximum of 8.6% of which commingled recycling (7.1%) and garden organics (1.5%) would lift landfill diversion to 46%. Scenario 3 could result in a maximum diversion of a further 29%, raising the maximum diversion to 75%. However, diverting all food, recyclables, vegetation, textiles, e-waste and hazardous materials is not considered realistic as it requires 100% participation rates and 100% presentation of correct materials. Indicatively, the trends data on landfill diversion on page 71 shows that councils could realistically aim for between 50-60% diversion in Scenario 3.

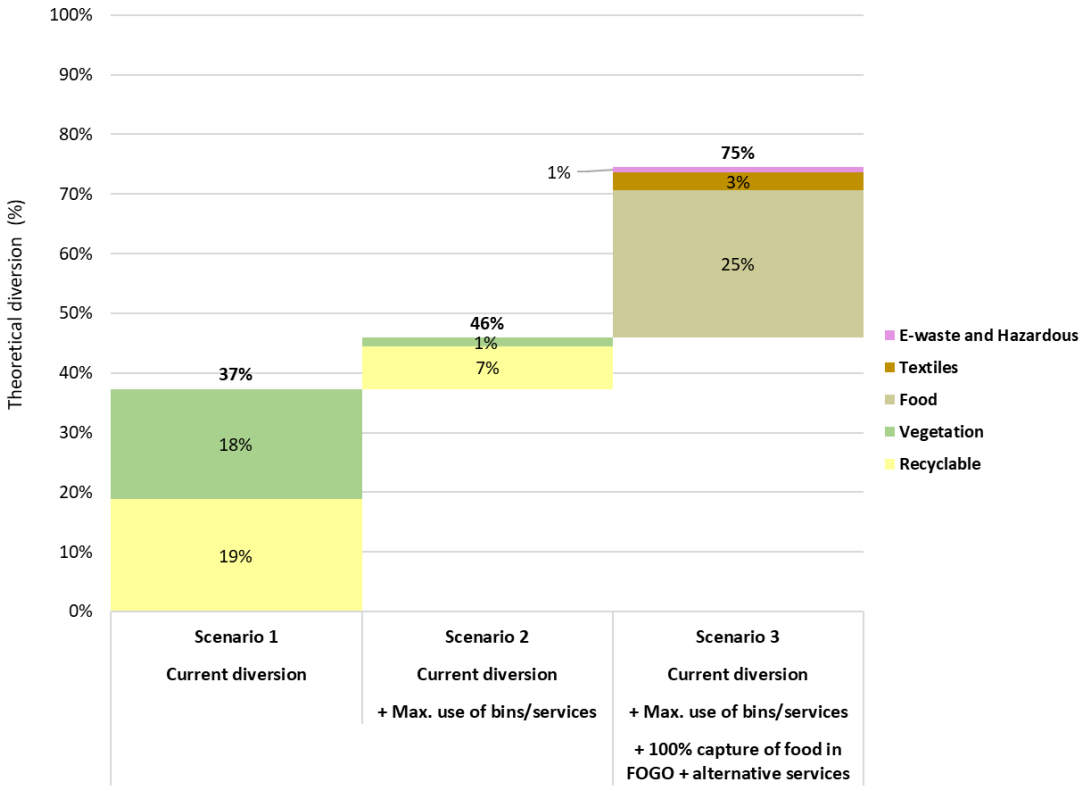
Table 16 Potential diversion for different recovery scenarios – details

Scenario	Material category	kg/hhld/wk diverted			Per cent diverted			Cumulative per cent diverted		
		SUD	MUD	Overall	SUD	MUD	Overall	SUD	MUD	Overall
Scenario 1: Current diversion	Recyclable	3.44	2.00	2.66	18.28%	19.93%	18.87%	18.28%	19.93%	18.87%
	Vegetation	4.57	0.70	2.60	24.29%	6.98%	18.46%	42.57%	26.90%	37.34%
	Total	***8.01***	***2.70***	***5.27***	***42.57%***	***26.90%***	***37.34%***	***42.57%***	***26.90%***	***37.34%***
Scenario 2: Current diversion + max. use of bins/services	Recyclable	1.02	0.99	1.01	5.45%	9.88%	7.15%	48.01%	36.78%	44.49%
	Vegetation	0.33	0.08	0.21	1.78%	0.81%	1.46%	49.79%	37.59%	45.94%
	Total	***1.36***	***1.07***	***1.21***	***7.23%***	***10.69%***	***8.60%***	***49.79%***	***37.59%***	***45.94%***
Scenario 3: Current diversion + max. use of bins/services + other pathways	Food[3]	4.44	2.69	3.49	23.62%	26.80%	24.72%	73.42%	64.39%	70.66%
	Textiles	0.44	0.42	0.42	2.33%	4.24%	2.96%	75.74%	68.63%	73.62%
	Hazardous /E-waste	0.16	0.10	0.13	0.83%	1.02%	0.89%	76.57%	69.65%	74.51%
	Total	***5.04***	***3.21***	***4.03***	***26.78%***	***32.05%***	***28.57%***	***76.57%***	***69.65%***	***74.51%***

[3] Calculation of food waste includes both loose food and containerised food and liquid materials.

These results are also shown in Figure 48 which presents the current diversion rate (Scenario 1) and potential additional diversion rates under two further scenarios (Scenarios 2 and 3) assuming 100% recovery of commingled recycling, FOGO and other problematic wastes (for alternative pathways).

Figure 48 Overall theoretical diversion for different recovery scenarios[4]



3.12 Bin capacity utilised

The audit measured the fullness of the bins at each housing type for each waste stream. Table 17 and Table 18 show detail of bin utilisation at each housing type.

Table 17 Bin utilisation at single-dwelling households

Bin fullness	General waste	Commingled recycling	Garden organics
Average per cent full	74%	75%	61%
Percentage of bins that are full or overflowing	35%	35%	24%
Percentage of bins that are less than half-full	17%	15%	37%

Table 18 Bin utilisation at multi- unit dwelling households

Bin fullness	General waste	Commingled recycling	Garden organics
Average per cent full	81%	82%	65%
Percentage of bins that are full or overflowing	53%	54%	32%
Percentage of bins that are less than half-full	12%	12%	32%

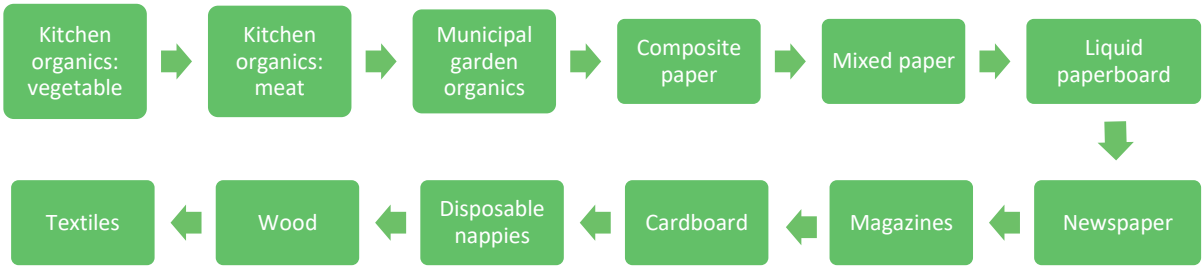
[4] Calculation of food waste includes both loose food and containerised food and liquid materials.

Image 9 Example of overflowing general waste bins

3.13 Calorific value of the general waste stream

To assist in assessing the potential for future energy-from-waste solutions for domestic waste, calorific values (CV) were calculated as per the Office of Renewable Energy Regulator *Guideline for Determining the Renewable Components in Waste for Electricity Generation,* 2001 (ORER Guideline)[5]. The ORER categories represent existing NSW EPA categories as per the *NSW Guidelines* with the exception of the two organics categories. Food was renamed kitchen organics and split by vegetable or meat. Similarly, vegetation renamed municipal garden organics.

Moisture content affects calorific value. The wetter the waste, the more energy is required to dry the material before it combusts to create energy. Therefore, the wetter the waste, the lower the raw calorific value. Hydrogen has a very high calorific value and therefore the hydrogen content of a waste type also influences its calorific value. APC conducted moisture-testing for the following categories of waste sorted during the audit:



The calorific value was calculated using the following formula:

$$CV_{raw} = ((1\text{-}w) \times (CV_{upper} - (2441^{*} \times 9) \times H)) - 2441 \times w$$

[5] ORER, now known as the Commonwealth's Clean Energy Regulator

Where:

CV = calorific value ('raw' is real 'as delivered' value, 'upper' is value for dried material) in kJ/kg

w = % moisture content (by weight)

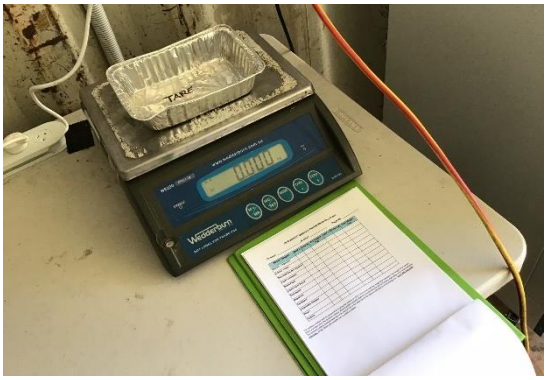
H = % hydrogen content (from literature values)

* vaporisation enthalpy of water (2441 kJ/kg at 250°C)

Data was entered into an Excel spreadsheet using the values and formulae as per the ORER *Guideline.* The values are presented in two ways and Image 10 shows the moisture-testing process.

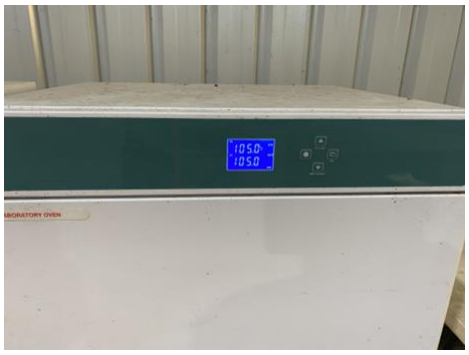
Raw	Dry
• 'As received' • Includes moisture content that is present when the material is collected from the kerb	• This is the 'upper' value • Assumes the moisture has been removed from the material following processing in the oven

Empty foil trays for samples



Staff tare scales prior to weighing

Raw sample



Oven permanently set to 105°C

Raw samples in oven

Post drying, re-weighing samples

Image 10 Moisture-testing process

HRL Technology who are NATA accredited conducted a site inspection and reviewed the sampling process on 7th of March 2023 and issued a report stating that moisture content was conducted according to the method provided by them and based on EN154414;2010. CI Scientific issued a NATA endorsed calibration certification on the 23rd of February 2023 for both ovens that we used to perform the test.

Table 19 provides a summary of CV by dwelling type across the region, noting that one council did not participate in the calorific assessment undertaken for the region. The general waste generated by the average SSROC household has a CV of between 9 (wet) and 19 (dry) megajoules per kilogram. This equates to a CV of between 75 and 156 megajoules per household per week.

Table 19 Calorific values

Category	Calorific value per kg of general waste (MJ)			Calorific value per household per week (MJ)		
	SUD	MUD	All dwellings	SUD	MUD	All dwellings
Raw	9	10	9	88	65	75
Dry	20	19	19	192	129	156

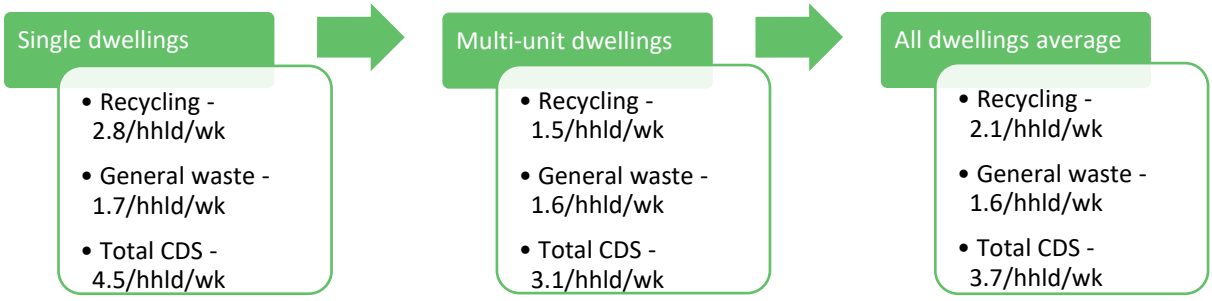
The calorific value of the total general waste generated by all households in SSROC each year is estimated at a maximum of 5,184 terajoules per year (this is the upper, or dry, value). Theoretically, this is enough energy to supply electricity to approximately 279,802 homes for one year, which is approximately 44% of the households in SSROC, based on an average household usage of 14.1 kWh per day[6].

The main contributors to CV in SSROC's general waste are kitchen (vegetables), other waste, mixed paper, plastic film and disposable nappies. The CVs of the remaining materials are less than 5%.
The CV detail by housing type and material category is provided in Appendix H.

3.14 Beverage containers in the kerbside bins

This section shows the results of the eligible used beverage container count of kerbside residual waste and recycling bins in 10 of the 11 councils participating in this year's audit, with one council opting out of the CDS audit. It is important to note that the calculations below estimate the value of CDS refunds not claimed by residents under the Return and Earn scheme. Refer to Appendix F for a list by product size and material. Figure 49 shows that the average SSROC household places 3.7 CDS-eligible beverage containers per week into their kerbside bins.

Figure 49 Generation of eligible beverage containers

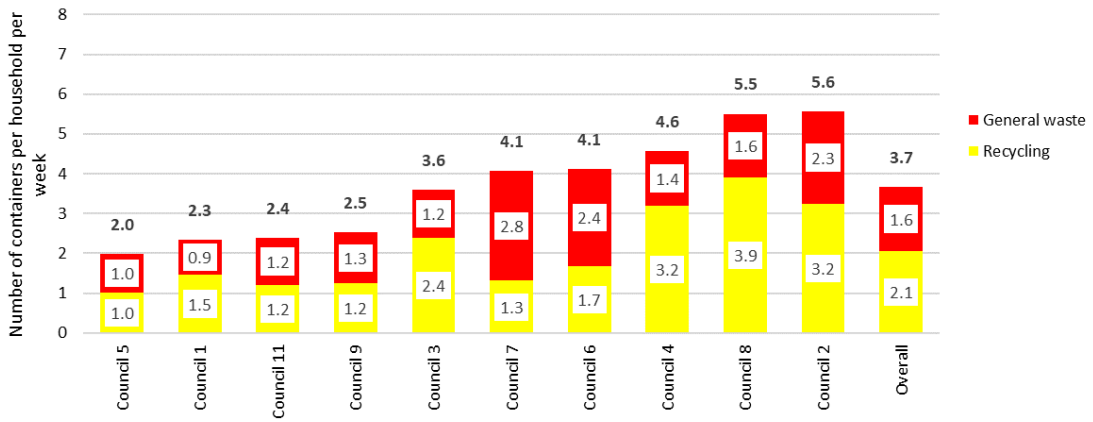


[6] Average electricity use - Ausgrid

Figure 50, Figure 51 and Figure 52 show the number of CDS-eligible containers in the general waste and recycling bins at each council, per household per week, for the various housing types. Slight differences in reported totals are due to rounding.

More CDS-eligible containers were present in the recycling stream of households than the general waste bins in the region, with only two (2) councils recording more CDS-eligible containers in the general waste stream with one council having comparable containers in both streams.

Figure 50 CDS-eligible containers in domestic bins, by council, all dwelling types



SUD households generated more eligible containers per week at 4.5 containers per week than MUDs at 3.1 containers, with only one council presenting more at MUDs (6.6 containers) than at SUDs (4.4 containers). Only one council presented more eligible containers in the general waste stream at SUDS while at MUDs, six (6) councils have more eligible containers in the general waste stream compared to the recycling stream.

Figure 51 CDS-eligible containers in domestic bins, by council, SUDs

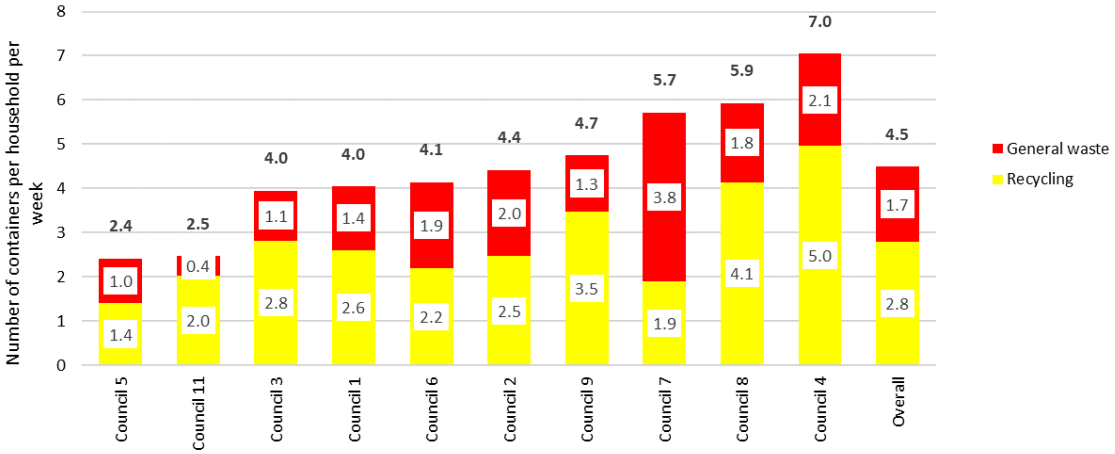
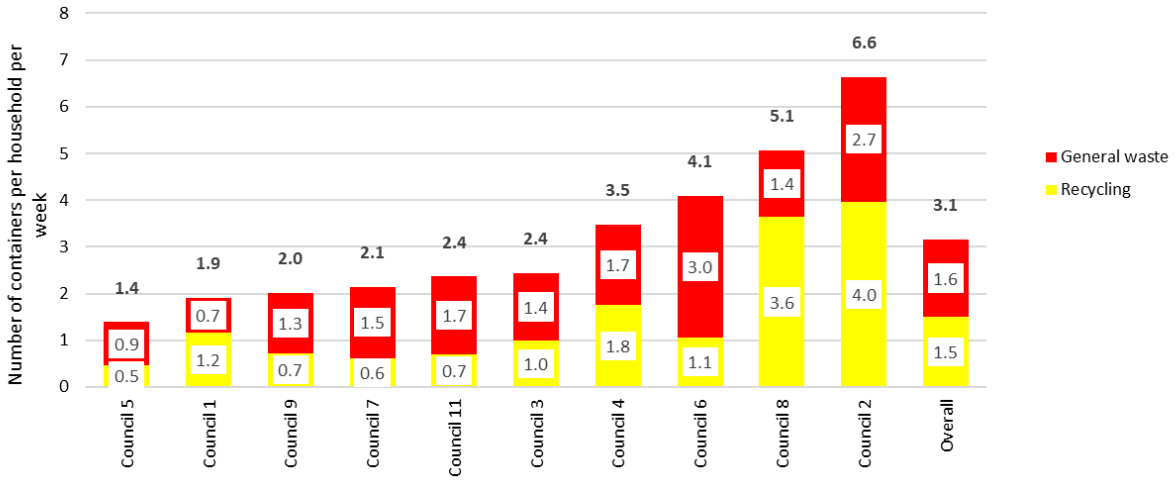


Figure 52 CDS-eligible containers in domestic bins, by council, MUDs



Currently, wine and spirit bottles are not eligible for a rebate under the NSW CDS. However, these containers are now part of the Queensland scheme, and it is expected will be part of the NSW scheme at some future point in time. Figure 53 shows that if wine and spirit containers were added as eligible items in the future, a further 1.0 container per week are present in the kerbside bins with almost all wine/spirit bottles in the recycling stream. SUDs averaged 1.3 wine/spirit containers per household per week while MUDs averaged 0.8 containers per week.

