

2014

ACT NOWaste  
Domestic Waste Audit  
Report



A.Prince Consulting  
ABN 96 077 504 226  
TH 4 / 28 West Street  
Nth Sydney NSW 2060  
P: +61 2 9907 0994  
F: +61 2 9907 0330  
E: [admin@aprince.com.au](mailto:admin@aprince.com.au)  
W: [www.aprince.com.au](http://www.aprince.com.au)

This report was researched and prepared by



A.Prince Consulting Pty Ltd  
 ABN 96 077 504 226  
 Email: admin@aprice.com.au  
 Web: www.aprice.com.au

SYDNEY  
 TH 4/28 West St  
 North Sydney NSW 2060  
 Phone: (02) 9907 0994  
 Fax: (02) 9907 0330

for:

Kim Harris  
 Senior Contracts Officer  
 ACT NOWaste  
 GPO Box 158, Canberra, ACT, 2601  
 Phone: 02 62054792  
 Mobile: 0417 498 820  
 Email: KimM.Harris@act.gov.au

#### Document status

| Rev. no. | Document purpose     | Author                    | Peer Review | Editor       | Date          |
|----------|----------------------|---------------------------|-------------|--------------|---------------|
| 0        | Final                | M. Cumming<br>B. Johnston | Anne Prince | Helen Cooney | December 2014 |
| 1        | Requested amendments | Anne Prince               | Anne Prince | Helen Cooney | August 2015   |
| 2        |                      |                           |             |              | November 2015 |

© November 2015 APC

#### DISCLAIMER

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

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>1. Executive Summary .....</b>                                   | <b>5</b>  |
| <b>1. Introduction .....</b>  | <b>8</b>  |
| 1.1 Project objectives.....   | 8         |
| <b>2. Methodology.....</b>  | <b>9</b>  |
| 2.1 Project inception.....  | 9         |
| 2.2 Sample size.....  | 9         |
| 2.3 Sample selection and collection .....                           | 9         |
| 2.4 Sorting.....  | 10        |
| 2.5 Quality assurance – data verification .....                     | 11        |
| <b>3. Study limitations .....</b>                                   | <b>12</b> |
| <b>4. Results.....</b>  | <b>13</b> |
| 4.1 Samples collected .....   | 13        |
| 4.2 Presentation rates.....   | 14        |
| 4.3 General waste composition .....                                 | 15        |
| 4.4 General waste generation .....                                  | 18        |
| 4.5 Recycling composition .....                                     | 19        |
| 4.6 Recycling generation.....                                       | 21        |
| 4.7 Recycling contamination.....                                    | 22        |
| 4.8 Overall waste stream composition .....                          | 24        |
| 4.9 Overall waste generation.....                                   | 24        |
| 4.10 Plastic bags.....  | 25        |
| 4.11 Recovery rates .....   | 26        |
| 4.12 Diversion rates .....  | 27        |
| 4.13 Bin capacity utilised .....                                    | 29        |
| <b>5. Comparison with previous audit data.....</b>                  | <b>31</b> |
| 5.1 General waste composition .....                                 | 31        |
| 5.2 Recycling composition .....                                     | 33        |
| 5.3 Waste generation.....   | 35        |
| 5.4 Recovery rates .....  | 35        |
| 5.5 Diversion rate.....   | 36        |
| 5.6 Bin volume utilisation .....                                    | 36        |
| 5.7 Key performance indicators comparison with previous audits..... | 37        |
| <b>6. Key findings .....</b>  | <b>38</b> |
| <b>7. Discussion .....</b>  | <b>40</b> |
| 7.1 The ACT Waste Strategy 2011–2015 .....                          | 40        |
| 7.2 Recycling diversion.....  | 40        |
| 7.3 Contamination management strategies .....                       | 40        |
| 7.4 Organics management .....                                       | 41        |
| 7.5 Alternative Waste Technology (AWT).....                         | 41        |
| 7.6 Education in MUDs .....   | 41        |
| 7.7 Adequate recycling bin capacity in MUDs .....                   | 41        |
| <b>8. Recommendations.....</b>                                      | <b>42</b> |

|   |           |
|---|-----------|
| <b>Appendix A: List of accepted materials .....</b> | <b>43</b> |
| <b>Appendix B: Agreed sorting categories .....</b>  | <b>44</b> |
| <b>Appendix C: Detailed waste composition .....</b> | <b>45</b> |

#### INDEX OF TABLES

|          |  |    |
|----------|--|----|
| Table 1  | ACT collection systems .....                                     | 8  |
| Table 2  | Sample collections .....   | 13 |
| Table 3  | Presentation rates .....   | 14 |
| Table 4  | Detailed composition of the general waste stream .....           | 16 |
| Table 5  | Detail of contaminants – all housing types .....                 | 22 |
| Table 6  | Detail of contaminants - SDs .....                               | 23 |
| Table 7  | Detail of contaminants - MUDs .....                              | 23 |
| Table 8  | Plastic bags in the waste and recycling streams .....            | 25 |
| Table 9  | Detailed potential diversion rates .....                         | 28 |
| Table 10 | Volume of general waste bins used (SDs) .....                    | 29 |
| Table 11 | Volume of recycling bins used (SDs).....                         | 29 |
| Table 12 | Volume of general waste bins used (MUDs) .....                   | 30 |
| Table 13 | Volume of recycling bins used (MUDs).....                        | 30 |
| Table 14 | Detailed comparison of general waste composition 2011-2014 ..... | 32 |
| Table 15 | Detailed comparison of recycling composition 2011-2014.....      | 34 |