Figure 53 Wine and spirit bottles in the domestic bins

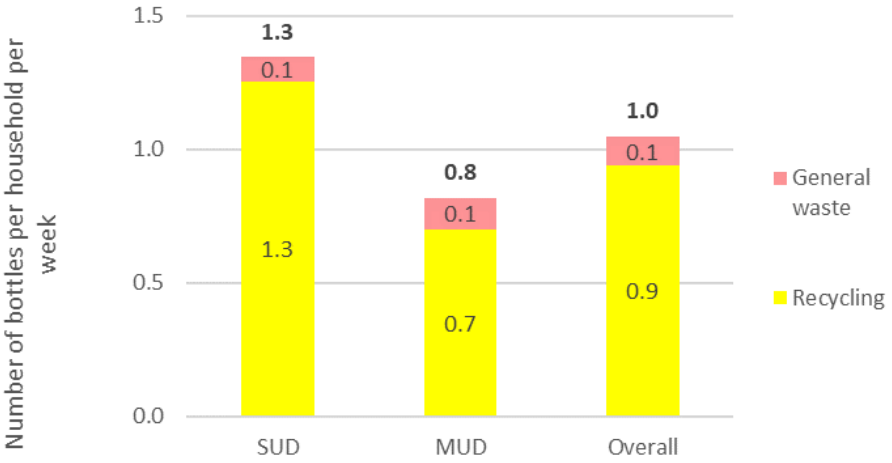
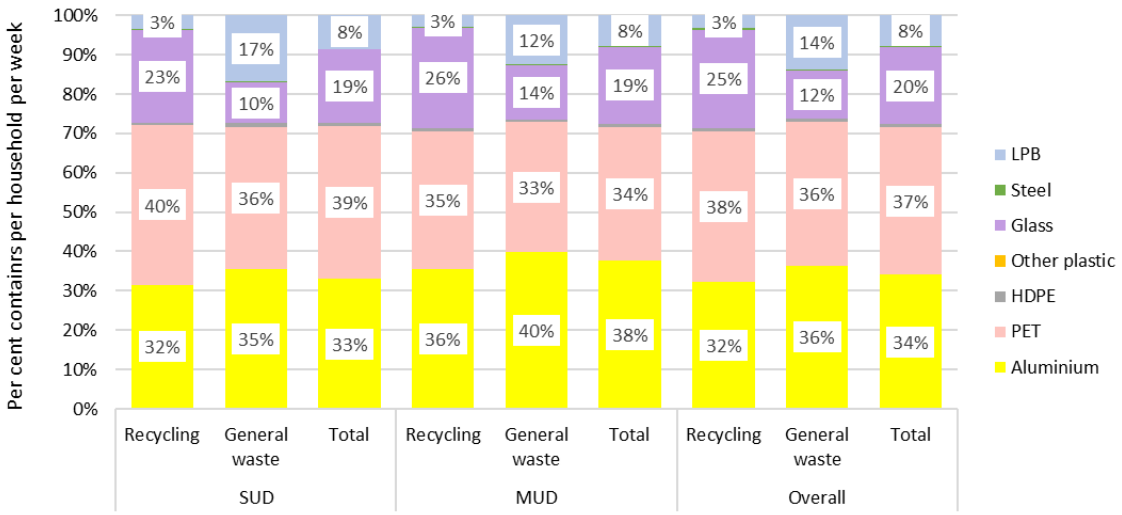


Figure 54 shows the percentage, by material type, of the total CDS-eligible beverage containers in the general waste and recycling stream. Overall, PET is the most common eligible container material (37%), followed by aluminium (34%), glass (20%) and liquid paperboard (8%). SUDs had more PET containers than MUDs; more aluminium containers were found in MUDs.

Figure 54 CDS-eligible beverage containers by material



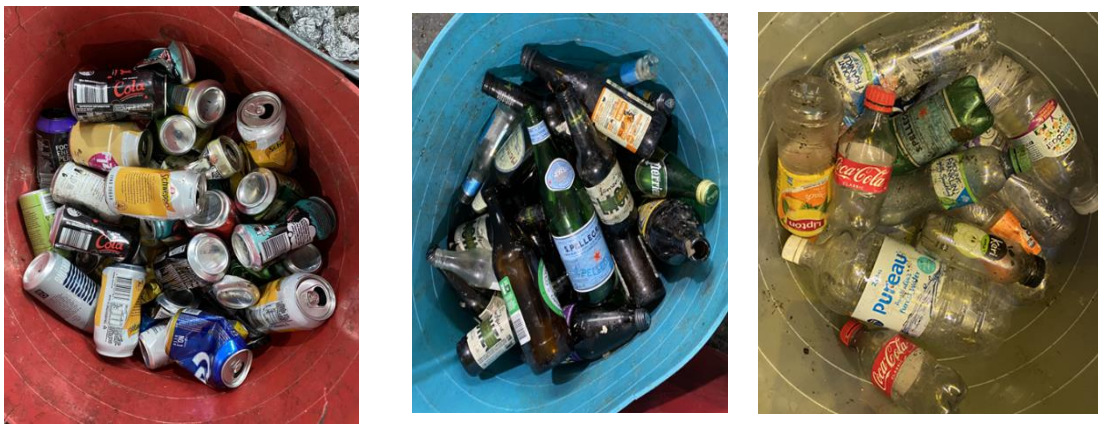


Image 11 CDS-eligible containers found in general waste and recycling streams

4. COMPARISON WITH PREVIOUS AUDIT DATA

Data in this section has been compared with previous audit results where relevant data was available.

This section provides comparative data of previous audits undertaken in 2011, 2015, 2019 with the current audit in 2023. Small differences in the comparison data may be evident as slightly different methodologies were used and climatic seasons varied when the audits were undertaken, as outlined below:

- Audits also are undertaken over several months with the predominate season shown below with the majority occurring from February to May and across the autumn season.
  - 2011 – Autumn
  - 2015 – Spring
  - 2019 – Autumn
  - 2023 – Autumn

- The 2008 and 2011 audits used the bin-by-bin or 'bag and tag' collection system, where waste was collected and sorted by SUD household and MUD property.

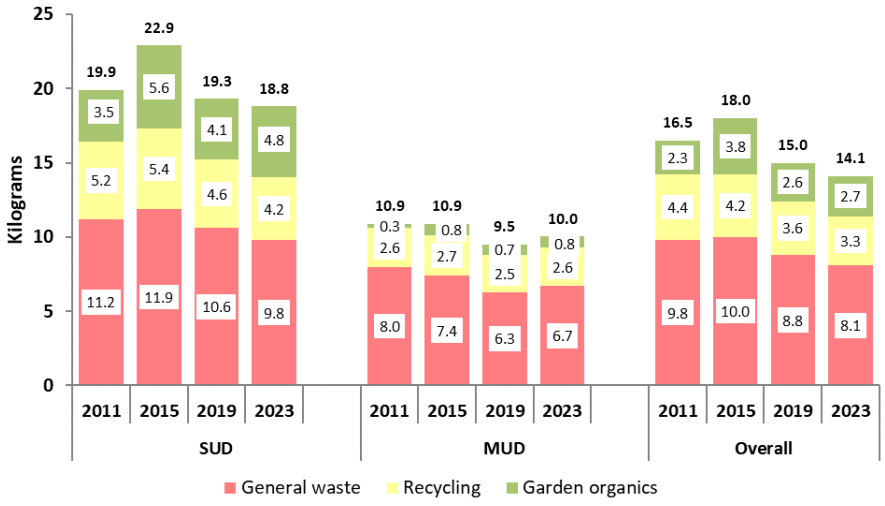
- Since 2015, all samples have been collected in an aggregated manner, with dedicated collections for MUDs and SUDs.

- One council is excluded from the 2019 and all prior audits however is included in the 2023 results.

4.1 Overall waste generation - trends

Figure 55 shows the weight of general waste, recycling and garden organics generated per household per week for all dwelling types in 2023 compared with previous years. It should be noted that the food materials in the FOGO stream, where existing service is available, are excluded in the calculation to achieve consistency across the region. Overall, domestic waste generation decreased from 2015 to 2023 with a similar declining trend at SUDs, with a 0.5 kg decrease between 2019 and 2023 while at MUDs total waste is relatively static in 2011 and 2015 with a decrease in 2019 and an increase of 0.5 kg in 2023.

Figure 55 Weekly weight of waste stream by household – trends



4.2 General waste generation and composition – trends

Figure 56 compares the generation of general waste at each housing type in 2023 compared with previous audits. The time series shows a general reduction in the amount of garden organics, food, recyclable material and other waste. In contrast, the amount of containerised food and liquid, non-recyclable paper and soft plastics has increased over the years.

Notably, general waste decreased in the last two audits (from 8.8 kg to 8.1 kg). This trend is more prevalent at SUDs, which demonstrated a decrease in general waste from 2015 onwards, with a decrease in 2023 by 0.8 kg (from 10.6 kg to 9.8 kg), also due to declining amount of garden organics, food waste, recyclable material, and other waste generated by SUDs in the region. MUDs, however, recorded an increase of general waste in the last two audits (from 6.3 kg to 6.7 kg), from a declining trend from 2011 to 2019, mainly due to an increase in recyclable waste, containerised food and liquid, non-recyclable paper and other waste in 2023.

Figure 56 General waste generation – trends

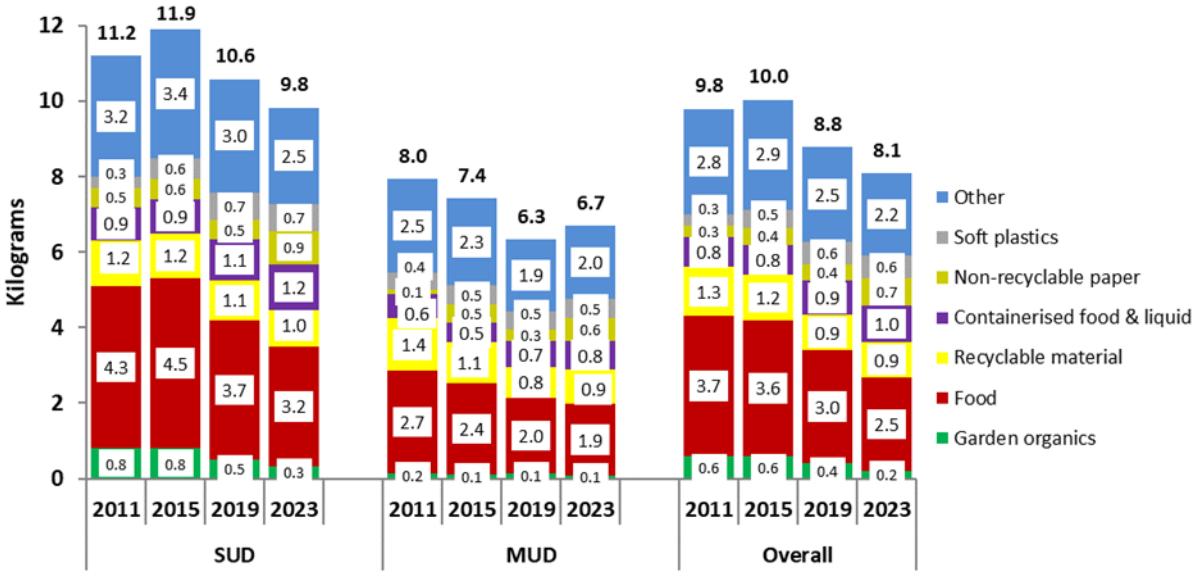
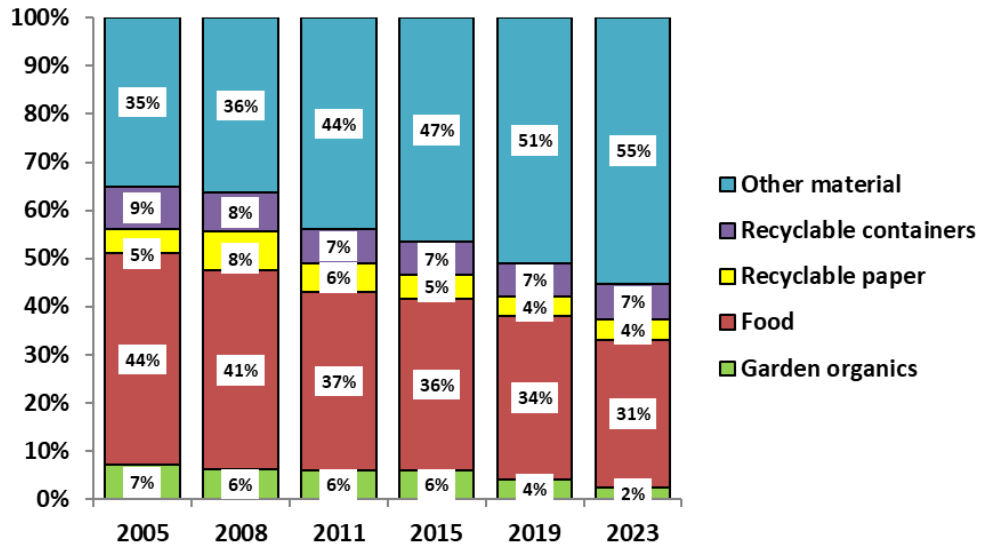


Figure 57 shows the consolidated composition of the general waste stream over time. Notably, the proportion of garden organics and food has reduced over time since 2005. Recyclable paper declined since 2008 and remained the same (4%) in the last two audits. Recyclable containers remained the same at 7% since 2011. As a result of the reductions in food and garden organics, the 'other material' proportion continued to increase over time.

Figure 57 General waste composition – trends



4.3 Commingled recycling generation and composition – trends

Figure 58 shows the times series for the consolidated generation of the recycling stream in 2023 compared with previous audits. The overall weekly generation of commingled recycling is in a declining trend since 2011. At SUDs, the amount of recycling decreased since 2015 while at MUDs there is a fluctuating trend with a 0.2 kg increase in 2023 from the 2019 level. The generation of recyclable paper and recyclable containers has generally reduced over time at SUDs but not at MUDs. Bagged material and loose contamination have decreased by 0.1kg in both housing types since the 2019 audit.

Figure 58 Commingled recycling generation – trends

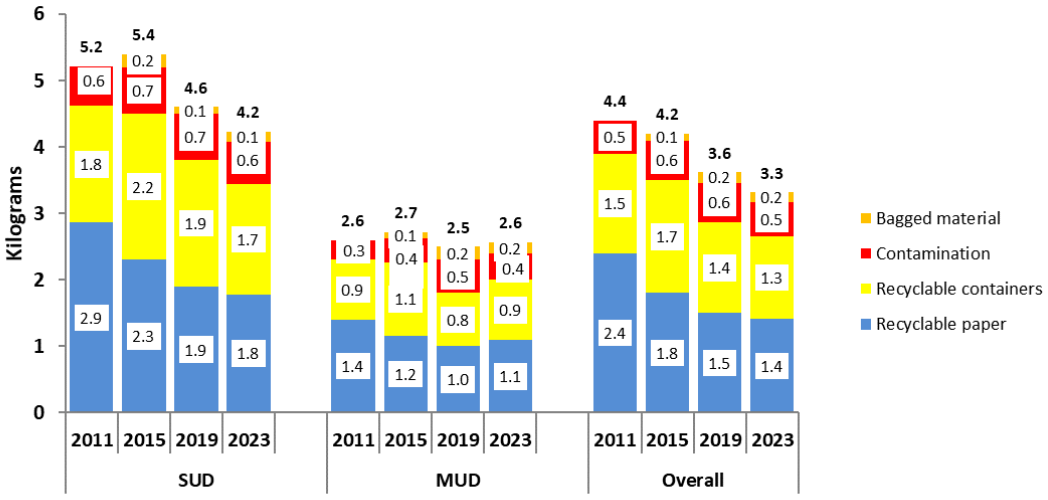


Figure 59 shows the time series for the consolidated composition of the recycling stream in 2023 compared with previous audits showing increasing contamination over time which stabilised in 2023. The 2019 and 2023 results are very similar.

Figure 59 Commingled recycling composition – trends

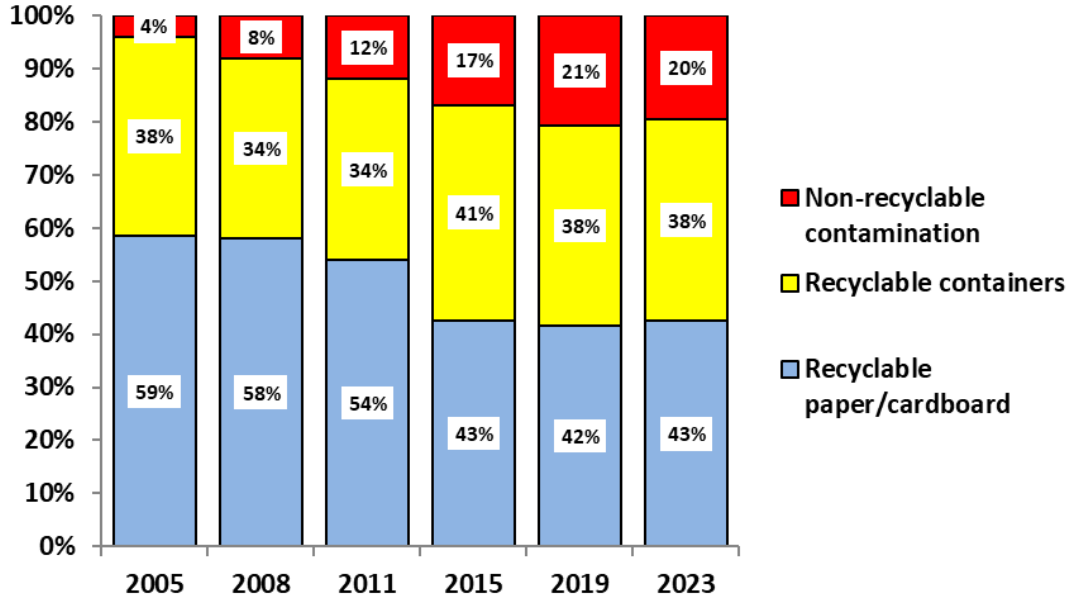


Figure 60 shows the proportion of contamination in the commingled recycling over time. The proportion of total contamination comprising loose contamination and bagged material has consistently increased since 2011. 2023 saw a reduction of just 1% in overall contamination. Overall MUDs consistently generate more contamination than SUDs.

Figure 60 Proportion of contamination in the commingled recycling – trends

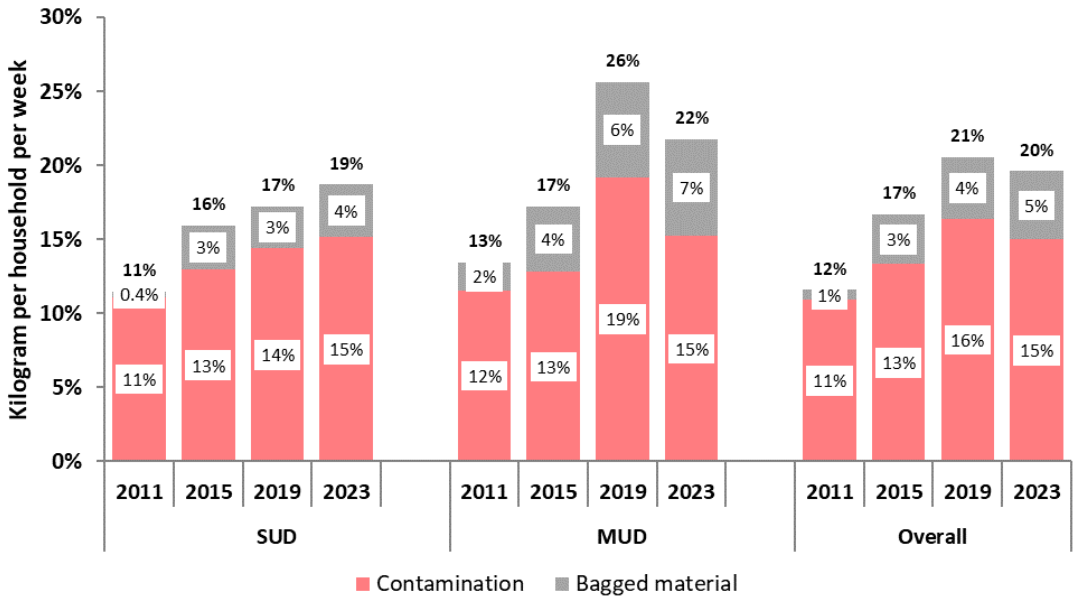
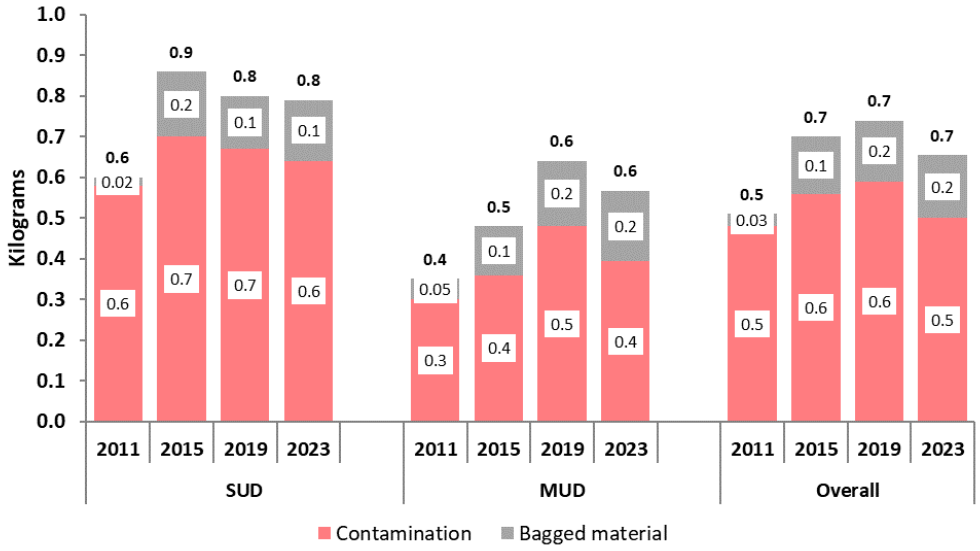


Figure 61 shows the generation of contamination in the commingled recycling by weight over time. Overall, the generation of both loose contamination and bagged material has increased since 2011 but levelled off since 2015. For both housing types, loose materials decreased slightly by 0.1 kg between 2019 and 2023.

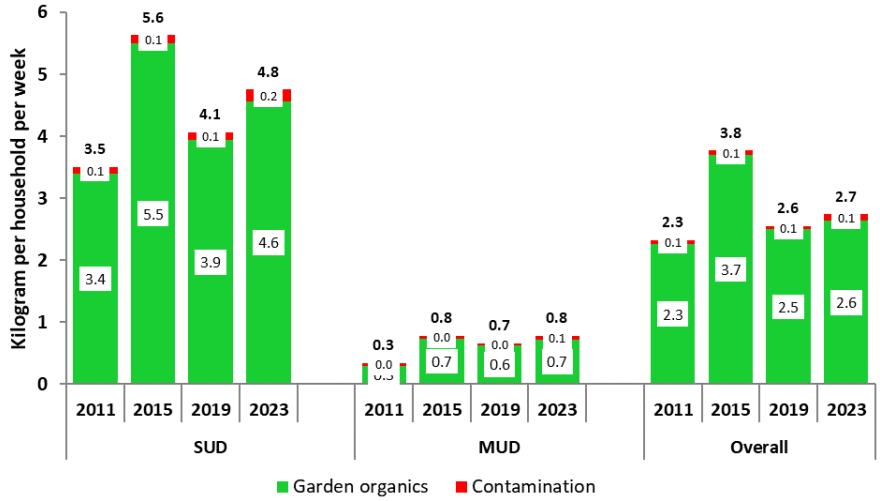
Figure 61 Commingled recycling contamination generation – trends



4.4 Organics recycling generation – trends

Figure 62 shows the generation of garden organics over time. Garden organics generation varies significantly with seasonal and climatic changes, with generation fluctuating over time for both housing types. The 2015 audit was conducted in spring and is probably the reason for the increased generation in that audit whereas all other audits are at similar climatic seasons. Contamination in the garden organics stream remained consistently low over time and ranged from zero to 0.1 kg per household per week. As only two councils accept food waste in the organics bin through the FOGO service (one of which only commenced prior to the 2019 audit), food waste is excluded from these results for consistency.

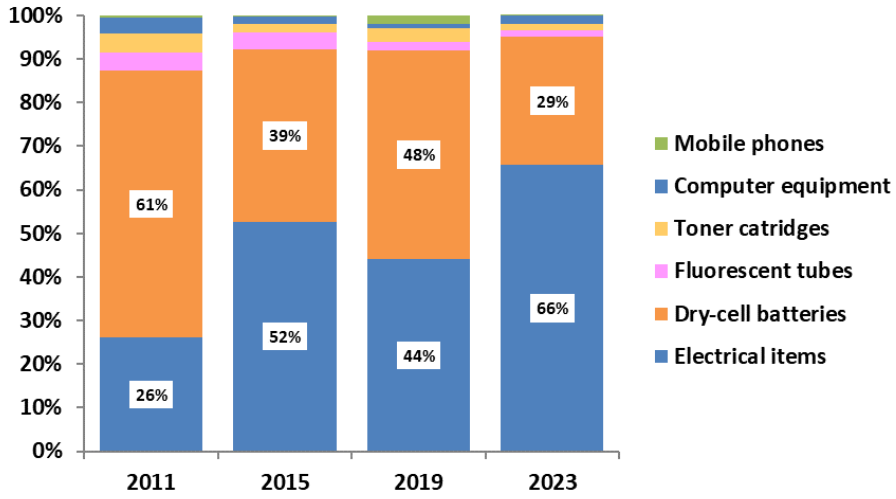
Figure 62 Organics recycling generation and composition – trends



4.5 E-waste and hazardous materials – trends

Figure 63 shows the composition of the e-waste and hazardous items counted in the audits over time by number of items. Electrical items and batteries are consistently the most common items found. The proportion of both items fluctuated over the years, with electrical items increasing by 22% in the last two audits and batteries decreasing by 19% during the same period.

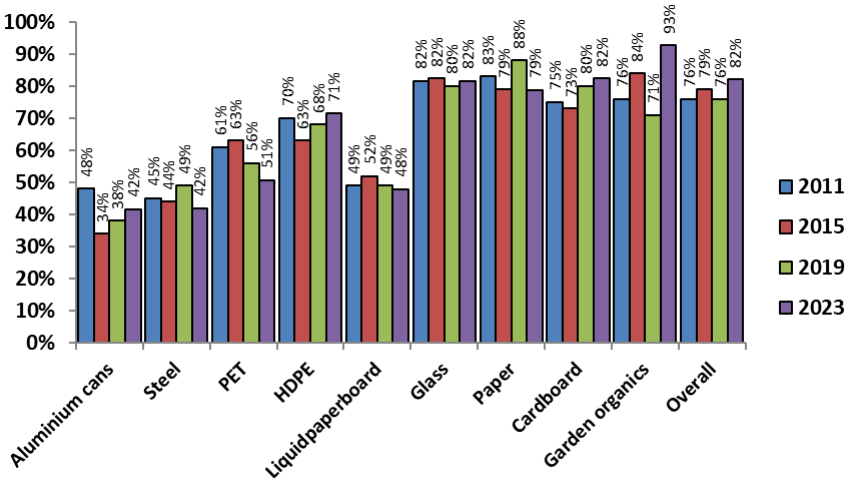
Figure 63 E-waste and hazardous materials – trends



4.6 Recovery of recyclables – trends

Figure 64 shows the recovery rates of recyclable materials, including garden organics, from all dwellings since 2011 compared with 2023. The overall recovery rates have been comparable over the years, ranging from 76% to 82%. The 2023 recovery rate is 82%, which increased by 6% from the 2019 level. All materials showed a fluctuating recovery trend, with garden organics, glass, paper and cardboard continuing to be well recovered at a rate of above 70%. The recovery of other materials remains below 70%. The recovery of glass, paper, cardboard and garden organics have been consistently high throughout the time series. In 2023 higher recovery levels were recorded for HDPE, glass, cardboard and garden organics compared to other years. Aluminium cans and steel are the least recovered items at 42%.

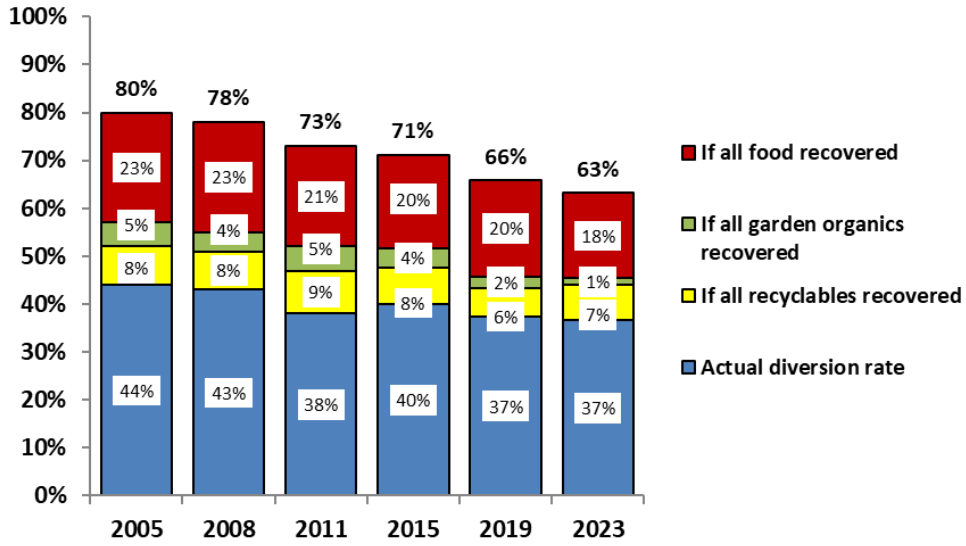
Figure 64 Recovery rates – trends



4.7 Landfill diversion – trends

Actual landfill diversion from SSROC municipal waste is shown to be generally declining and static over the last two audits. The potential diversion if the current services were used to their maximum decreased by 3%. Diversion from food waste recovery is decreasing with less available for recovery.

Figure 65 Current and potential diversion rates – all dwellings – previous audits

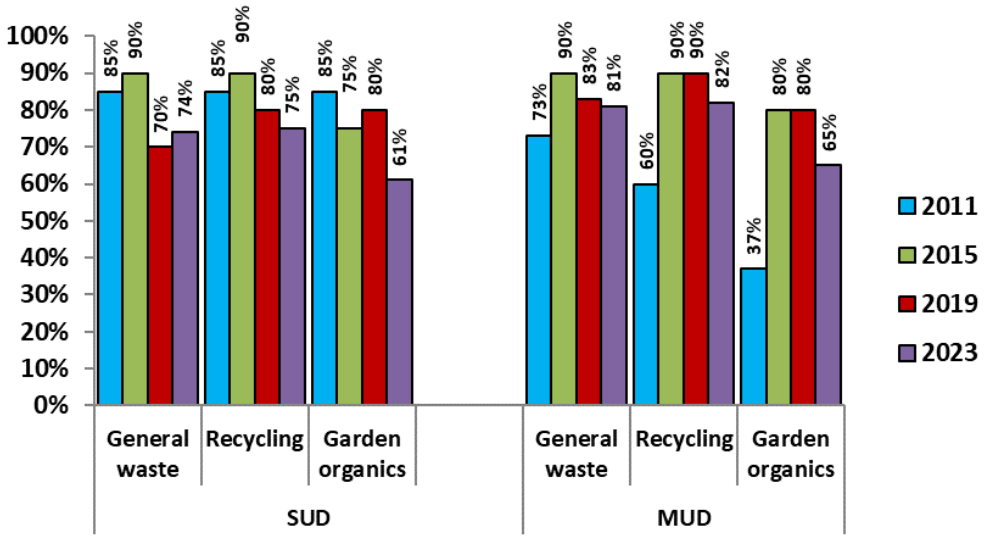


*Food does not include containerised food and liquid

4.8 Bin usage – trends

Figure 66 shows the median bin utilisation for 2023 compared with previous years. At SUDs, use of general waste bins has fluctuated, recycling bin utilisation has continued to decline since 2015 and garden organics bin usage decreased by 19% in 2023 over the 2019 usage. At MUDs, we only record the bins presented which demonstrate a declining trend since 2015 to 2023. Garden organics bins are less utilised, particularly in 2023, with 61% and 65% utilisation at SUDs and MUDs, respectively.

Figure 66 Median volume of bins used – previous audits



5. KEY FINDINGS

5.1. Bin presentation rates

- 97% of SUD and 100% of MUD households present a general waste bin for collection.
- 98% of SUD and 99% of MUD households present a commingled recycling bin for collection.
- 57% of SUD and 48% of MUD households present a garden organics bin for collection.
- In councils with separate paper/cardboard and container recycling bins, presentation rates are 100% for SUD containers and 87% for SUD paper/cardboard. MUDs present 100% for both bin types.
- In councils with FOGO service, SUDs and MUDs presented 88% and 89% of the bins, respectively.

5.2. Total waste and recycling generation

- The average SSROC household generated a total of 14.1 kg of general waste, commingled recycling and garden organics per week.
- The average SUD produced 47% more waste than the average MUD: 18.8 kg per week for SUDs and 10.0 kg per week for MUDs.

5.3. General waste generation

- The average SSROC household produced 8.1 kg of general waste per household per week.
- Generation ranged from 5.3 kg to 11.2 kg per household per week.
- SUDs produced one-third more general waste per week (9.8 kg) than MUDs (6.7 kg).
- The largest difference in generation between the housing types is loose food waste. SUDs generated 41% more food waste at 3.2 kg per household per week compared to 1.9 kg at MUDs.

5.4. Composition of the general waste stream

- The largest individual category is loose food waste at 30.6%, followed by other organics[7] (14.4%), containerised food and liquid (12.1%), soft plastic film (7.4%), and nappies/hygiene (6.9%).
- About 11.6% of general waste is material that should be in the recycling bins depending on the council collection service (either commingled or separate paper/container bins). This material comprises recyclable containers (7.3%) and recyclable paper/cardboard (4.3%).
- 1.2% of general waste is items that should be in the e-waste or hazardous waste services provided. By weight, these items are mainly electrical items and peripherals, and paint. E-waste was 0.9% of general waste and hazardous waste accounted for a low 0.3%.
- About 43% of general waste is material that could go into a combined food and garden organics (FOGO) bin. These materials are predominantly non-meat (29%) and containerised food and liquid (12%). Meat comprised 2% of these materials.
- 86% of general waste is presented in bags.

[7] Other organics include disposable paper products, contaminated paper, other putrescibles and wood/timber

5.5. General waste bin usage

- SUDs used an average of 74% of their general waste bins. MUDs averaged 81%.
- At SUDs, 35% of general waste bins were full or overflowing.
- At MUDs, 53% of general waste bins were full or overflowing.

5.6. Commingled recycling generation

- The average SSROC household produced 3.3 kg of commingled recycling per week.
- SUDs produced 4.2 kg per week; MUDs produced 2.6 kg a week.
- The generation ranged from 2.3 kg to 4.6 kg per household per week.

5.7. Composition of the commingled recycling stream

- The main components in the recycling stream were recyclable paper (42.5%) and recyclable containers (37.7%).
- Contaminants in the commingled recycling make up 19.7%, of which the largest proportion of single material was bagged material (4.7%) and contaminated paper (4.6%). All bagged material is considered contamination as it cannot be opened or separated at the MRF, regardless of whether the bagged material contents is recyclable.
- The next largest contaminants were other plastics and textile/carpet (both at 1.2%), composite materials, which are mostly paper, containerised food and liquid and plastic film (all at 0.9%).
- Recycling contamination ranged from 12.5% to 35.2%.
- MUDs had a higher proportion of contamination in the recycling (22.1%) than SUDs (18.7%).
- Both housing types generated comparable proportion of loose materials per household per week, while MUDs recorded almost twice as much bagged materials as SUDs.
- Bagged garbage/ recycling, contaminated paper, other plastics and textile/carpet were in the top four contaminants at both SUDs and MUDs, with the proportion of contaminated paper and textile/carpet higher at SUDs than MUDs. Bagged garbage/recyclables and other plastics were in greater proportion at MUDs compared with SUDs.

5.8. Commingled recycling bin usage

- SUDs used an average of 75% of their commingled recycling bin and MUDs used 82%.
- At SUDs, 35% of commingled bins were full or overflowing.
- At MUDs, 54% of commingled bins were full or overflowing.

5.9. Garden organics generation

- The average SSROC household produced 2.7 kg per week of garden organics.
- The majority of this was from SUDs at 4.8 kg, with MUDs generating 0.8 kg per household per week.
- Generation ranged from 0.3 kg to 7.3 kg per household per week, where 1.8 kg comes from food organics and other FOGO materials.

5.10. Composition of the garden organics stream

- The majority of the organics stream was vegetation (96.2%).
- Contamination in the garden organics stream was reasonably low, at 3.8%.
- Contamination ranged from 0.1% to 9.1% for most councils, with one garden organics bin filled up with ceramics, dirt, dust, rock and inert materials increasing one council's result to 42.1%. Bagged material was present only in six (6) councils ranging from 0.2% to 1.3%.
- The main contaminant was wood/timber, followed by ceramics, dirt, dust, rock, inert materials, bagged garbage, contaminated paper and cardboard.
- The contamination in the garden organics stream was higher at MUDs (7.1%) than at SUDs (3.9%).

5.11. Garden organics bin usage

- SUDs used an average of 61% and MUDs an average of 65% of their organics bin capacity.
- 24% of SUD organics bins are full or overflowing while 32% of MUD organics bins are full or overflowing.