#### INDEX OF FIGURES

|           |  |    |
|-----------|--|----|
| Figure 1  | Overall consolidated general waste composition .....               | 15 |
| Figure 2  | SD general waste composition .....                                 | 17 |
| Figure 3  | MUD general waste composition .....                                | 17 |
| Figure 4  | Weight of general waste per household per week .....               | 18 |
| Figure 5  | Consolidated recycling composition –all dwellings.....             | 19 |
| Figure 6  | Detailed recycling composition .....                               | 19 |
| Figure 7  | SD recycling composition.....                                      | 20 |
| Figure 8  | MUD recycling composition .....                                    | 20 |
| Figure 9  | Weight of recycling per household per week.....                    | 21 |
| Figure 10 | Overall waste stream composition .....                             | 24 |
| Figure 11 | Total waste generation per stream per week.....                    | 24 |
| Figure 12 | Recovery rates.....  | 26 |
| Figure 13 | Current and potential landfill diversion .....                     | 27 |
| Figure 14 | SD Bin utilisation .....   | 29 |
| Figure 15 | MUD Bin utilisation .....  | 30 |
| Figure 16 | Consolidated composition of general waste – previous audits.....   | 31 |
| Figure 17 | Consolidated composition of recycling – previous audits .....      | 33 |
| Figure 18 | Weekly weight of waste stream by household – previous audits ..... | 35 |
| Figure 19 | Recovery rates – all dwellings – previous audits .....             | 35 |
| Figure 20 | Diversion rates – previous audits.....                             | 36 |
| Figure 21 | Volume of bins used – previous audits – all dwellings .....        | 36 |
| Figure 22 | Summary of key indicators over time .....                          | 37 |

**INDEX of IMAGES**

|           |   |    |
|-----------|---|----|
| Image 1:  | Contents of a general waste bin collected and bagged .....              | 10 |
| Image 2:  | Recycling bins at a MUD block selected for sampling with wall signage.. | 10 |
| Image 3:  | Garbage delivered for sorting .....                                     | 11 |
| Image 4:  | Recycling delivered for sorting.....                                    | 11 |
| Image 5:  | Over a third of general waste is food waste .....                       | 15 |
| Image 6:  | Hazardous waste is less than 1% of general waste.....                   | 17 |
| Image 7:  | Example of non-recyclable plastic .....                                 | 20 |
| Image 8:  | Example of textiles, plastics and plastic bags .....                    | 20 |
| Image 9:  | Ferrous other evident .....   | 21 |
| Image 10: | Waste storage area in MUD block .....                                   | 41 |

## 1. EXECUTIVE SUMMARY

The ACT Waste Strategy 2011–2025 sets an ambitious target of 90% resource recovery by 2025. This means that the ACT Government is working towards diverting over 90% of all waste generated in the ACT from landfill. This target includes domestic, commercial, construction and demolition, and garden waste. Domestic kerbside waste makes up about one quarter of total waste sent to landfill in the ACT, while commercial waste accounts for about half.

This waste audit will help to inform future decision making as domestic waste is one waste stream being targeted by the ACT Government in its efforts to meet the 90% resource recovery target as part of a broader optimisation of the existing waste system.

### Audit parameters

- General waste and recycling bins from 300 single-unit dwellings (SDs) and 113 multi-unit dwellings (MUDs) were collected over seven (7) days in November 2014.
- During the 2014 waste audit, a total of 3.9 tonnes of general waste and 1.9 tonnes of recycling was sorted into 45 material categories.
- These results were compared with previous audits from 2007, 2009 and 2011.

### Bin presentation rates

- All MUDs presented general waste and recycling bins for collection.
- 90% of SDs presented a general waste bin and 88% presented a recycling bin

### Overall waste generation

- The average ACT household produces 14.2kg of waste and recycling per household per week. This is more than 2009 and 2011, but less than 2007.
- SDs produce 15.4kg per household per week and MUDs produce 10.9kg per household per week.

### General waste generation

- The average ACT household produces 9.54kg of general waste per household per week, which is higher than 2009 and 2011, but lower than 2007.
- SDs average 9.81kg and MUDs average 8.81kg.

### General waste composition

- The general waste stream comprises 35% food waste.
- The general waste bin comprises 24% recyclable items that could be placed in the co-mingled bin, which is down from 31% in 2011.
- MUDs have a higher proportion of recyclable material (29%) than SDs (22%) in the general waste.
- The proportion of garden organics in the general waste stream is 10%, which is higher than previous audits – SDs produce 11% and MUDs 6%.

### Recycling generation

- The amount of recycling generated by the average household is 4.65kg per week, which is higher than 2011 and 2009 but lower than 2007.
- SDs generated significantly more recycling than MUDs (5.62kg/week/household at SDs compared with 2.05kg/week/household at MUDs).

## Recycling composition

- The recycling stream comprises 46% paper and cardboard, which is lower than previous audits.
- Recyclable plastic, glass and metal comprises 47%, which is higher than previous audits.

## Recycling contamination

- Contamination in the recycling system is 7.8%, compared with 7.1% in 2011.
- SDs and MUDs have a similar proportion of contamination in their recycling bins.
- The main contaminants from SDs are miscellaneous items, containerised food/liquid, garden organics and textiles.
- The main contaminants from MUDs are expired packaged food, miscellaneous items and plastic film.

## Plastic bags in the waste stream

- Plastic shopping bags account for only 0.1% and low-density barrier bags are 0.2% of the general waste.
- Plastic bags make up an insignificant proportion of the recycling stream.
- The average household puts only 0.4 lightweight shopping bags in the bin per week, mostly in the general waste bin. SDs average 0.4 bags/week and MUDs 0.2 bags/week.
- Low-density barrier bags average 0.9 bags per household per week – SDs put 1.1 bags per week in the bins and MUDs only 0.4 bags.
- Total plastic bags in the waste stream average 1.3 bags per household per week.

## Bin capacity utilised (Single dwellings only)

- The average general waste bin is 85% full and the recycling bin is 93% full when presented for collection – an increase on previous years.
- Only 8% of recycling bins were over-full.
- A third of general waste bins in SDs were less than half full.

## Bin capacity utilised (Multi-unit dwellings)

- The average general waste bin in units was 60% full when presented for collection
- The average recycling bin in units was 98% full when presented with
- Half the bins were full to overflowing indicating capacity issues.

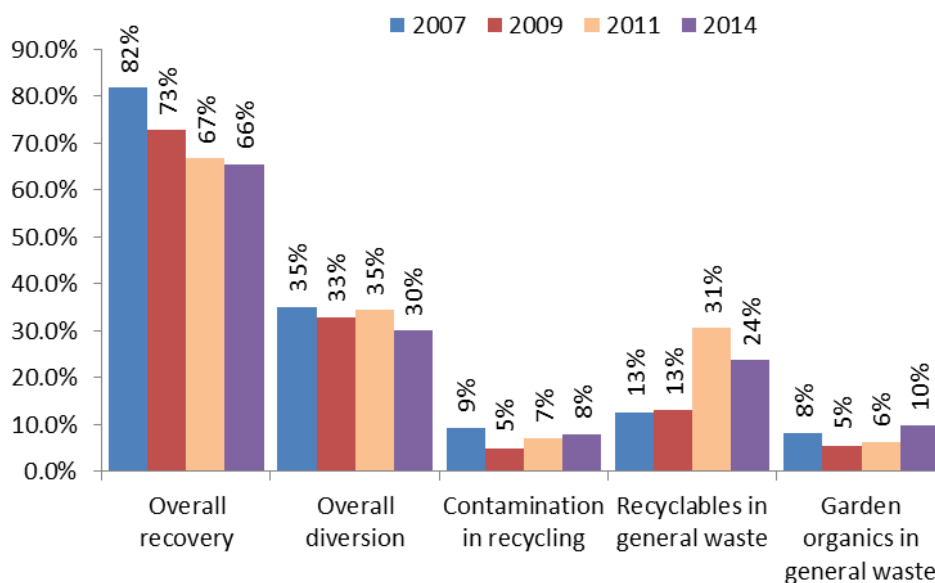
## Recovery rates

- Overall recovery of recyclables in 2014 is 66%, continuing a downward trend in recovery rates over time.
- Glass has the highest recovery rate, at 81%, followed by paper/cardboard at 62%. All other materials are less than 60%, with aluminium the lowest at 40%.
- Recovery rates at MUDs are much lower than at SDs (71% at SDs; 42% at MUDs).

## Diversion from landfill

- The 2014 diversion rate is 30%, which is a decrease from previous years.
- SDs currently divert 34% and MUDs 17%.
- The potential additional diversion possible if all recyclables were placed in the yellow bin is 16%. Recovering garden organics would achieve a further 7% diversion.
- Recovering 60% of food waste could add another 14% diversion, making a total maximum potential landfill diversion of 67%.

## Trends in key indicators



- Recovery and diversion are at the lowest levels since 2007.
- Garden organics are at the highest recorded levels at 10% of the general waste bin.
- Contamination appears to be steadily increasing from 5% in 2009 to 8% in 2014.
- Recyclables in the general waste is lower than 2011 but higher than 2007 and 2009

## Recommendations

1. That additional diversion is not possible without substantial policy changes to address the organics fraction, which is now almost half of the general waste bin contents. Organics should be separated from the waste stream through targeted community education and a clear plan to separately process them.
2. That diverting organics from landfill is key to the Government achieving its goal of a carbon neutral waste sector by 2020 and a carbon neutral city by 2060.
3. That to increase recycling diversion, ACT NOWaste should employ new and innovative methods focusing on targeted community education to reduce the 24% recycling in the general waste bin. In particular additional bin capacity should be provided to MUD properties where currently 20% of all recycling bins are overflowing.
4. That contamination management strategies focused targeted community education messages should target food waste, containerised food and liquid, plastic film, textiles and garden organics.
5. That ongoing education is required to communicate that garden organics are banned from the general waste bin as they currently comprise 11% of SDs and 6% of MUDs bins.
6. That to investigate Alternative Waste Technology (AWT) processes that can recover the recyclables and create an organic by-product. Greater recovery could be achieved with energy recovery of the residual.
7. That all MUD blocks should be inspected to determine if adequate wall and bin signage is provided indicating the materials being targeted. When bin lids are open all bins appears to be the same so clear signage should be placed on front and side of every bin.
8. That a full visual audit of all MUD properties should be undertaken to determine where additional capacity is required



## 1. INTRODUCTION

The *ACT Waste Management Strategy 2011–2025: Towards a Sustainable Canberra* identifies the need for resource-recovery surveys and audits of waste composition to provide ongoing reporting and analysis of trends in waste-to-landfill and resource-recovery rates.

ACT NOWaste contracted A.Prince Consulting Pty Ltd (APC) to conduct a domestic waste audit of the recycling and general waste bins at selected single dwellings (SDs) and multi-unit dwellings (MUDs) in the Canberra metropolitan area.

The methodology for the audit was based on the NSW Environmental Protection Agency (EPA) *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008* and the *Addendum 2010* as amended in discussion with ACT NOWaste staff.

ACT NOWaste has conducted seven previous domestic waste composition audits in 2001, 2003, 2004, 2005, 2007, 2009 and 2011. APC has undertaken six of these previous audits and we have provided a comparative analysis of the 2011, 2009 and 2007 results to show trends.

The 2014 sample collection was conducted over seven weekdays, which included five weekdays commencing Monday 3 November 2014 for the single dwellings (SDs) and Monday and Tuesday 10 and 11 November for multi-unit dwellings (MUDs). Sample collections for SDs were undertaken by SITA as an aggregated collection. Sample collections for MUDs were undertaken as a bin-by-bin collection by APC as SITA was unable to provide a collection vehicle.

### 1.1 Project objectives

ACT NOWaste set out the following project objectives in its initial brief:

- Determine the contents of a representative sample of domestic waste and recycling bins using methodology consistent and comparable with previous surveys;
- Analyse and report on trends and opportunities to further improve recycling and assist with community education programs conducted by ACT NOWaste.