5.12. E-waste and hazardous materials, including batteries

- On average, 0.47 e-waste and hazardous items were produced per household per week.
- The majority (82%) of e-waste and hazardous items were found in the general waste bins, with 18% in the recycling and none in garden organics bins.
- The most common e-waste items found were electrical items/peripherals and non-rechargeable batteries. A smaller amount of rechargeable batteries, computer equipment, toner cartridges, power tool batteries, other batteries and mobile phones were also found. A small amount of hazardous materials were found including clinical (medical) waste, paint, other hazardous items, fluorescent tubes, household chemicals, and asbestos.
- The number of e-waste and hazardous items per household per week ranged from 0.1 item to 1.0 item.

5.13. Textile generation and composition

- Overall, a SSROC household generated 0.36 kg of textiles per week.
- SUDs generated more textiles at 0.38 kg per household per week compared with MUDs at 0.36 kg per household per week.
- By weight, most of the material generated was unwearable clothing at 23%, followed by other textiles at 20%, linens and towelling at 19%, wearable clothing at 14% and shoes at 12%.
- By count, an average of 310 items were counted per week for each council, dominated by unwearable clothing (42%), wearable clothing (18%), shoes (13%), other textiles (12%) and linens and towelling (10%).
- Weekly textile generation ranged from 0.18 kg to 0.64 kg per household.

5.14. Recovery of recyclable materials

- The overall recovery rate is 82%.
- SUDs achieved 86% and MUDs 73% recovery of materials.

- Paper and glass were well recovered, particularly at SUDs, with a more than 85% recovery rate.
- Vegetation was the best recovered at both housing types: 93% and 90% recovery at SUDs and MUDs, respectively.
- Plastic, steel and aluminium were not as well recovered, with recovery rates of less than 54% at both housing types.

5.15. Diversion from landfill

- Current diversion from landfill from SSROC's municipal waste and recycling is still 37%. This comprises 19% diversion achieved from the commingled recycling and 18% from garden organics recycling. Since the audit involves kerbside waste produced by households only, it is not able to quantify additional diversion of food waste when councils opt to process general waste via an MBT facility after collection.
- SUDs achieved 43% diversion and MUDs 26%.
- If all commingled recycling material and garden organics were put into the designated bins, an extra 8.6% diversion (7.1% recycling and 1.5% garden organics) would be achieved, lifting overall diversion to 46%.
- Replacement of the garden organics bin with a FOGO bin for food waste (loose and containerised) and optimum utilisation of alternative disposal pathways for acceptable items such as e-waste, hazardous waste and clean clothing/textiles would contribute to a further 29% diversion, raising the maximum potential diversion to 75%.

5.16. Calorific value of the general waste stream

- The general waste generated by the average SSROC household has a CV of between 9 (wet) and 19 (dry) megajoules per kilogram. This equates to a CV of between 75 and 156 megajoules per household per week.
- The calorific value of the total general waste generated by all households in SSROC each year is estimated at a maximum of 5,184 terajoules per year (this is the upper, or dry, value). Theoretically, this is enough energy to supply electricity to approximately 279,802 homes for one year, which is approximately 44% of the households in SSROC, based on an average household usage of 14.1 kWh per day.
- The main contributors to CV in SSROC's general waste are kitchen (vegetables), other waste, mixed paper, plastic film and disposable nappies.

5.17. Beverage containers in the kerbside bins

- The average SSROC household puts 3.7 CDS-eligible containers into the kerbside bins each week.
- The average SSROC household puts 2.1 CDS-eligible containers per week into the recycling bin and 1.6 CDS-eligible containers per week into the general waste bin.
- Single dwellings averaged 4.5 containers per week (2.8 in the recycling and 1.7 in the general waste).
- Multi-unit dwellings averaged 3.1 containers per week (1.5 in the recycling and 1.6 in the general waste).

- Single dwellings generated more eligible containers per week than multi-unit dwellings in most councils, except for one council, where MUDs generated more eligible containers, and two councils, where comparable numbers of CDS-eligible containers were found in their kerbside bins for both housing types.
- Two councils had more CDS-eligible containers in the general waste stream than in the recycling.
- The average SSROC household puts 1.0 wine/spirit bottle per week into the domestic bins. Almost all of these are in the recycling bins. SUDs averaged 1.3 wine/spirit bottles per week and MUDs 0.8 bottles per week.

5.18. Trends

- Overall domestic waste generation is lower in 2023 than in previous audit years, with a steady decline in all waste streams from 2015. This trend is more prevalent at SUDs. However, caution must be taken when planning due to results likely to be impacted by limitations in sampling size and short audit period as well as changes in composition with lighter materials dominating the waste stream.
- For general waste, the time series shows a general reduction in the amount of garden organics, food, recyclable material and other waste. In contrast, the amount of containerised food and liquid, non-recyclable paper and soft plastics increased over the years. Notably, the quantity of general waste decreased in the last two audits. This trend is more prevalent at SUDs. The proportion of garden organics and food has also reduced over time since 2005.
- The overall weekly generation of commingled recycling is in a declining trend since 2011 but only had a slight decrease in 2023, which is more prevalent at SUDs. Recyclable paper has generally reduced over time at both housing types, except in the last two audits at MUDs where an increase was recorded. This could be due to residents moving to on-line news, bills and magazines. The generation of recyclable containers in the recycling stream decreased at SUDs since 2015 which may have been due to the introduction of the Container Deposit Scheme (CDS) in 2017. However, at MUDs, the decrease was not sustained, with an increase in recyclable containers in 2023 compared with the 2019 level. This may be attributed to limited participation in waste drop-off events organised by councils and access to community recycling centres as alternative disposal pathway.
- The proportion of total contamination (loose contamination and bagged material) has increased since 2011 but slightly decreased in 2023 by 1% owing to a decrease in loose contamination. Bagged material consistently increased over the time series. This trend is more prevalent at MUDs. SUDs recorded increasing contamination (both loose and bagged materials) throughout the time series.
- Generation of garden organics has fluctuated over time for both housing types. Contamination in the garden organics stream remained consistently low over time.
- Electrical items and batteries are consistently the most commonly found items. The proportion of both items fluctuated over the years, with an increase in electrical items and a decrease in batteries in the last two audits.
- The overall recovery rates have been comparable over the years. Glass, paper and cardboard continued to be well recovered. Recovery of garden organics has been consistently high throughout the time series, with significant improvement in the last two audits. Aluminium cans and steel were the least recovered item.

- Landfill diversion from SSROC municipal waste is shown to be generally declining, with a slight fluctuation, and has remained the same in the last two audits. This may have been the result of a reduction in recoverable materials, most notably paper and more recently containers. The potential diversion has also decreased as the amount of food waste, recyclable materials and garden organics available for recovery has declined over time.
- At SUDs, use of general waste bins fluctuated, with an increase in 2023. Garden organics bin usage also fluctuated, with a decrease in 2023. Recycling bin utilisation declined since 2015 with a decrease in 2023.
- At MUDs, bin utilisation for the three waste streams is in a declining trend since 2015 to 2023.
- Median bin utilisation for general waste and recycling for both housing types is consistently high since 2015, with at least 70% utilisation in both waste streams. Garden organics bins are less utilised.

6. DISCUSSION OF KEY FINDINGS

- The general waste stream contains 11.6% of materials that should be in recycling bins (containers at 7.3%, paper and cardboard at 4.3%) and 2.5% in garden organics bin. A community-wide education campaign could assist with diverting these materials from the general waste stream into the recycling and garden organic streams, resulting in a further lift in both recovery and diversion rates. Key materials to target include recyclable paper and cardboard, plastic, glass and metals.
- The general waste bin contains 1.2% of e-waste or household hazardous items mostly electrical items and peripherals and paint. Further education on the options for disposing of household hazardous waste may help in removing these from the general waste stream.
- The general waste contains 31% loose food waste and 12% containerised food and liquid which is SSROC's single largest opportunity for increasing resource recovery. As per the state government mandate, councils need to consider introducing a food and garden organics (FOGO) service by 2030.
- Contamination in the commingled recycling stream has continued to increase and is at 20% and requires ongoing vigilance and resident education on key contaminants: bagged material (both garbage and recyclable), contaminated paper, textile/carpet and other plastics. Different contaminants could be targeted at single and multi-unit dwellings based on the 'top four' contaminants listed in this report.
- Unredeemed CDS containers remaining in both the general waste and recycling streams in the audit sample if extrapolated across the region could have a combined value of $12,295,483 across the region per annum.
- Current landfill diversion now called recovery in the NSW *Waste and Sustainable Materials Strategy,* 2041 is set at 80%. SSROC is currently at 37% (not including any additional recovery of materials achieved by councils opting to process general waste at an MBT facility). If all recyclables (7%) and garden organics (1%) were diverted to existing services, the maximum increase would be 8% to an overall rate of 46%. If all food waste was diverted this has the potential to lift diversion by 29%, to a maximum of 75%.
- Alternative technology is the only way to achieve the prescribed state governments target.
- This audit found the energy recovery potential from general waste is a maximum of 5,184 terajoules, theoretically this is enough to provide electricity supply to approximately 279,802 homes for one year or approximately 44% of the households in SSROC.

APPENDIX A 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.

Contaminant*:* Item that is not accepted for processing in the bin it is placed in.

Commingled collection*: Pick up and transportation of mixed dry recyclable materials.

Diversion rate*:* The percentage of the total kerbside waste stream diverted from disposal not including clean-up collections, loose vegetation collections and drop-off systems.

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

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

Recycling stream*:* Material source-separated for the purposes of recycling.

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

$$\text{Recovery rate} = \frac{\text{Weight of recyclables in recycling bin + garden organics in the garden organics bin}}{\text{(Weight of recyclables in recycling bin + weight of garden organics in garden organics bin + weight of recyclables \& garden organics in general waste bin)}} \times 100$$

Segregation*:* Keeping the components of an assorted waste stream separated.

Source separation*: Physical sorting of the waste stream into its components at the point of generation.

Stringy materials: Rope, string, hose, electrical cable, carpet, textiles, cords, strips of bubble wrap and other plastic film, electrical lead, electrical wiring.

Problem waste: Hazardous waste and batteries, as noted in the sorting categories and definitions list at Appendix C.

Total waste stream*:* The combined waste, recycling and garden organics streams.

Waste composition*: Component material types by proportion of weight or volume.

*** Source: AS/NZS 3831:1998**

APPENDIX B DETAILED METHODOLOGY

The methodology for the kerbside waste audits, is based on the *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008,* including the audit *Guideline Addendum 2010.* The methodology for the sample selection and measurement of calorific values is based on the Commonwealth's Office of Renewable Energy (ORER) *Guideline for Determining the Renewable Components in Waste for Electricity Generation* (2001)[8]. A sub-audit of eligible CDS containers was undertaken based on the NSW EPA and Exchange for Change sampling protocol by count and weight.

Two sub-audits occurred by both count and weight, including:

- eligible CDS containers based on the NSW EPA and Exchange for Change sampling protocol
- textile-based categories and classifications as agreed with SSROC.

Project inception

APC representatives met with the SSROC and council waste managers to confirm and clarify the operational and logistical aspects of the audits including scheduling, sample selection, sample collection, sorting categories and definitions. It was agreed that an aggregated collection methodology would be followed, as had occurred in both 2019 and 2015.

As agreed, all SSROC councils were analysed based on the Visy Material Recycling Facility (MRF) acceptance standards to enable direct comparison and aggregation in this regional reporting. Following confirmation of the audit logistics, APC's project manager then liaised directly with each council to confirm the specific operational requirements for the audit.

Sample size

The *NSW Guidelines* and *Addendum 2010* require that 'matched pair' data from 220 households (i.e. general waste and recycling bins from the same household) for each council to measure household behaviour, including waste generation, composition, recovery and diversion. The household samples directly reflect the proportion of housing stock in the council areas as reported by the Australian Bureau of Statistics (ABS) 2021 census.

As the 2023 audit is based on an aggregated collection, and for the purpose of reporting results by housing type as well as overall, the collection days were dedicated to either MUDs or SUDs. Over the SSROC region, the sample was made up of 43% SUD households and 57% MUD households. In total, 8,235 kerbside bins were audited comprising 3,515 bins from SUDs and 4,720 from MUDs, as shown in Table 4.

[8] ORER, now known as the Commonwealth's Clean Energy Regulator

Sample selection

When selecting streets for sampling, the Guidelines 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.'[9]

For multi-unit dwellings (MUDs) 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'.[10]

The *Addendum 2010* also recommends that:

- At least 10 individual MUD properties should make up the entire sample;
- High-rise (more than three storeys) should be avoided.

The reason for avoiding high-rise is to prevent any one or two large MUD properties skewing the overall MUD results. It also allows for a larger number of MUD samples to be taken as part of the sampling regime. A separate high-rise MUD audit was undertaken for six councils that participated in this audit which are reported separately.

The streets and MUDs for the 2023 audit had been randomly selected based on specific councils' preference, i.e. either new designated streets or the same streets audited in 2019. Only three (3) councils opted to assign new streets and one (1) council chose to use a combination of new and 2019-designated streets while the 2019 streets were used in the rest of the councils.

In those councils where commingled recycling is collected on an alternating fortnightly cycle, the 2023 audit was conducted in the recycling collection zone that coincided with the first audit week along with the weekly general waste. In the one council where paper and container recycling are collected on alternate fortnights, the audit was conducted in the container collection zone along with the matched general waste. The paper stream was then collected in the second audit week to capture the entire recycling stream. In the two councils where general waste and FOGO were the 'matched pair', the commingled recycling stream was collected the following week. In accordance with the NSW Guidelines, garden/food organics bins were only collected from those households presenting a general waste bin. MUDs 'matched pair" was general waste and recycling bin collected in the first audit week and garden organics bin presented in week 2. This provided whole-system data for those households.

Sample collection

The *Addendum 2010* allows for aggregated sampling[11] to provide statistical analysis of variability where:

- At least one in four consecutive audits uses household-by-household auditing;

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

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

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

- Aggregated sampling is conducted using at least five and preferably 10 separate sub-samples (for example, if 220 households are to be audited, sub-samples of 22 or 44 households are taken separately).

The Guidelines also specify that

- 'every second to fifth bin is selected from the start address'.

This allows for non-presentation of bins by some households and the next household being used as the replacement sample. It also reduces results being affected by households that put material in their neighbours' bins. For these audits, every second household was selected in order to comply with both the NSW Guidelines and with approval from the Commonwealth's Office of Renewable Energy Regulator (ORER).

Where every second household did not present a bin, the following procedure was followed, as specified in the Guidelines:

> *'(i) Record non-presented MGBs as "non presenters" on the recording sheets*
> *(ii) Where a bin is not presented at a household which has been included in the sample, data collectors should move to the neighbouring household ...'.*

Waste Free Australia provided two collection vehicles and drivers to undertake the collection with the APC supervisor. This ensured both streams were co-collected to avoid any issues with the normal collection program.

The collection was overseen by APC's supervisor who travelled with the lead collection vehicle and was responsible for recording all the sample collection data, including sample addresses, bin presentation and bin fullness.

APC's crew collected bins only from those SUDs and MUDs presenting a 'matched pair' of a general waste and a commingled recycling bin (in most of the councils). In councils with FOGO services, general waste and FOGO comprised a 'matched pair', while in councils where recyclables are collected separately, i.e. containers and paper/cardboard, the 'matched pair' consisted of general waste and container bins.

APC and Waste Free conducted collections mostly on the morning of the scheduled collection day for each stream across a two-week period. APC returned to the same streets and the same households sampled in week 1 during the following week to collect the garden organics bin or garden organics and paper bins, if presented. If the bin was not presented, no substitute bin was collected.

Data collection included the date of collection, dwelling type, waste stream, address, bin size, capacity used (bin fullness percentage), presentation rate and a confirmation of the number of MUD households at each MUD property. APC's supervisor ensured the daily sample number required for each collection day was achieved.

In order to maintain positive public relations with the community, each council provided a letter on business letterhead explaining the audit rationale. The letter included a contact name and number for

specific enquiries. This letter was provided to any resident that enquired about the audit process during the sample collections.

Sorting

Following the sample collection, the collection vehicle was weighed at the site weighbridge before and after discharging the load and the weights were recorded for data-checking and data-quality purposes.

The methodology requires a preliminary sort of 'bagged' material from loose waste. The purpose of this step is to determine the proportion of material contained in bags and therefore not available for recovery at a materials recovery facility (MRF) or mechanical and biological treatment (MBT) facility without added equipment (for example, bag breakers or shredders to access the waste or recyclables). For each of the recycling and garden organics streams, any material in household shopping or garbage bags was weighed separately and recorded but was deemed contamination and not opened or sorted.

Each collected stream (general waste, recycling and garden organics) was sorted using a list of 73 sorting categories and definitions for each stream (as specified and agreed between SSROC and APC). Refer to Appendix C. To match the ORER categories, food is separated into 'meat' and 'non-meat'.

As the collections were aggregated by day, the unbagged material for the general waste stream was weighed separately from the bagged material and deducted from the truck weight to provide the weight of the bagged material.

Separated materials were placed in appropriate containers, labelled by category, weighed on electronic scales and the weight recorded. All electronic scales were calibrated prior to commencing the SSROC audit. Images of some key categories are provided in Appendix D.

For the first time in this time series, a sub-sort of textiles was conducted using the following categories:

1. Wearable clothing (clean, no rips or broken parts) – can easily be worn again
2. Unwearable clothing acceptable for recycling (e.g. damaged, stained or broken but relatively clean and suitable for recycling)
3. Carpet
4. Linens and towelling
5. Soft furnishings, cushion, curtains, etc.
6. Other textiles.[12]

Sorting of waste was conducted at the following locations:

- Veolia Port Botany – garden organics
- Veolia Banksmeadow - FOGO
- Visy Taren Point – general waste and commingled recycling.

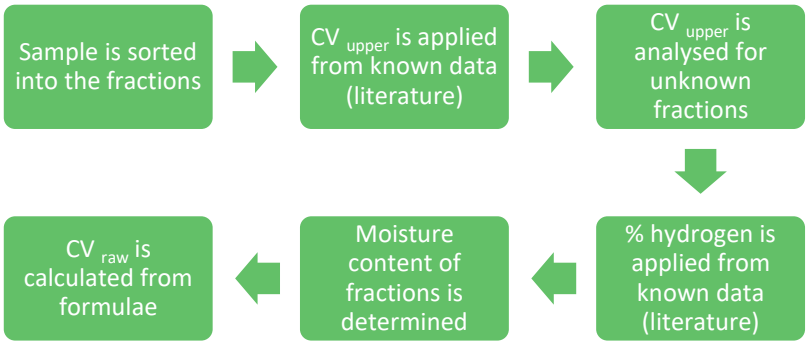
Disposal of samples was managed by the respective sites. All sorted garden organics and FOGO materials at Port Botany and Banksmeadow were managed by Veolia. Recyclable materials sorted at Visy Taren Point were added to other deliveries for transfer to the Smithfield MRF for processing. Garden organics and general waste were delivered to Banksmeadow terminus from Port Botany and

[12] 'Other textiles' includes all textile materials that cannot be allocated to the other above categories.

Visy Taren Point, respectively, loaded separately, and subsequently transported by rail to Woodlawn for processing or disposal.