For this project, the following primary objectives were sought:

- Establish the character, amount, type and proportion of materials in the selected waste streams to be audited;
- Determine the recovery rate of each category of recycled materials identified;
- Identify the type of contamination (hazardous or otherwise) in the recycling stream;
- Measure changes to household waste management since the previous waste audit.

Table 1 below shows the details of the general waste and recycling services. A list of accepted and non-accepted materials is provided at **Appendix A**.

**Table 1: ACT collection systems**

| Stream | General waste |           | Recycling |             |
|--------|---------------|-----------|-----------|-------------|
|        | Bin size      | Frequency | Bin size  | Frequency   |
| SDs    | 120L          | Weekly    | 240L      | Fortnightly |
| MUDs   | 240L          | Variable  | Variable  | Variable    |

## 2. METHODOLOGY

### 2.1 Project inception

On being awarded the project, APC's Director and Project Manager held a teleconference with ACT NOWaste's Project Manager to confirm the specific operational requirements for the audit. APC liaised with SITA, ACT NOWaste's waste services provider, and arranged to have the single-dwelling sample collection undertaken as an aggregated collection using their driver and vehicle accompanied by the APC Collection Supervisor.

Sorting was undertaken at the SITA waste depot and APC provided all necessary WHS equipment, risk documentation and undertook the required safety inductions prior to commencing the project.

### 2.2 Sample size

It was agreed with ACT NOWaste that the sample would consist of 300 single-dwelling households and 100 MUD households, preferably split to represent MUD households with MGBs and those with hoppers. Due to the logistical challenges, only MUDs with hoppers were included and form the total MUD sample for this audit.

### 2.3 Sample selection and collection

As the methodology for this audit was based on the NSW *Guidelines*, the 'matched pair' requirement was followed. This means only households presenting both garbage and recycling bin were included in the audit. This requirement provides a total measurement of household behaviour, including waste generation, composition, recovery and diversion. Accordingly, only streets and MUDs in the recycling week of the audit were included for selection.

For single dwellings, ACT NOWaste provided a list of suburbs for each of the respective days in the nominated recycling week. APC then randomly selected the suburbs and one street in each suburb to commence the collections. As this collection was aggregated and collected by SITA, it was agreed by ACT NOWaste that every consecutive SD household presenting both bins would be included in the audit.

An automated side-loader waste collection vehicle collected the contents of the presented bins on the morning of the scheduled collection. The collection commenced at the randomly selected nominated street and continued along each subsequent street until the daily sample of 60 matched general waste bins had been collected. This load was then delivered to the sorting site with the truck emptying the load and returning to collect the recycling bin from the same properties.

APC's Collection Supervisor travelled in the collection vehicle, recording both presentation rates for all households passed and bin volumes (% capacity used) of those bins collected. This ensured the sample size was met and only matched bins were collected.

Where households didn't present a bin, the following procedure was undertaken, as specified in the NSW *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, bagging and analysing the contents as per these Guidelines.'<sup>1</sup>

MUD addresses were collected as provided on the list supplied by service day from ACT NOWaste. MUD samples were collected the night prior to the scheduled collections, with all data recorded e.g. bin contents by volume and bin size). Samples were placed into heavy-duty plastic bags and coded from a pre-coded data-collection MUD sheet to identify the sample location and waste stream.



**Image 1: Contents of a general waste bin collected and bagged**



**Image 2: Recycling bins at a MUD block selected for sampling with wall signage**

## 2.4 Sorting

Sorting was conducted at the SITA depot at Hume. Collected material deposited at the sorting site was separated into the sampled waste streams (general waste and recycling) and sorted to the agreed material sorting categories. The same sorting categories used in the 2011 audit were used for this audit, however some slight amendments were made in relation to plastic film and bags, and food waste. A copy of the agreed sorting categories is provided at **Appendix B**.

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 Advanced Waste Treatment (AWT) facility without added equipment (i.e., bag breakers or shredders to access the waste or recyclables). For each household and waste stream any material in household shopping or general waste bags was weighed separately. The bagged waste was then placed on the sort table, opened and the contents added in with the remainder of the material to be sorted by category.

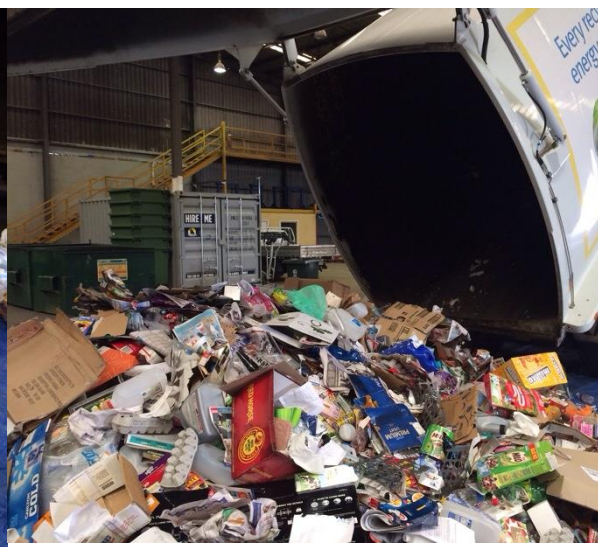
<sup>1</sup> *Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 4.4, page 9*

Separated materials were placed in appropriate containers labelled by category, weighed on a set of electronic scales and the weight recorded. All electronic scales are calibrated regularly.

Sorted material was placed into general waste, recycling and garden organics bins for appropriate disposal or recycling.



**Image 3: Garbage delivered for sorting**



**Image 4: Recycling delivered for sorting**

## 2.5 Quality assurance – data verification

At the data-entry stage, each coded sheet on which sorting data was recorded was checked again against the collection entry for that sample. Also, the weight of each MUD sample bag recorded before sorting was checked against the total weight of the sorted components and any significant differences were investigated.

All data was entered into a Microsoft Excel spreadsheet, which was designed for the analysis of the ACT NOWaste audits. This includes a systematic error check at the data-entry stage and ensures consistency in layout and the design of charts.

### 3. STUDY LIMITATIONS

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

**Timeframe:** This audit collection was carried out over seven weekdays, with samples distributed over the geographic area of the subject area. The data was then used as being representative of the Canberra metropolitan area. It should be noted that seasonal trends (e.g. warmer weather leading to increased consumption of beverages), seasonal celebrations (e.g. Easter, Christmas) and the impact of weather events (e.g. high rainfall leading to grass growth and larger amounts of organic waste) might change waste generation over time. Thus, the results of this audit should be treated with due caution when analysing this report or comparing it 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 a random sampling method, stratified by geographic area, to minimise the chance of this situation occurring.

**Weight-based analysis:** The collection of data for this audit was recorded by weight. This type of collection may cause some materials to appear to be present in quite small proportions due to their comparatively low densities (e.g. plastic beverage containers) yet they can and do consume large amounts of volume. Weight-based analysis has been used in this audit because it is a standard procedure and is the most accurate way to collect data on a number of different types of materials.

**Limitations of sample size:** All surveys carry an element of sampling error, which is the mathematical error associated with using a sample to represent a total population. Taking larger samples reduces sampling error. The sampling error involved in waste audits is usually small and can be tabulated by producing estimates augmented by upper and lower confidence intervals.

## 4. RESULTS

All data in this section is weight-based unless otherwise stated. The results of the audit have been graphically represented in charts and tables that show the various characteristics of the waste stream with detailed explanations. The weights of materials have been calculated by aggregating gram weights of materials from sample households. Some percentages and weights have been rounded to the nearest whole number and therefore some figures and descriptions may not add up to 100%.

The results have been divided into sections:

- Presentation rates
- General waste composition and generation
- Recycling composition and generation
- Plastic bags
- Recovery rates
- Landfill diversion
- Bin utilisation by volume
- Comparison with previous audit results.

The main findings and analysis have been summarised in the section 'Key Findings'. Details of the data used in composition charts are available in **Appendix C**.

### 4.1 Samples collected

The table below shows the number of samples collected and from which suburbs they were collected. A total sample of 413 households was included in the audit representing 300 single- dwelling (SDs) households and 113 multi-unit dwelling (MUDs) households.

**Table 2: Sample collections**

| Collection day              | Suburbs sampled    | No. of households<br>General waste |      | No. of households<br>Recycling Bins |      |
|-----------------------------|--------------------|------------------------------------|------|-------------------------------------|------|
|                             |                    | SDs                                | MUDs | SDs                                 | MUDs |
| Monday 3 Nov                | Chapman            | 60                                 | 0    | 60                                  | 0    |
| Tuesday 4 Nov               | Banks              | 60                                 | 0    | 60                                  | 0    |
| Wednesday 5 Nov             | Amaroo             | 60                                 | 0    | 60                                  | 0    |
| Thursday 6 Nov              | Holt, Downer       | 60                                 | 0    | 60                                  | 0    |
| Friday 7 Nov                | Downer             | 60                                 | 0    | 60                                  | 0    |
| Monday 10 Nov               | Kingston           | 0                                  | 61   | 0                                   | 61   |
| Tuesday 11 Nov              | Greenway, Waniassa | 0                                  | 52   | 0                                   | 52   |
| <b>Total bins collected</b> |                    | <b>413</b>                         |      | <b>413</b>                          |      |

\*Note: The sample collection day for SDs occurred on the scheduled collection day because it was an aggregated collection. MUD sample collection occurred the night prior to the scheduled service day for that area.

## 4.2 Presentation rates

As well as recording the number of properties presenting bins, sample collectors also recorded the number not presenting bins. The presentation rates in Table 3 were calculated by dividing the total number of properties passed during the collection by the number of properties recorded as presenting bins. The *Guidelines* required that matched pairs were collected, so if a property presented only one of the two streams the bins were left and the next property was audited.

Presentation rates for single dwellings are high, at 90% for general waste bins and 88% for recycling bins. MUDs had 100% presentation rate for both bins.

**Table 3: Presentation rates**

| Waste stream  | Dwelling type | No of households | No of bins presented | Presentation rate |
|---------------|---------------|------------------|----------------------|-------------------|
| General waste | SD            | 344              | 310                  | 90%               |
|               | MUD           | 113              | 7                    | 100%              |
| Recycling     | SD            | 344              | 302                  | 88%               |
|               | MUD           | 113              | 10                   | 100%              |

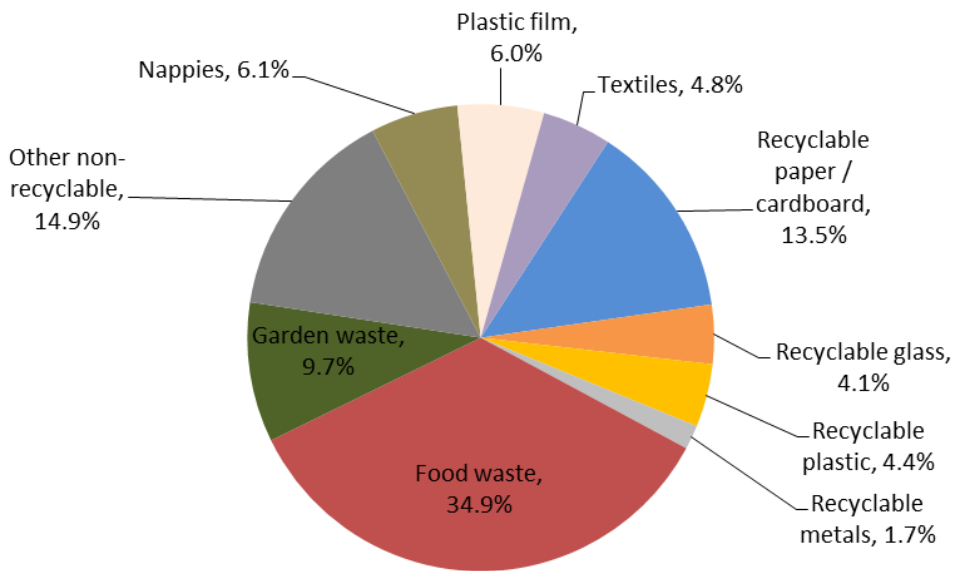
Sampling a larger number of households over several weeks of the general waste and recycling collection cycles would give greater accuracy of participation rates. The presentation rates in this table are based on bins presented at the time of sample collection and may not truly reflect the presentation or participation rates.