Calorific value assessment

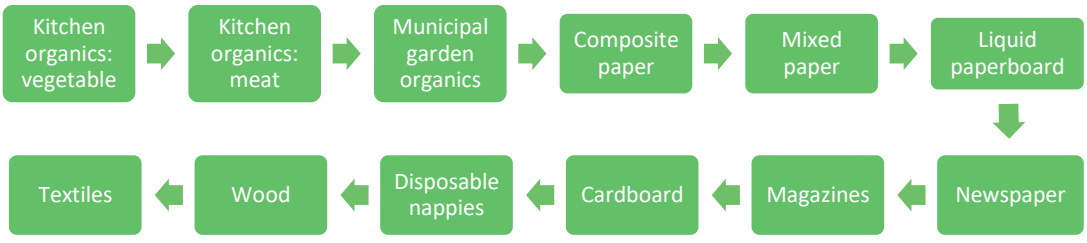
The ORER Guideline states that in order to determine the calorific value (CV) of a waste stream, the following steps should be carried out:



The Guideline provides a methodology for the collection of samples, which includes collecting from every fifth to twentieth bin. Following discussion with the ORER during the 2015 SSROC audit, APC received written confirmation from ORER on varying the collection methodology to sample every second SD household as per the *NSW Guidelines Addendum 2010*. All bins at each MUD property were collected.

Following the sorting of the general waste samples into the required categories a sub-sample of representative sample material was then selected from each of the ORER categories, placed in a foil tray and weighed. The net weight of the material was recorded prior to being placed in an oven (specifically purchased for determining moisture content) for a period of 24 hours set to 105 degrees Celsius, as per the ORER Guideline. At the expiration of the 24-hour period, the sample was removed, and the dry weight recorded. The moisture content of each sample was then calculated.

APC sampled the moisture content of 12 material categories per day over four sample collection days representing Monday to Thursday. The 12 material categories are shown below.



In 2015, APC calculated the calorific value of the renewable component of the general waste stream (i.e. calorific value of the materials within the waste that are considered renewable). However, since 2019 and including this audit, APC has calculated the calorific value of the whole general waste stream. The ORER default moisture content values were used for the remaining categories, as these represent smaller proportions of the waste stream and are less subject to variations in moisture content. The calorific calculations are provided in section 3 and Appendix H.

Beverage containers

The beverage container audit was undertaken as a sub-audit of each council's kerbside waste audit of both the general waste and recycling streams. The audit aimed to obtain data on the number of Container Deposit Scheme (CDS)-eligible beverage containers present in the kerbside bins by counting the:

After the initial sort of the kerbside waste, the beverage containers eligible for a refund under the CDS were sorted by material type and then counted and weighed. In addition, wine/spirit bottles were counted and weighed to accumulate baseline data should the CDS be extended to include these products in the future. A summary of the categories deemed eligible is provided in Appendix F.

Quality assurance – data verification

A number of techniques and procedures were used to check and verify data. All collection vehicles are checked prior to leaving the APC depot to ensure that they are clean of any residual waste from previous collections. All collection vehicles are recorded on a weighbridge before and after discharging the sample so that the net weight of the sample is recorded.

At the data-entry stage, each coded sheet on which sorting data is recorded is checked against the data collection sheets for that sample. The net weight of the sample, as recorded at the weighbridge, is matched against the total weight of the sorted material for each sample load. APC's analysis tool flags any difference between the sample load weight and the total weight of the sorted material categories, and any significant differences are investigated. An independent staff member not involved in the data-entry process randomly checks all data for accuracy.

APC has invested in a computer model to assist with the analysis of audits. This allows systematic error checking at the data-entry stage and ensures consistency in the layout and the design of charts and tables.

A summary of the classification and consolidation of all waste categories of materials deemed contamination is provided in Appendix G.

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 on the next page.

Time frame	• This audit was carried out over 6 months, taking samples randomly distributed over the recycling zone coinciding with the audit week. The data was then used as being representative of the whole council. • Seasonal trends (e.g. warmer weather leading to increased consumption of beverages and garden growth) and weather events (e.g. high rainfall leading to grass growth) may change waste generation over time. • The results of this audit should be treated with caution when comparing 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 audits are carried out using strict random sampling, stratified by geographic area, to minimise the chance of this situation occurring. • Slightly different sampling methods are used for SUDs than for MUDs. In accordance with the NSW Guidelines, SUD sampling requires the matched-pair approach, which distorts waste generation data in favour of households presenting both a general waste and recycling bin. As MUD households are sampled by block, waste generation is calculated as an average per number of households in the block, regardless of occupancy and use of the bins provided. MUD generation therefore tends to be calculated as being lower than SUD generation and the two average estimates are not strictly comparable.
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. •Audit samples are only taken from kerbside bins. It does not necessarily quantify the weighbridge tonnages as well as the materials recovered for processing after collection through the different arrangements organised by individual councils thus may affect diversion data, e.g., food recovery from general waste stream which is sent to an MBT facility for composting. •The generation rates reflect what was found in a small representative sample of households but are unlikely to match annual tonnages.
Weight-based analysis	• The data for this audit was recorded by weight as weight-based is a standard procedure and the most accurate way to collect data on a number of different types of materials. •This data may cause some materials to appear to be present in quite small proportions due to their comparatively low densities (e.g. plastic beverage containers). They can, however, consume large amounts of volume.

Analysis and reporting

Units of measurement: The standard unit of measurement for reporting, unless otherwise stated, is weight. 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 waste stream 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.

In some instances, results are presented by count, i.e. the **number** of items per household per week.

Individual material categories vs consolidated material categories:

- **Individual material categories** are the agreed sorting categories for this audit, as accepted at the commencement of the project. This report aggregates some materials. The raw data used in composition charts is provided in Appendix E.
- **Consolidated categories** involve grouping individual material categories to assist interpretation and to present a large amount of data visually in charts. Refer to Appendix G.

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

Other details: Unless referring to whole numbers, results are presented to 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**.**

The sample numbers: for generation is calculated are based on households included in the audit and are not representative of the actual bins collected. This is because some SUDs may present more than one bin per stream. MUDs share bins so the number of bins collected does not equate to the number of households per MUD property but rather the allocation of bins per block per stream.

Recycling and garden organics composition and contamination: This has been calculated with bagged material as a separate individual category as opposed to being dispersed throughout the sample, unless stated otherwise. All bagged material is considered contamination.

A list of the acceptable items per stream is shown on the next page:

Table 20 Acceptable items per waste stream

Material categories consolidated by material types		
Recycling		
Recyclable paper and cardboard	**Recyclable plastic**	**Recyclable glass**
Newspaper	PET drink containers (1)	Glass drink containers
Magazines	PET packaging (1)	Other packaging glass
Cardboard	HDPE drink containers (2)	Glass fines
Liquid paperboard	HDPE packaging (2)	
Recyclable paper	PVC drink containers (3)	**Garden organics**
Recyclable metals	PVC packaging (3)	Municipal garden organics
Steel drink containers	LDPE packaging (4)	**FOGO**
Steel packaging	PP packaging (5)	**Garden organics**
Steel other	PS packaging (6)	Food in AS 4736 bags
Aluminium drink cans		Food – non-meat
Aluminium packaging		Food – meat

Liquid paperboard

Paper

Cardboard

Glass containers

Steel containers

PET packaging

Image 12 Examples of acceptable materials in the recycling stream

APPENDIX C SORTING CATEGORIES AND DEFINITIONS

Materials are listed by EPA name, as defined in Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008, including the audit Guideline Addendum 2010. Australian Waste Database (AWD) codes are listed where applicable.

Table 21 Material sorting categories definitions

AWD Code	Material type	Material items
	Bagged materials	Any bag containing garbage or recyclables other than food in compostable bags
PAPER		
A01	Newspapers	Newspapers, newspaper-like pamphlets
A02	Magazines, Brochures	Magazines (glossy and non-glossy), pamphlets, brochures
A03	Miscellaneous Packaging	Wrapping paper, labels, paper packaging (no plastic or wax coatings)
A04	Corrugated Cardboard	Cardboard with corrugation
A05	Package Board	Cardboard without corrugation (glossy and non-glossy), cereal boxes, business cards
A06	Liquid Paperboard Containers	Soy milk cartons, some fruit juice cartons, UHT/long-life milk
A07	Disposable Paper Products	Hand towels, tissues, coffee cups, paper napkins, paper food bags (unsoiled)
A08	Print/Writing Office Paper	A4 document paper, writing pads, letters, envelopes, books
A09	Composite (mostly paper)	Composite paper items for which the weight of the paper is estimated to be greater than the weight of the other materials
A90	Nappies	Used disposable nappies[13]
A092	Contaminated Soiled Paper	Paper not suitable for recycling, mixed and other paper, used tissues, soiled paper
ORGANIC (COMPOSTABLES)		
B01	Food/Kitchen – meat	Meat scraps
B01	Food/Kitchen – non-meat	Vegetable scraps, leftover food
	Containerised food and liquid	Any containers or packaged food containing left over or out of date expired food material
B02	Garden/Vegetation	Grass clippings, tree trimmings/prunings, flowers, tree wood (< 20 mm)
B03	Other Putrescible	Animal excrement, mixed compostable items, cellophane
	Food in AS 4736 bags	Food contained in compostable bags which complies with the AS 4736-2006 standard
	AS 4736 compostable bags	Bags made of plastics materials that meet the AS 4736-2006 standard requirements to be biodegraded in industrial anaerobic composting facilities
OTHER ORGANIC		
C01	Wood/Timber	Milled wood/timber, children's wooden toys, wooden skewers, garden trees (> 20 mm)
C02	Textile/Rags/Carpet (Organic)	Wool, cotton and natural fibre materials
C03	Leather	Leather clothing, craft leather, some shoes, belts with belt buckle
C04	Rubber	Rubber bands, rubber toys, Shoes, latex gloves
C05	Oils	Used car oil, motor and other, vegetable, cooking oil
	Food in non-compostable bags	Food contained in bags not meeting the AS 4736-2006 standard
	Food in non-council bio bags	Food contained in bio-bags not issued by Council
GLASS		
D012	Glass Beverage Containers	Recyclable beer bottles, wine bottles, food and sauce jars other than clear, green or brown
D012	Glass Other Packaging Glass	Non-beverage containers – sauce bottles, jam jars, vegetable oils, other food containers
D02	Miscellaneous/Other Glass	Plate glass, Pyrex, Corning ware, laboratory glass, white opaque glass (e.g., Malibu)
D050	Mixed Glass/Fines	Mixed Glass or glass fines < 4.75 mm
PLASTIC		
E01	PET Beverage Containers	Soft drink, flavoured water, fruit juice, sports drinks, plain water (carbonated/non-carb)
E01	PET Packaging (excluding beverage containers)	Food containers, mouthwash containers, detergent bottles, bottle tops, clear packaging film
E01	PET Other Non-Beverage/Non-Packaging	Pillow and sleeping bag filler, laminated sheets, carpet fibres
E02	HDPE Beverage Containers	Milk and flavoured milk and cream bottles, shampoo and cleaner bottles
	HDPE Packaging (excluding beverage containers)	Freezer bags, bleach bottles, oil containers, food containers
	HDPE Other Non-Beverage / Non-Packaging	Buckets, rigid ag pipe, crates, pallets, bins, household bags, rigid moulded products
E03	PVC Beverage Containers	Clear cordial and juice bottles

[13] In this report this category is referred to as nappies/hygiene as it also includes feminine hygiene products and incontinence pads.

AWD Code	Material type	Material items
	PVC Packaging (excluding beverage containers)	Blister packs, blood bags, detergent bottles
	PVC Other Non-Beverage / Non-Packaging	Electrical conduit, plumbing pipes and fittings, garden hose, shoe sole, tubing, rainwear
E04	LDPE – Packaging	(Low-density polyethylene) squeeze bottles, stretch and shrink films, silage and mulch
	LDPE – Non-packaging	Carry bags, garbage bags, garbage bins
E05	PP Packaging	Films, bottles, caps and closures
	PP – Non-Packaging	Appliance parts, crates and boxes, toys, houseware/kitchenware, furniture, plant pots, mouldings, irrigation fittings
E06	PS & EPS Packaging	Meat and poultry trays, yogurt, dairy containers, vending cups, clam shells, beads
	PS & EPS – Non-Packaging	Panel insulation, refrigerator bins and crispers, moulded products, office accessories, spools, rulers, video cases, building and picture frame mouldings
E07	Other Plastic	Furniture fittings, wheels and castors, fence posts, pallets, outdoor furniture and marine structures, automotive, aircraft and boating, furniture, electrical and medical Tupperware, mixed unidentifiable plastics, low-cost brittle toys, all other resins and multi-blend plastic materials, synthetic textiles, all other containers
E08	Composite (mostly plastic)	Cigarette butts, composite plastic items for which the weight of the plastic is estimated to be greater than the other material items.
FERROUS		
F01	Steel Beverage	Alcoholic sodas and spirit-based mixers, beer, soft drink
F01	Steel Packaging	Food cans, pet food cans, aerosols, industrial cans, clean/empty paint cans
F02	Steel Other Non-Packaging	100% ferrous items that are not cans/tins/packaging materials, any other steel
F03	Composite (mostly ferrous)	Beer bottle tops, jar lids, composite ferrous items the weight of the ferrous metal is estimated to be greater than the other material items
NON-FERROUS		
G01	Aluminium Beverage	Alcoholic sodas and spirit-based mixers, beer and soft drink
	Aluminium Packaging	Food cans, pet food cans, aerosols, industrial cans
	Aluminium Non-Packaging	Foils, 100% aluminium items non-packaging materials, any other aluminium
G02	Non – Ferrous - Other (specify)	Copper/brass/bronze items, other metals (not ferrous/aluminium)
G03	Composite (mostly non-ferrous)	Composite non-ferrous metal items where the weight of the metal is estimated to be greater than the other material items
HAZARDOUS		
H01	Paint	Containers containing paint (dry or wet)
H02	Fluorescent Tubes	Fluorescent tubes; compact fluorescent lamps (CFLs)
H03	Dry-cell Batteries (non-rechargeable)	Common batteries, AAA, AA etc, single-use or rechargeable
H03	Dry cell batteries (rechargeable)	Common batteries (rechargeable), AAA, AA etc, single use or rechargeable
H04	Vehicle Batteries	Large batteries used in vehicles or other machinery
H05	Household Chemicals	Containers containing bleach, shampoo, cleaning products, unused medical pills
H061	Asbestos	Asbestos and asbestos-containing products or building materials
H07	Clinical Pathogenic Infectious	Sharps, dialysis tubing, bulk bodily fluids, blood-stained disposable material or equipment
H08	Gas Bottles	Gas bottles
H00	Hazardous Other	Any other hazardous material
BUILDING WASTE		
I50	Building Materials	Building materials (not included in other material categories) includes plasterboard, composite fittings, etc.
EARTH-BASED		
10	Ceramics, Dust, Dirt, Rock, Inert, Ash	Ceramic cups, bowls, pottery items, vacuum bag contents, soil, rocks, dirt, concrete, ash
E WASTE		
	Computer Equipment	Keyboard, monitor, hard drives, printers, etc.
	TVs	TVs
	Mobile Phones	Mobile phones, phones, pads, chargers, car kits, Bluetooth
	Electrical Items and Peripherals	Radio, iPods, Gameboys, stereos, speakers, VCR, DVD players, power tools, wiring and cables, small electrical items (toaster, blender, etc), computer discs, cassettes, DVDs, CDs
Y571	Toner Cartridges	Printer and toner cartridges
MISCELLANEOUS		
XX00	Other	Other, please specify

APPENDIX D EXAMPLES OF SPECIFIC MATERIALS

Image 13 Visual examples of material categories

PP packaging

Aluminium packaging

Glass drink containers

Recyclable paper

Other packaging glass

Glass fines

HDPE drink containers

Steel packaging

PET drinking containers

PET packaging

Bagged garbage

Other steel

Other waste

Other textile

Food (kitchen organics)

Household chemicals

Cardboard

Contaminated paper

Other aluminium

Composite (mostly plastic)

Disposable paper product

Nappies

Electrical and peripherals

Plastic film

Paint

Clinical/medical waste

APPENDIX E DETAILED WASTE COMPOSITION

Table 22 General waste composition: all dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged material				
Newspapers	28.1	28.5	0.0	0.13%
Magazines	43.0	42.9	0.0	0.20%
Cardboard	498.7	500.4	0.2	2.32%
Liquid paperboard	76.3	76.0	0.0	0.37%
Disposable paper products	118.7	118.3	0.0	0.57%
Recyclable paper	270.6	274.5	0.1	1.24%
Composite (mostly paper)	172.3	171.2	0.1	0.67%
Nappies	1,509.5	1,437.7	0.6	6.90%
Contaminated paper	1,853.0	1,817.5	0.7	8.54%
Non-meat	6,086.2	6,106.6	2.3	29.00%
Meat	337.4	329.7	0.1	1.61%
Containerised food and liquid	2,549.3	2,520.5	1.0	12.10%
Garden organics	517.7	511.2	0.2	2.50%
Other putrescible	827.4	812.3	0.3	3.84%
Wood/timber	314.6	291.6	0.1	1.42%
Textile/carpet	983.1	955.4	0.4	4.58%
Leather	11.4	9.7	0.0	0.05%
Rubber	13.4	12.8	0.0	0.06%
Oils	1.4	1.4	0.0	0.01%
Glass drink containers	304.9	307.8	0.1	1.42%
Other packaging glass	230.9	224.7	0.1	1.05%
Other glass	43.9	39.5	0.0	0.20%
Glass fines	3.7	3.7	0.0	0.02%
PET drink containers	80.1	79.9	0.0	0.34%
PET packaging	184.9	181.8	0.1	0.85%
PET other	2.4	1.7	0.0	0.01%
HDPE drink containers	20.2	20.7	0.0	0.10%
HDPE packaging	78.0	77.7	0.0	0.37%
HDPE other	0.6	0.3	0.0	0.00%
PVC drink containers	0.3	0.3	0.0	0.00%
PVC packaging	0.2	0.3	0.0	0.00%
PVC other	8.0	7.5	0.0	0.04%
LDPE packaging	1.9	1.7	0.0	0.01%
LDPE other	0.7	0.7	0.0	0.00%
PP packaging	304.0	297.7	0.1	1.42%
PP other	4.4	3.2	0.0	0.02%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
EPS packaging	21.6	21.5	0.0	0.10%
PS & EPS other	23.7	21.5	0.0	0.10%
PS packaging	27.6	27.8	0.0	0.13%
Other plastics	352.1	343.8	0.1	1.66%
Composite (mostly plastic)	220.4	217.5	0.1	1.02%
Plastic bags	268.7	258.4	0.1	1.27%
Plastic film	1,312.0	1,291.3	0.5	6.15%
Steel drink containers	4.5	4.5	0.0	0.02%
Steel packaging	126.3	124.6	0.0	0.59%
Steel other	158.1	154.8	0.1	0.73%
Composite (mostly ferrous)	32.7	32.3	0.0	0.16%
Aluminium drink cans	25.5	25.0	0.0	0.12%
Aluminium packaging	22.1	21.2	0.0	0.10%
Aluminium other	48.6	48.0	0.0	0.23%
Other non-ferrous (specify)	2.2	1.2	0.0	0.01%
Composite (mostly non-ferrous)	20.5	19.0	0.0	0.09%
Paint	27.5	32.6	0.0	0.17%
Fluorescent tubes	1.5	1.5	0.0	0.01%
Non-rechargeable	7.6	6.9	0.0	0.03%
Rechargeable batteries	0.5	0.6	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	5.0	4.6	0.0	0.02%
Asbestos	2.5	1.2	0.0	0.01%
Clinical (medical)	13.1	16.0	0.0	0.08%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.4	0.3	0.0	0.00%
Building materials	400.5	389.2	0.1	1.81%
Ceramics, dust, dirt, rock, inert	246.4	245.2	0.1	1.23%
Computer equipment	8.1	8.1	0.0	0.04%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	1.4	0.7	0.0	0.00%
Electrical items and peripherals	182.5	178.6	0.1	0.82%
Toner cartridges	2.8	2.8	0.0	0.01%
Other	271.3	267.1	0.1	1.31%
Total	**21,318.6**	**21,034.9**	**8.1**	**100%**

Table 23 General waste composition: single dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged material				
Newspapers	17.5	17.3	0.0	0.15%
Magazines	13.4	12.6	0.0	0.11%
Cardboard	221.4	207.0	0.2	1.81%
Liquid paperboard	60.0	59.5	0.1	0.52%
Disposable paper products	60.9	57.6	0.1	0.50%
Recyclable paper	115.7	110.7	0.1	0.97%
Composite (mostly paper)	58.8	55.7	0.1	0.49%
Nappies/hygiene	913.1	832.6	0.7	7.28%
Contaminated paper	1,009.9	948.2	0.8	8.29%
Non-meat	3,641.5	3,558.6	3.0	31.12%
Meat	220.3	206.7	0.2	1.81%
Containerised food and liquid	1,528.5	1,431.6	1.2	12.52%
Garden organics	401.1	388.1	0.3	3.39%
Other putrescible	443.3	407.4	0.4	3.56%
Wood/timber	166.9	143.0	0.1	1.25%
Textile/carpet	467.0	430.1	0.4	3.76%
Leather	7.4	5.7	0.0	0.05%
Rubber	5.9	5.2	0.0	0.05%
Oils	0.0	0.0	0.0	0.00%
Glass drink containers	90.8	86.5	0.1	0.76%
Other packaging glass	116.6	110.0	0.1	0.96%
Other glass	25.9	21.6	0.0	0.19%
Glass fines	0.5	0.5	0.0	0.00%
PET drink containers	26.6	25.1	0.0	0.22%
PET packaging	100.7	94.0	0.1	0.82%
PET other	2.4	1.6	0.0	0.01%
HDPE drink containers	5.7	5.6	0.0	0.05%
HDPE packaging	37.8	35.3	0.0	0.31%
HDPE other	0.6	0.3	0.0	0.00%
PVC drink containers	0.1	0.1	0.0	0.00%
PVC packaging	0.0	0.0	0.0	0.00%
PVC other	8.0	7.5	0.0	0.07%
LDPE packaging	1.0	0.8	0.0	0.01%
LDPE other	0.7	0.7	0.0	0.01%
PP packaging	166.3	155.2	0.1	1.36%
PP other	2.3	1.2	0.0	0.01%
EPS packaging	10.5	9.9	0.0	0.09%
PS & EPS other	12.4	10.3	0.0	0.09%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
PS packaging	15.6	15.1	0.0	0.13%
Other plastics	212.9	200.4	0.2	1.75%
Composite (mostly plastic)	113.2	108.3	0.1	0.95%
Plastic bags	152.4	139.0	0.1	1.22%
Plastic film	759.3	713.3	0.6	6.24%
Steel drink containers	2.3	2.3	0.0	0.02%
Steel packaging	71.0	67.8	0.1	0.59%
Steel other	80.9	76.0	0.1	0.66%
Composite (mostly ferrous)	14.9	14.5	0.0	0.13%
Aluminium drink cans	12.8	11.9	0.0	0.10%
Aluminium packaging	13.5	12.2	0.0	0.11%
Aluminium other	27.9	26.4	0.0	0.23%
Other non-ferrous (specify)	2.2	1.2	0.0	0.01%
Composite (mostly non-ferrous)	8.8	7.3	0.0	0.06%
Paint	16.8	16.8	0.0	0.15%
Fluorescent tubes	1.4	1.4	0.0	0.01%
Non-rechargeable	5.2	4.4	0.0	0.04%
Rechargeable batteries	0.1	0.1	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	3.4	3.0	0.0	0.03%
Asbestos	2.5	1.2	0.0	0.01%
Clinical (medical)	7.6	7.6	0.0	0.07%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.3	0.3	0.0	0.00%
Building materials	211.2	192.5	0.1	1.68%
Ceramics, dust, dirt, rock, inert	137.9	133.2	0.1	1.16%
Computer equipment	3.2	3.2	0.0	0.03%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	1.4	0.7	0.0	0.01%
Electrical items and peripherals	98.3	92.1	0.1	0.81%
Toner cartridges	2.1	2.1	0.0	0.02%
Other	145.0	139.0	0.1	1.22%
Total	**12,085.5**	**11,436.7**	**9.8**	**100%**

Table 24 General waste composition: multi-unit dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged material				
Newspapers	10.6	11.1	0.0	0.09%
Magazines	29.6	30.2	0.0	0.28%
Cardboard	277.4	293.4	0.2	2.99%
Liquid paperboard	16.2	16.4	0.0	0.17%
Disposable paper products	57.8	60.7	0.0	0.64%
Recyclable paper	154.9	163.9	0.1	1.50%
Composite (mostly paper)	113.6	115.6	0.1	0.87%
Nappies/hygiene	596.4	605.1	0.5	6.71%
Contaminated paper	843.1	869.3	0.6	8.60%
Non-meat	2,444.8	2,547.9	1.8	26.84%
Meat	117.1	122.9	0.1	1.42%
Containerised food and liquid	1,020.8	1,088.9	0.8	11.40%
Garden organics	116.6	123.1	0.1	1.17%
Other putrescible	384.1	405.0	0.3	4.09%
Wood/timber	147.8	148.7	0.1	1.76%
Textile/carpet	516.2	525.3	0.4	5.80%
Leather	4.0	4.0	0.0	0.04%
Rubber	7.5	7.6	0.0	0.09%
Oils	1.4	1.4	0.0	0.02%
Glass drink containers	214.1	221.4	0.1	2.07%
Other packaging glass	114.2	114.7	0.1	1.19%
Other glass	17.9	17.9	0.0	0.27%
Glass fines	3.2	3.2	0.0	0.04%
PET drink containers	53.5	54.8	0.0	0.46%
PET packaging	84.2	87.9	0.1	0.88%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	14.5	15.2	0.0	0.17%
HDPE packaging	40.2	42.4	0.0	0.48%
HDPE other	0.0	0.0	0.0	0.00%
PVC drink containers	0.2	0.2	0.0	0.00%
PVC packaging	0.2	0.3	0.0	0.00%
PVC other	0.0	0.0	0.0	0.00%
LDPE packaging	0.9	0.9	0.0	0.01%
LDPE other	0.0	0.0	0.0	0.00%
PP packaging	137.6	142.5	0.1	1.49%
PP other	2.1	2.1	0.0	0.02%
EPS packaging	11.1	11.7	0.0	0.11%
PS & EPS other	11.3	11.3	0.0	0.12%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
PS packaging	12.0	12.7	0.0	0.13%
Other plastics	139.1	143.4	0.1	1.60%
Composite (mostly plastic)	107.2	109.2	0.1	1.05%
Plastic bags	116.3	119.3	0.1	1.30%
Plastic film	552.7	578.0	0.4	6.05%
Steel drink containers	2.1	2.1	0.0	0.06%
Steel packaging	55.4	56.8	0.0	0.56%
Steel other	77.1	78.8	0.0	0.68%
Composite (mostly ferrous)	17.8	17.8	0.0	0.24%
Aluminium drink cans	12.7	13.1	0.0	0.14%
Aluminium packaging	8.6	9.0	0.0	0.09%
Aluminium other	20.7	21.7	0.0	0.25%
Other non-ferrous (specify)	0.0	0.0	0.0	0.00%
Composite (mostly non-ferrous)	11.6	11.6	0.0	0.14%
Paint	10.7	15.8	0.0	0.14%
Fluorescent tubes	0.1	0.1	0.0	0.00%
Non-rechargeable	2.4	2.4	0.0	0.03%
Rechargeable batteries	0.4	0.5	0.0	0.01%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	1.6	1.6	0.0	0.01%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	5.5	8.5	0.0	0.06%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.0	0.0	0.0	0.00%
Building materials	189.3	196.7	0.1	2.15%
Ceramics, dust, dirt, rock, inert	108.5	112.1	0.1	1.28%
Computer equipment	4.9	4.9	0.0	0.06%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.0	0.0	0.0	0.00%
Electrical items and peripherals	84.2	86.5	0.1	0.80%
Toner cartridges	0.7	0.8	0.0	0.01%
Other	126.3	128.1	0.1	1.37%
Total	**9,233.1**	**9,598.2**	**6.7**	**100%**

Table 25 Commingled recycling composition: all dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	328.8	221.5	0.1	2.71%
Bagged recyclables	244.6	170.4	0.1	1.96%
Newspapers	556.6	327.1	0.1	3.79%
Magazines	482.1	285.0	0.1	3.31%
Cardboard	3,837.7	2,327.6	0.9	27.34%
Liquid paperboard	120.2	69.9	0.0	0.84%
Disposable paper products	56.3	36.7	0.0	0.45%
Recyclable paper	1,041.8	615.0	0.2	7.27%
Composite (mostly paper)	137.1	84.3	0.0	0.92%
Nappies/hygiene	15.7	10.6	0.0	0.13%
Contaminated paper	676.6	387.2	0.2	4.62%
Non-meat	13.5	7.8	0.0	0.09%
Meat	1.8	1.1	0.0	0.01%
Containerised food and liquid	112.1	75.4	0.0	0.88%
Garden organics	13.6	8.7	0.0	0.11%
Other putrescible	4.1	3.3	0.0	0.04%
Wood/timber	46.2	37.9	0.0	0.48%
Textile/carpet	146.0	99.0	0.0	1.24%
Leather	4.8	2.6	0.0	0.02%
Rubber	1.5	1.3	0.0	0.02%
Oils	6.1	5.6	0.0	0.07%
Glass drink containers	2,514.9	1,539.4	0.6	18.07%
Other packaging glass	876.1	517.6	0.2	5.95%
Other glass	46.9	27.3	0.0	0.32%
Glass fines	454.6	276.0	0.1	3.28%
PET drink containers	173.4	105.8	0.0	1.24%
PET packaging	246.8	149.4	0.1	1.75%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	223.0	128.8	0.0	1.50%
HDPE packaging	194.6	118.0	0.0	1.37%
HDPE other	0.2	0.1	0.0	0.00%
PVC drink containers	0.8	0.5	0.0	0.01%
PVC packaging	2.4	1.2	0.0	0.01%
PVC other	2.4	1.6	0.0	0.02%
LDPE packaging	5.3	3.5	0.0	0.04%
LDPE other	0.5	0.3	0.0	0.00%
PP packaging	241.4	144.3	0.1	1.67%
PP other	1.6	0.8	0.0	0.01%
EPS packaging	5.8	3.2	0.0	0.04%
PS & EPS other	5.2	2.8	0.0	0.03%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
PS packaging	11.2	6.8	0.0	0.08%
Other plastics	176.7	105.6	0.0	1.22%
Composite (mostly plastic)	50.3	32.6	0.0	0.41%
Plastic bags	11.7	7.7	0.0	0.09%
Plastic film	124.1	73.3	0.0	0.86%
Steel drink containers	7.6	4.0	0.0	0.05%
Steel packaging	249.2	147.6	0.1	1.72%
Steel other	93.3	51.7	0.0	0.60%
Composite (mostly ferrous)	21.3	14.8	0.0	0.18%
Aluminium drink cans	38.0	24.2	0.0	0.29%
Aluminium packaging	12.9	7.8	0.0	0.09%
Aluminium other	8.3	4.7	0.0	0.05%
Other non-ferrous (specify)	0.2	0.1	0.0	0.00%
Composite (mostly non-ferrous)	10.2	7.7	0.0	0.10%
Paint	2.3	1.4	0.0	0.02%
Fluorescent tubes	0.2	0.2	0.0	0.00%
Non-rechargeable batteries	2.1	1.1	0.0	0.01%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	2.6	1.6	0.0	0.02%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	1.9	1.0	0.0	0.01%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.4	0.2	0.0	0.00%
Gas bottles	1.3	0.7	0.0	0.00%
Hazardous other	20.6	14.3	0.0	0.18%
Building materials	56.7	30.3	0.0	0.36%
Ceramics, dust, dirt, rock, inert	58.3	33.9	0.0	0.42%
Computer equipment	6.4	4.7	0.0	0.06%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.2	0.1	0.0	0.00%
Electrical items and peripherals	67.2	45.9	0.0	0.57%
Toner cartridges	0.8	0.6	0.0	0.01%
Other	163.8	96.1	0.0	0.99%
Total	**14042.7**	**8518.7**	**3.3**	**100%**

Table 26 Commingled recycling composition: single dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	182.2	101.7	0.1	2.08%
Bagged recyclables	109.9	59.3	0.1	1.21%
Newspapers	401.5	219.7	0.2	4.50%
Magazines	335.7	185.6	0.2	3.80%
Cardboard	2,370.6	1,246.2	1.1	25.53%
Liquid paperboard	84.8	44.2	0.0	0.90%
Disposable paper products	32.7	20.2	0.0	0.41%
Recyclable paper	756.2	401.5	0.3	8.23%
Composite (mostly paper)	71.2	40.8	0.0	0.83%
Nappies/hygiene	10.3	5.1	0.0	0.11%
Contaminated paper	521.5	270.2	0.2	5.53%
Non-meat	9.2	4.7	0.0	0.10%
Meat	0.5	0.3	0.0	0.01%
Containerised food and liquid	66.2	42.2	0.0	0.86%
Garden organics	9.0	4.5	0.0	0.09%
Other putrescible	0.1	0.1	0.0	0.00%
Wood/timber	16.9	9.0	0.0	0.18%
Textile/carpet	105.9	60.8	0.1	1.25%
Leather	1.0	0.5	0.0	0.01%
Rubber	0.4	0.3	0.0	0.01%
Oils	1.1	0.6	0.0	0.01%
Glass drink containers	1,592.9	898.2	0.8	18.40%
Other packaging glass	572.3	306.3	0.3	6.27%
Other glass	36.3	18.3	0.0	0.37%
Glass fines	296.8	159.7	0.1	3.27%
PET drink containers	114.9	62.4	0.1	1.28%
PET packaging	162.8	86.6	0.1	1.77%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	123.2	65.0	0.1	1.33%
HDPE packaging	128.1	68.5	0.1	1.40%
HDPE other	0.0	0.0	0.0	0.00%
PVC drink containers	0.4	0.2	0.0	0.00%
PVC packaging	2.3	1.1	0.0	0.02%
PVC other	1.5	0.8	0.0	0.02%
LDPE packaging	3.5	1.9	0.0	0.04%
LDPE other	0.5	0.3	0.0	0.01%
PP packaging	159.0	84.6	0.1	1.73%
PP other	1.6	0.8	0.0	0.02%
EPS packaging	4.9	2.5	0.0	0.05%
PS & EPS other	2.3	1.1	0.0	0.02%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
PS packaging	8.7	4.5	0.0	0.09%
Other plastics	102.3	57.8	0.1	1.18%
Composite (mostly plastic)	36.6	19.6	0.0	0.40%
Plastic bags	6.4	3.3	0.0	0.07%
Plastic film	88.3	45.8	0.0	0.94%
Steel drink containers	0.7	0.4	0.0	0.01%
Steel packaging	166.0	88.3	0.1	1.81%
Steel other	76.8	39.9	0.0	0.82%
Composite (mostly ferrous)	10.5	5.2	0.0	0.11%
Aluminium drink cans	23.3	13.3	0.0	0.27%
Aluminium packaging	9.0	4.8	0.0	0.10%
Aluminium other	6.0	3.2	0.0	0.07%
Other non-ferrous (specify)	0.1	0.1	0.0	0.00%
Composite (mostly non-ferrous)	7.2	4.7	0.0	0.10%
Paint	1.8	0.9	0.0	0.02%
Fluorescent tubes	0.0	0.0	0.0	0.00%
Non-rechargeable batteries	2.1	1.1	0.0	0.02%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	2.2	1.1	0.0	0.02%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	1.9	1.0	0.0	0.02%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.1	0.0	0.0	0.00%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	12.4	6.2	0.0	0.13%
Building materials	46.0	23.0	0.0	0.47%
Ceramics, dust, dirt, rock, inert	49.2	25.1	0.0	0.51%
Computer equipment	2.8	1.4	0.0	0.03%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.2	0.1	0.0	0.00%
Electrical items and peripherals	45.1	25.0	0.0	0.51%
Toner cartridges	0.4	0.2	0.0	0.00%
Other	46.3	30.3	0.0	0.62%
Total	**9042.7**	**4881.7**	**4.2**	**100%**

Table 27 Commingled recycling composition: multi-unit dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	146.6	119.8	0.1	3.57%
Bagged recyclables	134.7	111.2	0.1	3.18%
Newspapers	155.1	107.4	0.1	2.89%
Magazines	146.4	99.3	0.1	2.77%
Cardboard	1,467.1	1,081.4	0.8	30.39%
Liquid paperboard	35.5	25.8	0.0	0.75%
Disposable paper products	23.6	16.4	0.0	0.52%
Recyclable paper	285.5	213.4	0.1	5.67%
Composite (mostly paper)	65.9	43.5	0.0	1.01%
Nappies/hygiene	5.4	5.4	0.0	0.18%
Contaminated paper	155.2	117.0	0.1	3.44%
Non-meat	4.3	3.1	0.0	0.08%
Meat	1.2	0.9	0.0	0.02%
Containerised food and liquid	45.9	33.2	0.0	0.87%
Garden organics	4.6	4.2	0.0	0.13%
Other putrescible	3.9	3.2	0.0	0.09%
Wood/timber	29.3	28.8	0.0	0.91%
Textile/carpet	40.1	38.2	0.0	1.24%
Leather	3.8	2.1	0.0	0.03%
Rubber	1.0	1.0	0.0	0.04%
Oils	5.0	5.0	0.0	0.20%
Glass drink containers	922.0	641.2	0.4	16.70%
Other packaging glass	303.9	211.3	0.1	5.42%
Other glass	10.6	9.1	0.0	0.29%
Glass fines	157.8	116.3	0.1	3.25%
PET drink containers	58.6	43.3	0.0	1.21%
PET packaging	83.9	62.8	0.0	1.75%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	99.7	63.8	0.0	1.72%
HDPE packaging	66.5	49.4	0.0	1.36%
HDPE other	0.2	0.1	0.0	0.00%
PVC drink containers	0.4	0.3	0.0	0.01%
PVC packaging	0.1	0.1	0.0	0.00%
PVC other	0.9	0.9	0.0	0.03%
LDPE packaging	1.7	1.6	0.0	0.05%
LDPE other	0.0	0.0	0.0	0.00%
PP packaging	82.4	59.8	0.0	1.57%
PP other	0.0	0.0	0.0	0.00%
EPS packaging	0.9	0.7	0.0	0.02%
PS & EPS other	2.9	1.7	0.0	0.04%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
PS packaging	2.6	2.3	0.0	0.07%
Other plastics	74.4	47.8	0.0	1.46%
Composite (mostly plastic)	13.7	13.0	0.0	0.42%
Plastic bags	5.3	4.4	0.0	0.13%
Plastic film	35.8	27.5	0.0	0.79%
Steel drink containers	6.8	3.5	0.0	0.08%
Steel packaging	83.2	59.3	0.0	1.56%
Steel other	16.5	11.8	0.0	0.30%
Composite (mostly ferrous)	10.9	9.6	0.0	0.30%
Aluminium drink cans	14.7	10.9	0.0	0.31%
Aluminium packaging	3.9	3.0	0.0	0.08%
Aluminium other	2.4	1.5	0.0	0.03%
Other non-ferrous (specify)	0.0	0.0	0.0	0.00%
Composite (mostly non-ferrous)	3.0	3.0	0.0	0.12%
Paint	0.5	0.5	0.0	0.02%
Fluorescent tubes	0.2	0.2	0.0	0.01%
Non-rechargeable batteries	0.0	0.0	0.0	0.00%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.5	0.5	0.0	0.02%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	0.0	0.0	0.0	0.00%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.3	0.2	0.0	0.00%
Gas bottles	1.3	0.7	0.0	0.01%
Hazardous other	8.1	8.1	0.0	0.25%
Building materials	10.7	7.3	0.0	0.18%
Ceramics, dust, dirt, rock, inert	9.1	8.8	0.0	0.26%
Computer equipment	3.5	3.3	0.0	0.11%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.0	0.0	0.0	0.00%
Electrical items and peripherals	22.1	20.9	0.0	0.69%
Toner cartridges	0.4	0.4	0.0	0.02%
Other	117.5	65.8	0.0	1.38%
Total	**5000.1**	**3637.0**	**2.6**	**100%**