### 4.3 General waste composition

#### 4.3.1 General waste composition – all dwellings

Figure 1 shows the composition of the general waste stream from all dwellings audited consolidated into some key categories. The largest proportion of the stream is food waste, at 35%. Currently, 24% of the general waste is material that can be recycled in the co-mingled recycling bin – over half of this is recyclable paper and cardboard. Garden waste represents 10% – this material is deemed not acceptable in the general waste bin. Nappies and plastic film each represent 6% and textiles 5%. Fifteen per cent (15%) is residual material that would not be recoverable through any method other than thermal treatment.

**Figure 1: Overall consolidated general waste composition**



**Image 5: More than a third of general waste is food waste**





Table 4 shows the detailed composition of the general waste stream from all dwellings audited. Food scraps, garden organics, contaminated paper and nappies make up more than half of the general waste stream. The next largest categories are plastic film (6%), expired food and textiles, both 5%.

Hazardous waste (paint, fluorescent lights, batteries, chemicals and medical waste) represents less than 1%. Plastic bags account for only 0.3% of general waste (see Section 4.10 for more details). A more detailed breakdown of general waste composition is provided in **Appendix C**.

**Table 4: Detailed composition of the general waste stream**

| Material category                               | Per cent      |
|---|---------------|
| Food/kitchen – scraps (other food)              | 29.0%         |
| Garden / garden organics                        | 9.7%          |
| Disposable / contaminated paper                 | 7.9%          |
| Nappies   | 6.1%          |
| Film, plastic soft                              | 6.0%          |
| Food/kitchen – expired food                     | 5.1%          |
| Textiles / clothing / footwear / carpet         | 4.8%          |
| Residual / Other miscellaneous                  | 4.2%          |
| Glass packaging / glass containers              | 3.7%          |
| Other organics / wood / timber                  | 3.7%          |
| Containerised food and liquid                   | 2.8%          |
| Other paper                                     | 2.6%          |
| Newspapers and magazines                        | 2.1%          |
| Other plastic                                   | 1.2%          |
| Polypropylene                                   | 1.1%          |
| Steel packaging                                 | 1.0%          |
| Ferrous other                                   | 0.9%          |
| Food/kitchen – edible food                      | 0.8%          |
| Plastic 1 PET                                   | 0.8%          |
| Corrugated cardboard                            | 0.7%          |
| Aluminium – cans, trays and foil                | 0.6%          |
| Ceramics  | 0.6%          |
| Other rigid plastic containers                  | 0.6%          |
| Non-glass fines                                 | 0.6%          |
| Plastic 2 HDPE                                  | 0.6%          |
| Cobbles / boulders                              | 0.5%          |
| Glass miscellaneous / other glass               | 0.4%          |
| Soil / rubble / inert                           | 0.4%          |
| Hazardous – paint / fluoros / batteries         | 0.3%          |
| Other – specify                                 | 0.3%          |
| Liquidpaperboard                                | 0.3%          |
| Plastic bags – low-density barrier bags         | 0.2%          |
| Chemicals                                       | 0.1%          |
| Medical / sharps                                | 0.1%          |
| Plastic bags – lightweight, single-use shopping | 0.1%          |
| Non-expanded polystyrene                        | 0.1%          |
| Plastic 3 PVC                                   | 0.1%          |
| <b>Total all materials</b>                      | <b>100.0%</b> |

**Image 6: Hazardous waste is less than 1% of general waste**

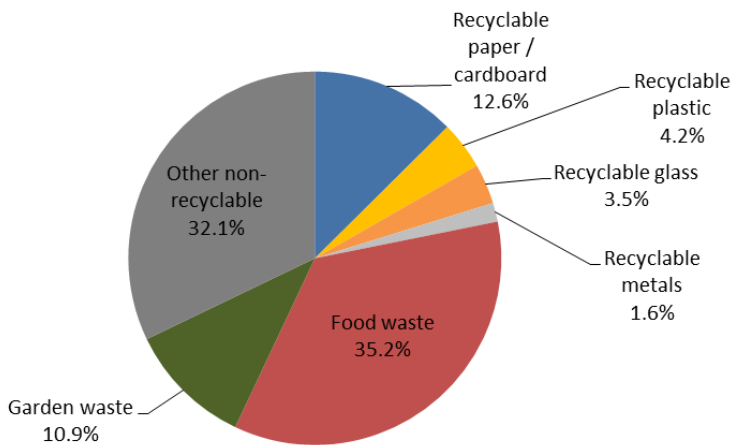


**4.3.2 General waste composition – by housing type**

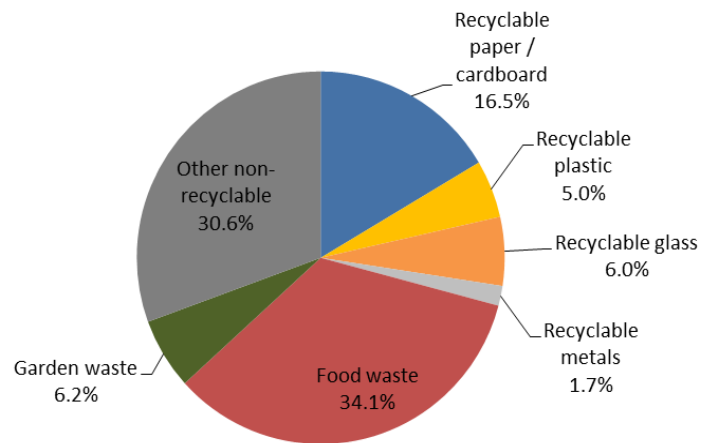
General waste composition is similar in both SDs and MUDs, as shown in Figure 2 and Figure 3. The main differences are:

- MUDs have a higher proportion of recyclable material in the general waste (29% at MUDs versus 22% at SDs); and
- SDs have a higher proportion of garden waste in the general waste (11%, compared with 6% at MUDs).