Table 28 Garden organics composition: all dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	16.3	8.2	0.0	0.19%
Newspapers	0.2	0.1	0.0	0.00%
Magazines	0.1	0.1	0.0	0.00%
Cardboard	3.8	1.9	0.0	0.04%
Liquid paperboard	0.1	0.0	0.0	0.00%
Disposable paper products	0.2	0.1	0.0	0.00%
Recyclable paper	0.4	0.2	0.0	0.00%
Composite (mostly paper)	1.9	0.9	0.0	0.02%
Nappies/hygiene	0.7	0.4	0.0	0.01%
Contaminated paper	6.4	3.2	0.0	0.08%
Non-meat	11.1	5.6	0.0	0.11%
Meat	0.0	0.0	0.0	0.00%
Containerised food and liquid	1.7	0.9	0.0	0.02%
Garden organics	7,944.7	3,972.3	2.1	96.34%
Other putrescible	0.8	0.4	0.0	0.01%
Wood/timber	127.6	63.8	0.0	1.37%
Textile/carpet	5.9	2.9	0.0	0.07%
Leather	0.0	0.0	0.0	0.00%
Rubber	0.8	0.4	0.0	0.01%
Oils	0.0	0.0	0.0	0.00%
Glass drink containers	1.7	0.8	0.0	0.02%
Other packaging glass	0.2	0.1	0.0	0.00%
Other glass	0.0	0.0	0.0	0.00%
Glass fines	0.0	0.0	0.0	0.00%
PET drink containers	0.2	0.1	0.0	0.00%
PET packaging	0.1	0.0	0.0	0.00%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	0.0	0.0	0.0	0.00%
HDPE packaging	0.0	0.0	0.0	0.00%
HDPE other	0.0	0.0	0.0	0.00%
PVC drink containers	0.0	0.0	0.0	0.00%
PVC packaging	0.0	0.0	0.0	0.00%
PVC other	0.2	0.1	0.0	0.00%
LDPE packaging	0.0	0.0	0.0	0.00%
LDPE other	0.0	0.0	0.0	0.00%
PP packaging	0.6	0.3	0.0	0.01%
PP other	0.0	0.0	0.0	0.00%
EPS packaging	0.1	0.1	0.0	0.00%
PS & EPS other	0.0	0.0	0.0	0.00%
PS packaging	0.0	0.0	0.0	0.00%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Other plastics	2.9	1.5	0.0	0.04%
Composite (mostly plastic)	1.1	0.6	0.0	0.01%
Plastic bags	0.1	0.0	0.0	0.00%
Plastic film	1.7	0.9	0.0	0.02%
Steel drink containers	0.0	0.0	0.0	0.00%
Steel packaging	0.9	0.5	0.0	0.01%
Steel other	0.4	0.2	0.0	0.00%
Composite (mostly ferrous)	1.1	0.5	0.0	0.01%
Aluminium drink cans	0.1	0.1	0.0	0.00%
Aluminium packaging	0.0	0.0	0.0	0.00%
Aluminium other	0.0	0.0	0.0	0.00%
Other non-ferrous (specify)	0.0	0.0	0.0	0.00%
Composite (mostly non-ferrous)	0.0	0.0	0.0	0.00%
Paint	0.0	0.0	0.0	0.00%
Fluorescent tubes	0.0	0.0	0.0	0.00%
Non-rechargeable batteries	0.0	0.0	0.0	0.00%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	0.0	0.0	0.0	0.00%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.0	0.0	0.0	0.00%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.0	0.0	0.0	0.00%
Building materials	1.3	0.7	0.0	0.01%
Ceramics, dust, dirt, rock, inert	114.3	57.1	0.0	1.37%
Computer equipment	0.0	0.0	0.0	0.00%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.0	0.0	0.0	0.00%
Electrical items and peripherals	0.0	0.0	0.0	0.00%
Toner cartridges	0.0	0.0	0.0	0.00%
Other	13.6	6.8	0.0	0.17%
BAGGED food in AS 4736 bags	3.3	1.6	0.0	0.04%
Total	**8266.3**	**4133.1**	**2.2**	**100%**

Table 29 Garden organics composition: single-unit dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	9.2	4.6	0.0	0.12%
Newspapers	0.1	0.1	0.0	0.00%
Magazines	0.0	0.0	0.0	0.00%
Cardboard	2.4	1.2	0.0	0.03%
Liquid paperboard	0.0	0.0	0.0	0.00%
Disposable paper products	0.2	0.1	0.0	0.00%
Recyclable paper	0.0	0.0	0.0	0.00%
Composite (mostly paper)	1.8	0.9	0.0	0.02%
Nappies/hygiene	0.0	0.0	0.0	0.00%
Contaminated paper	6.0	3.0	0.0	0.08%
Non-meat	6.7	3.3	0.0	0.09%
Meat	0.0	0.0	0.0	0.00%
Containerised food and liquid	1.6	0.8	0.0	0.02%
Garden organics	7,143.3	3,571.7	2.7	97.10%
Other putrescible	0.6	0.3	0.9	0.01%
Wood/timber	96.2	48.1	0.0	1.31%
Textile/carpet	5.9	2.9	0.0	0.08%
Leather	0.0	0.0	0.0	0.00%
Rubber	0.8	0.4	0.0	0.01%
Oils	0.0	0.0	0.0	0.00%
Glass drink containers	1.2	0.6	0.0	0.02%
Other packaging glass	0.0	0.0	0.0	0.00%
Other glass	0.0	0.0	0.0	0.00%
Glass fines	0.0	0.0	0.0	0.00%
PET drink containers	0.2	0.1	0.0	0.00%
PET packaging	0.1	0.0	0.0	0.00%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	0.0	0.0	0.0	0.00%
HDPE packaging	0.0	0.0	0.0	0.00%
HDPE other	0.0	0.0	0.0	0.00%
PVC drink containers	0.0	0.0	0.0	0.00%
PVC packaging	0.0	0.0	0.0	0.00%
PVC other	0.2	0.1	0.0	0.00%
LDPE packaging	0.0	0.0	0.0	0.00%
LDPE other	0.0	0.0	0.0	0.00%
PP packaging	0.4	0.2	0.0	0.00%
PP other	0.0	0.0	0.0	0.00%
EPS packaging	0.1	0.0	0.0	0.00%
PS & EPS other	0.0	0.0	0.0	0.00%
PS packaging	0.0	0.0	0.0	0.00%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Other plastics	2.9	1.4	0.0	0.04%
Composite (mostly plastic)	0.9	0.4	0.0	0.01%
Plastic bags	0.1	0.0	0.0	0.00%
Plastic film	1.5	0.8	0.0	0.02%
Steel drink containers	0.0	0.0	0.0	0.00%
Steel packaging	0.9	0.4	0.0	0.01%
Steel other	0.4	0.2	0.0	0.01%
Composite (mostly ferrous)	1.1	0.5	0.0	0.01%
Aluminium drink cans	0.1	0.0	0.0	0.00%
Aluminium packaging	0.0	0.0	0.0	0.00%
Aluminium other	0.0	0.0	0.0	0.00%
Other non-ferrous (specify)	0.0	0.0	0.0	0.00%
Composite (mostly non-ferrous)	0.0	0.0	0.0	0.00%
Paint	0.0	0.0	0.0	0.00%
Fluorescent tubes	0.0	0.0	0.0	0.00%
Non-rechargeable batteries	0.0	0.0	0.0	0.00%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	0.0	0.0	0.0	0.00%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.0	0.0	0.0	0.00%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.0	0.0	0.0	0.00%
Building materials	1.3	0.7	0.0	0.02%
Ceramics, dust, dirt, rock, inert	67.4	33.7	0.1	0.92%
Computer equipment	0.0	0.0	0.0	0.00%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.0	0.0	0.0	0.00%
Electrical items and peripherals	0.0	0.0	0.0	0.00%
Toner cartridges	0.0	0.0	0.0	0.00%
Other	0.4	0.2	0.0	0.00%
BAGGED food in AS 4736 bags	3.3	1.6	0.0	0.04%
Total	**7356.6**	**3678.3**	**3.7**	**100%**

Table 30 Garden organics composition: multi-unit dwellings

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Bagged garbage	7.2	3.6	0.0	0.44%
Newspapers	0.1	0.1	0.0	0.00%
Magazines	0.1	0.1	0.0	0.01%
Cardboard	1.4	0.7	0.0	0.13%
Liquid paperboard	0.1	0.0	0.0	0.00%
Disposable paper products	0.0	0.0	0.0	0.00%
Recyclable paper	0.3	0.2	0.0	0.01%
Composite (mostly paper)	0.1	0.1	0.0	0.01%
Nappies/hygiene	0.7	0.4	0.0	0.07%
Contaminated paper	0.4	0.2	0.0	0.05%
Non-meat	4.4	2.2	0.0	0.13%
Meat	0.0	0.0	0.0	0.00%
Containerised food and liquid	0.2	0.1	0.0	0.03%
Garden organics	801.3	400.7	0.5	91.16%
Other putrescible	0.2	0.1	0.0	0.04%
Wood/timber	31.4	15.7	0.0	1.61%
Textile/carpet	0.0	0.0	0.0	0.00%
Leather	0.0	0.0	0.0	0.00%
Rubber	0.0	0.0	0.0	0.00%
Oils	0.0	0.0	0.0	0.00%
Glass drink containers	0.5	0.3	0.0	0.02%
Other packaging glass	0.2	0.1	0.0	0.01%
Other glass	0.0	0.0	0.0	0.00%
Glass fines	0.0	0.0	0.0	0.00%
PET drink containers	0.0	0.0	0.0	0.00%
PET packaging	0.0	0.0	0.0	0.00%
PET other	0.0	0.0	0.0	0.00%
HDPE drink containers	0.0	0.0	0.0	0.00%
HDPE packaging	0.0	0.0	0.0	0.00%
HDPE other	0.0	0.0	0.0	0.00%
PVC drink containers	0.0	0.0	0.0	0.00%
PVC packaging	0.0	0.0	0.0	0.00%
PVC other	0.0	0.0	0.0	0.00%
LDPE packaging	0.0	0.0	0.0	0.00%
LDPE other	0.0	0.0	0.0	0.00%
PP packaging	0.2	0.1	0.0	0.01%
PP other	0.0	0.0	0.0	0.00%
EPS packaging	0.1	0.0	0.0	0.01%
PS & EPS other	0.0	0.0	0.0	0.00%
PS packaging	0.0	0.0	0.0	0.00%

Material	Amount audited (kg)	Amount per week (kg/wk)	Average (kg/hhld/wk)	Per cent
Other plastics	0.1	0.0	0.0	0.01%
Composite (mostly plastic)	0.2	0.1	0.0	0.01%
Plastic bags	0.0	0.0	0.0	0.00%
Plastic film	0.2	0.1	0.0	0.02%
Steel drink containers	0.0	0.0	0.0	0.00%
Steel packaging	0.1	0.0	0.0	0.00%
Steel other	0.0	0.0	0.0	0.00%
Composite (mostly ferrous)	0.0	0.0	0.0	0.00%
Aluminium drink cans	0.1	0.0	0.0	0.00%
Aluminium packaging	0.0	0.0	0.0	0.00%
Aluminium other	0.0	0.0	0.0	0.00%
Other non-ferrous (specify)	0.0	0.0	0.0	0.00%
Composite (mostly non-ferrous)	0.0	0.0	0.0	0.00%
Paint	0.0	0.0	0.0	0.00%
Fluorescent tubes	0.0	0.0	0.0	0.00%
Non-rechargeable batteries	0.0	0.0	0.0	0.00%
Rechargeable batteries	0.0	0.0	0.0	0.00%
Vehicle batteries	0.0	0.0	0.0	0.00%
Mobile phone batteries	0.0	0.0	0.0	0.00%
Power tool batteries	0.0	0.0	0.0	0.00%
Other batteries	0.0	0.0	0.0	0.00%
Household chemicals	0.0	0.0	0.0	0.00%
Asbestos	0.0	0.0	0.0	0.00%
Clinical (medical)	0.0	0.0	0.0	0.00%
Gas bottles	0.0	0.0	0.0	0.00%
Hazardous other	0.0	0.0	0.0	0.00%
Building materials	0.0	0.0	0.0	0.00%
Ceramics, dust, dirt, rock, inert	46.9	23.5	0.0	4.84%
Computer equipment	0.0	0.0	0.0	0.00%
TVs	0.0	0.0	0.0	0.00%
Mobile phones	0.0	0.0	0.0	0.00%
Electrical items and peripherals	0.0	0.0	0.0	0.00%
Toner cartridges	0.0	0.0	0.0	0.00%
Other	13.2	6.6	0.0	1.36%
BAGGED food in AS 4736 bags	0.0	0.0	0.0	0.00%
Total	**909.6**	**454.8**	**0.5**	**100.00%**

APPENDIX F CDS-ELIGIBLE BEVERAGE CONTAINER LIST

MATERIAL CATEGORY	0 – 150ml	>150 – 500ml	>500ml – 1L	>1L – 1.5L	>1.5L – 2L	>2 – 2.5L	>2.5L – 3L	>3L
Aluminium								
Alcoholic sodas and spirit-based mixers	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Beer	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Cider/fruit based etc	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Steel								
Alcoholic sodas and spirit-based mixers	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Beer	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Cider/fruit-based, etc.	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
LPB								
Milk	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Flavoured milk	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Fruit juice (>90% fruit and/or veg juice)	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Fruit drink	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/sports drink, non-carb	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
HDPE								
Milk	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Drink pouches	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured milk	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Flavoured water/ sports drink, etc. (non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Plain water (carbonated or non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Fruit juice (>90% fruit and/or veg juice)	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Fruit drink	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
PET								
Milk	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Drink pouches	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured milk	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Flavoured water/ sports drink, etc (non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Plain water (carbonated or non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Fruit juice (>90% fruit and/or veg juice)	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL

MATERIAL CATEGORY	0 – 150ml	>150 – 500ml	>500ml – 1L	>1L – 1.5L	>1.5L – 2L	>2 – 2.5L	>2.5L – 3L	>3L
Fruit drink	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Plastic other								
Milk	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Drink pouches	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured milk	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Flavoured water/ sports drink, etc (non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Plain water (carbonated or non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Fruit juice (>90% fruit and/or veg juice)	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Fruit drink	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Wine bladders	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Glass								
Alcoholic sodas/spirit-based mixers	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Beer	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Cider/fruit-based, etc.	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Flavoured water/soft drink (carbonated)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Plain water (carbonated or non-carb)	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Fruit juice (>90% fruit and/or veg juice)	EXCL	✓	✓	EXCL	EXCL	EXCL	EXCL	EXCL
Fruit drink	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Wine (glass only)	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Wine cooler	EXCL	✓	✓	✓	✓	✓	✓	EXCL
Spirit	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL
Other	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL	EXCL

APPENDIX G MATERIAL CONSOLIDATION DETAILS BY STREAM

Table 31 General waste consolidations for reporting

Material type	General waste consolidation 1	General waste consolidation 2
Newspaper	Paper and cardboard	Recyclable material
Magazines	Paper and cardboard	Recyclable material
Cardboard	Paper and cardboard	Recyclable material
Liquid paperboard	Paper and cardboard	Recyclable material
Disposable paper product	Other organic	General waste
Recyclable paper	Paper and cardboard	Recyclable material
Composite (mostly paper)	Paper and cardboard	General waste
Nappies/hygiene products	Hygiene	General waste
Contaminated paper	Other organics	General waste
Food kitchen organics – non-meat	Food organics	Potentially recoverable – FOGO
Food kitchen organics – meat	Food organics	Potentially recoverable – FOGO
Containerised/packaged food and liquid	Other food	Potentially recoverable – FOGO
Municipal garden organics	Garden organics	Potentially recoverable – FOGO
Other putrescible	Other organics	General waste
Wood/Timber	Other organics	General waste
Textile/Carpet	Textiles	Potentially recoverable – textiles
Leather	Textiles	Potentially recoverable – textiles
Rubber	Other	General waste
Oils	Hazardous/problematic	General waste
Glass drink containers	Glass	Recyclable material
Other packaging glass	Glass	Recyclable material
Other glass	Glass	General waste
Glass fines	Glass	Recyclable material
PET drink containers (1)	Recyclable plastic	Recyclable material
PET packaging (1)	Recyclable plastic	Recyclable material
PET other (1)	Other plastic	General waste
HDPE drink containers (2)	Recyclable plastic	Recyclable material
HDPE packaging (2)	Recyclable plastic	Recyclable material
HDPE other (2)	Other plastic	General waste
PVC drink containers (3)	Recyclable plastic	Recyclable material
PVC packaging (3)	Recyclable plastic	Recyclable material
PVC other (3)	Other plastic	General waste
LDPE packaging (4)	Recyclable plastic	Recyclable material
LDPE other (4)	Other plastic	General waste
PP packaging (5)	Recyclable plastic	Recyclable material
PP other (5)	Other plastic	General waste
EPS packaging (6)	Other plastic	General waste
PS & EPS other (6)	Other plastic	General waste
PS packaging (6)	Recyclable plastic	Recyclable material
Other plastic (7)	Other plastic	General waste
Composite (mostly plastic)	Other plastic	General waste

Material type	General waste consolidation 1	General waste consolidation 2
Plastic bags	Soft plastic/film	General waste
Plastic Film	Soft plastic/film	General waste
Steel drink containers	Metals	Recyclable material
Steel packaging	Metals	Recyclable material
Steel other	Metals	Recyclable material
Composite (mostly ferrous)	Other non-recyclable metal	General waste
Aluminium drink cans	Metals	Recyclable material
Aluminium packaging	Metals	Recyclable material
Aluminium other	Other non-recyclable metal	General waste
Other non-ferrous (specify)	Other non-recyclable metal	General waste
Composite (mostly non-ferrous)	Other non-recyclable metal	General waste
Paint	Hazardous/problematic	General waste
Fluorescent tubes	Hazardous/problematic	General waste
Non-rechargeable batteries	Hazardous/problematic	General waste
Rechargeable batteries	Hazardous/problematic	General waste
Vehicle batteries	Hazardous/problematic	General waste
Mobile phone batteries	Hazardous/problematic	General waste
Power tool batteries	Hazardous/problematic	General waste
Other batteries	Hazardous/problematic	General waste
Household chemicals	Hazardous/problematic	General waste
Asbestos	Hazardous/problematic	General waste
Clinical (medical)	Hazardous/problematic	General waste
Gas Bottles	Hazardous/problematic	General waste
Hazardous other (specify)	Hazardous/problematic	General waste
Computer equipment	E-waste	General waste
TVs	E-waste	General waste
Mobile phones	E-waste	General waste
Electrical items and peripherals	E-waste	General waste
Toner cartridges	E-waste	General waste
Building materials	Building material	General waste
Ceramics, dust, dirt, rock, inert	Other	General waste
Other (specify)	Other	General waste

Table 32 Recycling consolidations for reporting

Material type	Recycling consolidation 1	Recycling consolidation 2
Newspaper	Paper and cardboard	Recyclable paper and cardboard
Magazines	Paper and cardboard	Recyclable paper and cardboard
Cardboard	Paper and cardboard	Recyclable paper and cardboard
Liquid paperboard	Paper and cardboard	Recyclable paper and cardboard
Disposable paper product	Other organic	Contamination
Recyclable paper	Paper and cardboard	Recyclable paper and cardboard
Composite (mostly paper)	Paper and cardboard	Contamination
Nappies	Hygiene	Contamination
Contaminated paper	Other organics	Contamination
Food kitchen organics – non-meat	Food organics	Contamination
Food kitchen organics - meat	Food organics	Contamination
Containerised/packaged food and liquid	Other food	Contamination
Municipal garden organics	Garden organics	Contamination
Other putrescible	Other organics	Contamination
Wood/Timber	Other organics	Contamination
Textile/Carpet	Textiles	Contamination
Leather	Textiles	Contamination
Rubber	Other	Contamination
Oils	Hazardous/problematic	Contamination
Glass drink containers	Glass	Recyclable glass
Other packaging glass	Glass	Recyclable glass
Other glass	Glass	Contamination
Glass fines	Glass	Recyclable glass
PET drink containers (1)	Recyclable plastic	Recyclable plastic
PET packaging (1)	Recyclable plastic	Recyclable plastic
PET other (1)	Other plastic	Contamination
HDPE drink containers (2)	Recyclable plastic	Recyclable plastic
HDPE packaging (2)	Recyclable plastic	Recyclable plastic
HDPE other (2)	Other plastic	Contamination
PVC drink containers (3)	Recyclable plastic	Recyclable plastic
PVC packaging (3)	Recyclable plastic	Recyclable plastic
PVC other (3)	Other plastic	Contamination
LDPE packaging (4)	Recyclable plastic	Recyclable plastic
LDPE other (4)	Other plastic	Contamination
PP packaging (5)	Recyclable plastic	Recyclable plastic
PP other (5)	Other plastic	Contamination
EPS packaging (6)	Other plastic	Contamination
PS & EPS other (6)	Other plastic	Contamination
PS packaging (6)	Recyclable plastic	Recyclable plastic
Other plastic (7)	Other plastic	Contamination
Composite (mostly plastic)	Other plastic	Contamination
Plastic bags	Soft plastic/film	Contamination
Plastic film	Soft plastic/film	Contamination

Material type	Recycling consolidation 1	Recycling consolidation 2
Steel drink containers	Metals	Recyclable metals
Steel packaging	Metals	Recyclable metals
Steel other	Metals	Recyclable metals
Composite (mostly ferrous)	Other non-recyclable metal	Contamination
Aluminium drink cans	Metals	Recyclable metals
Aluminium packaging	Metals	Recyclable metals
Aluminium other	Other non-recyclable metal	Contamination
Other non-ferrous (specify)	Other non-recyclable metal	Contamination
Composite (mostly non-ferrous)	Other non-recyclable metal	Contamination
Paint	Hazardous/problematic	Contamination
Fluorescent tubes	Hazardous/problematic	Contamination
Non-rechargeable batteries	Hazardous/problematic	Contamination
Rechargeable batteries	Hazardous/problematic	Contamination
Vehicle batteries	Hazardous/problematic	Contamination
Mobile phone batteries	Hazardous/problematic	Contamination
Power tool batteries	Hazardous/problematic	Contamination
Other batteries	Hazardous/problematic	Contamination
Household chemicals	Hazardous/problematic	Contamination
Asbestos	Hazardous/problematic	Contamination
Clinical (medical)	Hazardous/problematic	Contamination
Gas bottles	Hazardous/problematic	Contamination
Hazardous other (specify)	Hazardous/problematic	Contamination
Computer equipment	E-waste	Contamination
TVs	E-waste	Contamination
Mobile phones	E-waste	Contamination
Electrical items and peripherals	E-waste	Contamination
Toner cartridges	E-waste	Contamination
Building materials	Building material	Contamination
Ceramics, dust, dirt, rock, inert	Other	Contamination
Other (specify)	Other	Contamination

Table 33 Garden organics consolidations for reporting

Material type	Garden organics consolidation 1	Garden organics consolidation 2
Newspaper	Paper and cardboard	Contamination
Magazines	Paper and cardboard	Contamination
Cardboard	Paper and cardboard	Contamination
Liquid paperboard	Paper and cardboard	Contamination
Disposable paper product	Other organic	Contamination
Recyclable paper	Paper and cardboard	Contamination
Composite (mostly paper)	Paper and cardboard	Contamination
Nappies	Hygiene	Contamination
Contaminated paper	Other organics	Contamination
Food in AS 4736 compostable bags	Food organics	Contamination
Food in non-compostable bags	Other food	Contamination
Food kitchen organics – non-meat	Food organics	Contamination
Food kitchen organics – meat	Food organics	Contamination
Containerised/packaged food and liquid	Other food	Contamination
Municipal garden organics	Garden organics	Garden organics
Other putrescible	Other organics	Contamination
Wood/Timber	Other organics	Contamination
Textile/Carpet	Textiles	Contamination
Leather	Textiles	Contamination
Rubber	Other	Contamination
Oils	Hazardous/problematic	Contamination
Glass drink containers	Glass	Contamination
Other packaging glass	Glass	Contamination
Other glass	Glass	Contamination
Glass fines	Glass	Contamination
PET drink containers (1)	Recyclable plastic	Contamination
PET packaging (1)	Recyclable plastic	Contamination
PET other (1)	Other plastic	Contamination
HDPE drink containers (2)	Recyclable plastic	Contamination
HDPE packaging (2)	Recyclable plastic	Contamination
HDPE other (2)	Other plastic	Contamination
PVC drink containers (3)	Recyclable plastic	Contamination
PVC packaging (3)	Recyclable plastic	Contamination
PVC other (3)	Other plastic	Contamination
LDPE packaging (4)	Recyclable plastic	Contamination
LDPE other (4)	Other plastic	Contamination
PP packaging (5)	Recyclable plastic	Contamination
PP other (5)	Other plastic	Contamination
EPS packaging (6)	Other plastic	Contamination
PS & EPS other (6)	Other plastic	Contamination
PS packaging (6)	Recyclable plastic	Contamination
Other plastic (7)	Other plastic	Contamination
Composite (mostly plastic)	Other plastic	Contamination

Material type	Garden organics consolidation 1	Garden organics consolidation 2
Plastic bags	Soft plastic/film	Contamination
Plastic film	Soft plastic/film	Contamination
Steel drink containers	Metals	Contamination
Steel packaging	Metals	Contamination
Steel other	Metals	Contamination
Composite (mostly ferrous)	Other non-recyclable metal	Contamination
Aluminium drink cans	Metals	Contamination
Aluminium packaging	Metals	Contamination
Aluminium other	Other non-recyclable metal	Contamination
Other non-ferrous (specify)	Other non-recyclable metal	Contamination
Composite (mostly non-ferrous)	Other non-recyclable metal	Contamination
Paint	Hazardous/problematic	Contamination
Fluorescent tubes	Hazardous/problematic	Contamination
Non-rechargeable batteries	Hazardous/problematic	Contamination
Rechargeable batteries	Hazardous/problematic	Contamination
Vehicle batteries	Hazardous/problematic	Contamination
Mobile phone batteries	Hazardous/problematic	Contamination
Power tool batteries	Hazardous/problematic	Contamination
Other batteries	Hazardous/problematic	Contamination
Household chemicals	Hazardous/problematic	Contamination
Asbestos	Hazardous/problematic	Contamination
Clinical (medical)	Hazardous/problematic	Contamination
Gas bottles	Hazardous/problematic	Contamination
Hazardous other (specify)	Hazardous/problematic	Contamination
Computer equipment	E-waste	Contamination
TVs	E-waste	Contamination
Mobile phones	E-waste	Contamination
Electrical items and peripherals	E-waste	Contamination
Toner cartridges	E-waste	Contamination
Building materials	Building material	Contamination
Ceramics, dust, dirt, rock, inert	Other	Contamination
Other (specify)	Other	Contamination
Bagged garbage	General waste	Contamination

Table 34 FOGO consolidations for reporting

Material type	FOGO consolidation 1	FOGO consolidation 2
Newspaper	Paper and cardboard	Contamination
Magazines	Paper and cardboard	Contamination
Cardboard	Paper and cardboard	Contamination
Liquid paperboard	Paper and cardboard	Contamination
Disposable paper product	Other organic	Contamination
Recyclable paper	Paper and cardboard	Contamination
Composite (mostly paper)	Paper and cardboard	Contamination
Nappies	Hygiene	Contamination
Contaminated paper	Other organics	Contamination
Food in AS 4736 compostable bags	Food organics	Food and garden organics
Food in non-council bio bags	Other food	Potentially recoverable
Food in non-compostable bags	Other food	Potentially recoverable
Food kitchen organics – non-meat	Food organics	Food and garden organics
Food kitchen organics – meat	Food organics	Food and garden organics
Containerised/packaged food and liquid	Other food	Potentially recoverable
Municipal garden organics	Garden organics	Food and garden organics
Other putrescible	Other organics	Contamination
Wood/timber	Other organics	Contamination
Textiles carpet	Textiles	Contamination
Leather	Textiles	Contamination
Rubber	Other	Contamination
Oils	Hazardous/problematic	Contamination
Glass drink containers	Glass	Contamination
Other packaging glass	Glass	Contamination
Other glass	Glass	Contamination
Glass fines	Glass	Contamination
PET drink containers (1)	Recyclable plastic	Contamination
PET packaging (1)	Recyclable plastic	Contamination
PET other (1)	Other plastic	Contamination
HDPE drink containers (2)	Recyclable plastic	Contamination
HDPE packaging (2)	Recyclable plastic	Contamination
HDPE other (2)	Other plastic	Contamination
PVC drink containers (3)	Recyclable plastic	Contamination
PVC packaging (3)	Recyclable plastic	Contamination
PVC other (3)	Other plastic	Contamination
LDPE packaging (4)	Recyclable plastic	Contamination
LDPE other (4)	Other plastic	Contamination
PP packaging (5)	Recyclable plastic	Contamination
PP other (5)	Other plastic	Contamination
EPS Packaging (6)	Other plastic	Contamination
PS & EPS other (6)	Other plastic	Contamination
PS packaging (6)	Recyclable plastic	Contamination
Other plastic (7)	Other plastic	Contamination

Material type	FOGO consolidation 1	FOGO consolidation 2
Composite (mostly plastic)	Other plastic	Contamination
Plastic bags	Soft plastic/film	Contamination
Plastic film	Soft plastic/film	Contamination
Steel drink containers	Metals	Contamination
Steel packaging	Metals	Contamination
Steel other	Metals	Contamination
Composite (mostly ferrous)	Other non-recyclable metal	Contamination
Aluminium drink cans	Metals	Contamination
Aluminium packaging	Metals	Contamination
Aluminium other	Other non-recyclable metal	Contamination
Other non-ferrous (specify)	Other non-recyclable metal	Contamination
Composite (mostly non-ferrous)	Other non-recyclable metal	Contamination
Paint	Hazardous/problematic	Contamination
Fluorescent tubes	Hazardous/problematic	Contamination
Non-rechargeable batteries	Hazardous/problematic	Contamination
Rechargeable batteries	Hazardous/problematic	Contamination
Vehicle batteries	Hazardous/problematic	Contamination
Mobile phone batteries	Hazardous/problematic	Contamination
Power tool batteries	Hazardous/problematic	Contamination
Other batteries	Hazardous/problematic	Contamination
Household chemicals	Hazardous/problematic	Contamination
Asbestos	Hazardous/problematic	Contamination
Clinical (medical)	Hazardous/problematic	Contamination
Gas bottles	Hazardous/problematic	Contamination
Hazardous other (specify)	Hazardous/problematic	Contamination
Computer equipment	E-waste	Contamination
TVs	E-waste	Contamination
Mobile phones	E-waste	Contamination
Electrical items and peripherals	E-waste	Contamination
Toner cartridges	E-waste	Contamination
Building Materials	Building material	Contamination
Ceramics, dust, dirt, rock, inert	Other	Contamination
Other (specify)	Other	Contamination
Bagged garbage	General waste	Contamination

APPENDIX H DETAILED CALORIFIC VALUES

Table 35 Calorific values of general waste by material category

Source of data	See other tab for category inclusions	Kitchen - vegetable	Kitchen - meat	Municipal garden organics	Paper composite	Mixed paper	Liquid paperboard	Newspaper	Magazines	Cardboard	Disposable nappies	Wood	Textiles	Compounds (radios etc)	Mixed plastics	Plastic composite	Plastic film	Polystyrene (PS)	Polyethylene (PE)	Polyvinyl chloride (PVC)	Polyethylene terephthalate (PET)	Polypropylene (PP)	Rubber	Other	Check total	Total CV (kJ/kg of MSW)	Total CV (MJ/kg of MSW)	CV per household per week (MJ/hhld/week)	CV per year, whole Council (MJ/year)	CV per year, whole Council (TJ/year)	At W2E plant efficiency of 30%, the whole Council's MSW would make enough electricity to power how many homes each year?
ORER default	CV upper (kJ/kg)	19,8	11,9	16,8	21,4	15,1	21,450	17,3	13,5	18,6	22,9	20,6	16,780	12,000	39,0	37,1	40,0	40,0	45,0	25,0	25,0	44,000	23,100	0							
ORER default	Hydrogen content	6.2%	9.4%	6.0%	7.5%	5.8%	7.5%	6.1%	5.1%	5.9%	6.4%	6.0%	6.4%	Use ORER default CV raw for these categories based on ORER hydrogen and moisture contents																	
Enter or default	Moisture content	77%	52%	67%	13%	16%	20%	21%	9%	16%	60%	17%	21%																		
Calc or default	CV raw (kJ/kg)	2,287	3,437	3,490	16,873	11,223	15,300	12,063	11,041	14,239	7,203	15,694	11,647	9,570	32,880	34,900	37,800	38,150	41,880	23,770	23,680	40,920	16,770	0							
	Single Dwellings																														
Enter	% of MSW	43%	2%	3%	1%	10%	1%	0%	0%	2%	8%	1%	4%	3%	2%	1%	7%	0%	0%	0%	1%	1%	0%	10%	*100%*						
Calc	kJ/kg of overall MSW, raw	986	58	119	84	1,111	76	12	11	256	547	188	443	287	592	349	2,759	114	168	24	237	532	0	0		8,954	9	88			
Calc	kJ/kg of overall MSW, upper	8533.8	202.3	571.2	107.25	1499.9	107.25	17.33	13.5	336.06	1740.4	247.56	637.64	360	702	371	2920	120	180	25	250	572	0	0		19,514	20	192			

Source of data	See other tab for category inclusions	Kitchen - vegetable	Kitchen - meat	Municipal garden organics	Paper composite	Mixed paper	Liquid paperboard	Newspaper	Magazines	Cardboard	Disposable nappies	Wood	Textiles	Compounds (radios etc)	Mixed plastics	Plastic composite	Plastic film	Polystyrene (PS)	Polyethylene (PE)	Polyvinyl chloride (PVC)	Polyethylene terephthalate (PET)	Polypropylene (PP)	Rubber	Other	Check total	Total CV (kJ/kg of MSW)	Total CV (MJ/kg of MSW)	CV per household per week (MJ/hhld/week)	CV per year, whole Council (MJ/year)	CV per year, whole Council (TJ/year)	At W2E plant efficiency of 30%, the whole Council's MSW would make enough electricity to power how many homes each year?
	Multi-unit dwellings																														
Enter	% of MSW	38%	1%	1%	1%	11%	0%	0%	0%	3%	7%	2%	6%	4%	2%	1%	7%	0%	1%	0%	1%	2%	0%	12%	100%						
Calc	kJ/kg of overall MSW, raw	874	48	42	152	1,201	31	12	33	427	483	282	676	373	526	349	2,797	153	293	0	308	614	17	0		9,690	10	65			
Calc	kJ/kg of overall MSW, upper	7563.6	166.6	201.6	193.05	1621.05	42.9	17.33	40.5	560.1	1534.3	371.34	973.24	468	624	371	2960	160	315	0	325	660	23.1	0		19,192	19	129			
	Average all dwellings																														
Enter	% of MSW	41%	2%	3%	1%	10%	0%	0%	0%	2%	7%	1%	5%	3%	2%	1%	7%	0%	1%	0%	1%	1%	0%	11%	100%						
Calc	kJ/kg of overall MSW, raw	940	55	87	118	1,167	61	12	22	327	497	220	536	325	559	349	2,797	114	209	0	284	573	17	0		9,271	9	75	2,483,465,757	2,483	40,253
Calc	kJ/kg of overall MSW, upper	8137.8	190.4	420	150.15	1575.6	85.8	17.33	27	429.41	1580.1	288.82	771.88	408	663	371	2960	120	225	0	300	616	23.1	0		19,360	19	156	5,186,166,456	5,186	84,060

CV contribution of each material:

	Kitchen - vegetable	Kitchen - meat	Municipal Garden Organics	Paper composite	Mixed paper	Liquid Paper Board	Newspaper	Magazines	Cardboard	Disposable Nappies	Wood	Textiles	Compounds (radios etc)	Mixed plastics	Plastic composite	Plastic film	Polystyrene (PS)	Polyethylene (PE)	Polyvinyl chloride (PVC)	Polyethylene terephthalate (PET)	Polypropylene (PP)	Rubber	Other
SUD	43.1%	1.7%	3.4%	0.5%	9.9%	0.5%	0.1%	0.1%	1.8%	7.6%	1.2%	3.8%	3.0%	1.8%	1.0%	7.3%	0.3%	0.4%	0.1%	1.0%	1.3%	0.0%	10.0%
MUD	38.2%	1.4%	1.2%	0.9%	10.7%	0.2%	0.1%	0.3%	3.0%	6.7%	1.8%	5.8%	3.9%	1.6%	1.0%	7.4%	0.4%	0.7%	0.0%	1.3%	1.5%	0.1%	11.9%
Overall	41.1%	1.6%	2.5%	0.7%	10.4%	0.4%	0.1%	0.2%	2.3%	6.9%	1.4%	4.6%	3.4%	1.7%	1.0%	7.4%	0.3%	0.5%	0.0%	1.2%	1.4%	0.1%	10.8%