**Figure 2: SD general waste composition**



**Figure 3: MUD general waste composition**

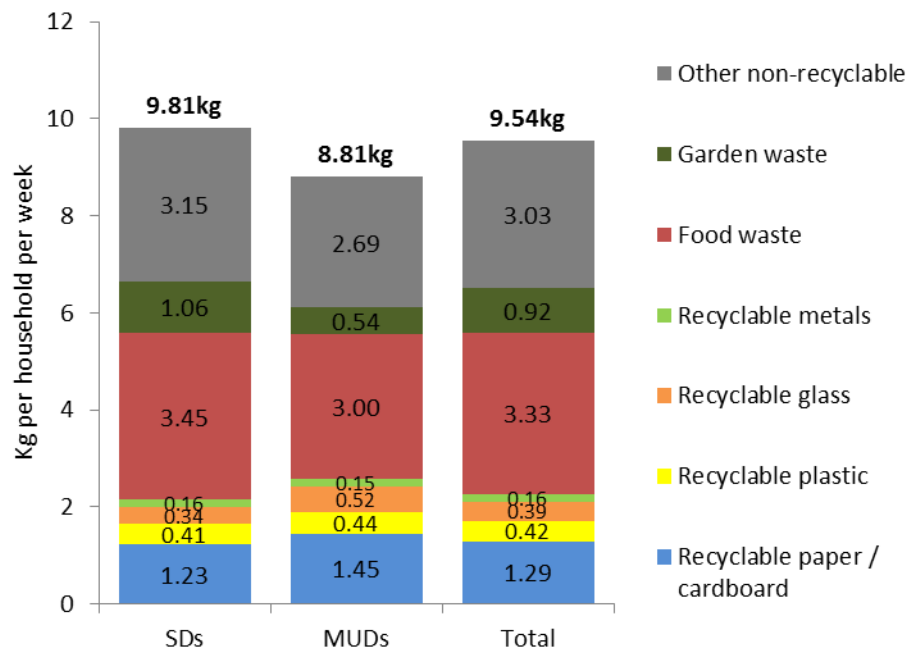


### 4.4 General waste generation

The average ACT household produces 9.54kg of general waste per household per week. SDs average 9.81kg per week and MUDs average 8.81kg per week.

Figure 4 shows that SDs produce more food and garden waste per week than MUDs. Despite generating one kilogram less general waste per week than SDs, MUD households have a higher ‘weight per week’ of recyclables in the general waste compared with SDs.

**Figure 4: Weight of general waste per household per week**



## 4.5 Recycling composition

### 4.5.1 Recycling composition – all dwellings

Figure 5 shows the composition of the recycling stream from all dwellings audited consolidated into key categories. Recyclable paper and cardboard represent the largest proportion at 46%, followed by recyclable glass (35%), recyclable plastic (9%) and recyclable metals (3%). Non-recyclable contamination comprises 8%. For a more detailed analysis of contamination refer to Section 4.7.

**Figure 5: Consolidated recycling composition – all dwellings**

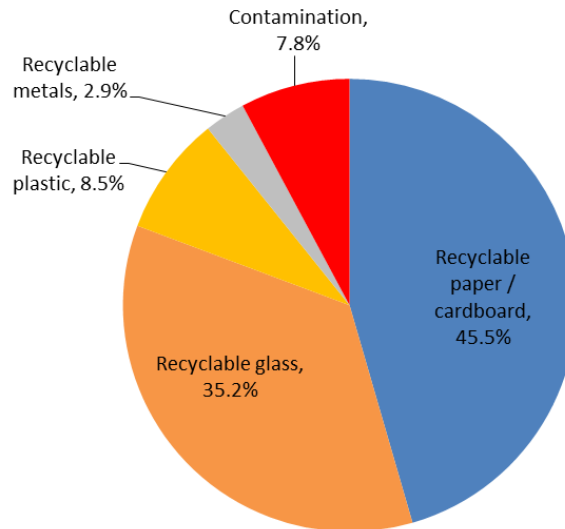
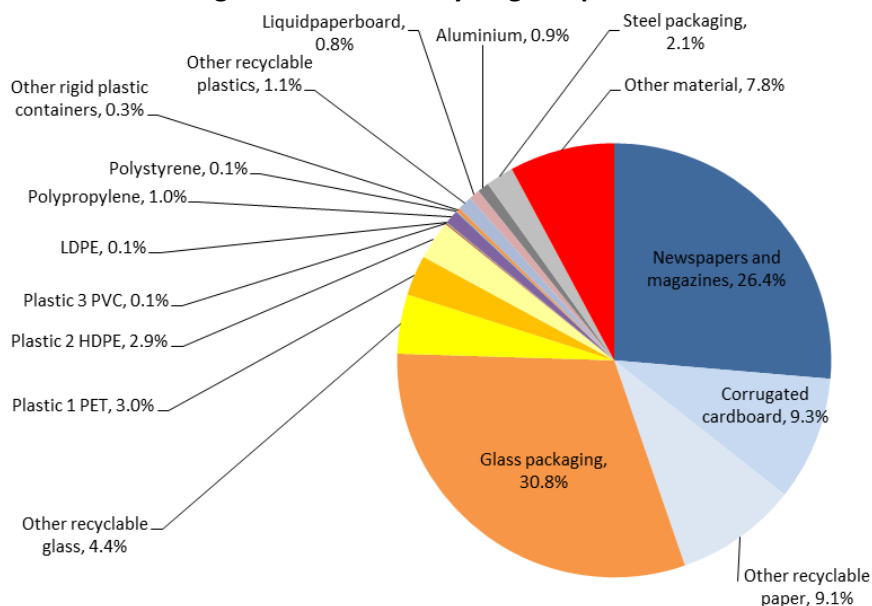


Figure 6 shows the detailed composition of the recycling stream from all dwellings audited. The largest component of the stream is glass containers (31%), followed by newspapers/magazines (26%), corrugated cardboard (9%) and other recyclable paper (9%). More detail is contained in **Appendix C**.

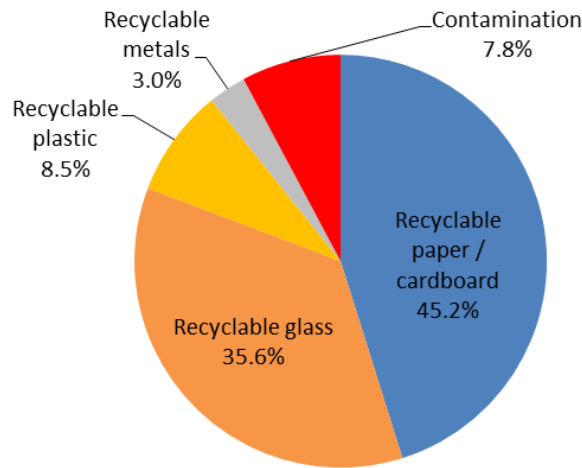
**Figure 6: Detailed recycling composition**



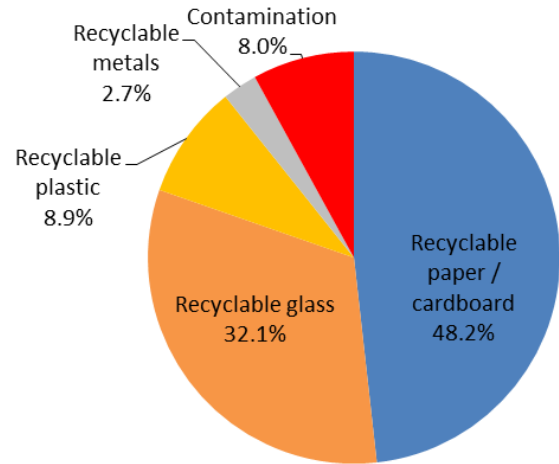
**4.5.2 Recycling composition – by housing type**

Recycling composition is similar in both SDs and MUDs, as shown in Figure 7 and Figure 8. SDs have slightly more glass and MUDs have slightly more paper/cardboard. Contamination levels are almost identical.

**Figure 7: SD recycling composition**



**Figure 8: MUD recycling composition**



**Image 7: Example of non-recyclable plastic**



**Image 8: Example of textiles, plastics and plastic bags**



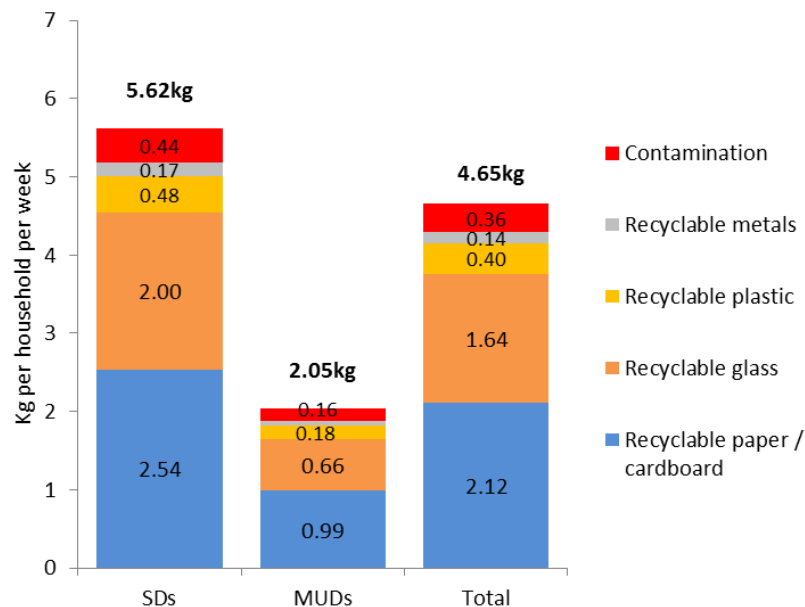
Image 9: Ferrous – other evident

### 4.6 Recycling generation

The average ACT household produces 4.65kg of recycling per household per week. SDs produce considerably more than MUDs; SDs generate 5.62kg per week of recycling and MUD households average 2.05kg per week.

Figure 9 shows that SDs produce more of each category of recycling than MUDs. SDs produce 0.44kg per week of contamination per household per week, which is almost four times that produced by MUDs (0.16kg per household per week), although contamination as a proportion of total recycling is about the same – see Section 4.7 for more detail on contamination.

Figure 9: Weight of recycling per household per week



## 4.7 Recycling contamination

### 4.7.1 Recycling contamination – all dwellings

Table 5 shows a detailed breakdown of the materials that are contaminating the recycling stream. Almost a third of contamination is miscellaneous materials. This is followed by containerised food and liquid, garden organics and textiles. There was an insignificant amount of plastic bags in the recycling (see Section 4.10 for more detail on plastic bags).

**Table 5: Detail of contaminants – all housing types**

| Material  | % of total recycling | % of contamination |
|---|----------------------|--------------------|
| Residual / other miscellaneous                  | 2.3%                 | 29.3%              |
| Containerised food and liquid                   | 1.3%                 | 16.8%              |
| Garden / garden organics                        | 0.9%                 | 11.7%              |
| Textiles / clothing / footwear / carpet         | 0.8%                 | 10.7%              |
| Film, plastic soft                              | 0.5%                 | 6.9%               |
| Ferrous other                                   | 0.5%                 | 6.2%               |
| Food/kitchen – expired food                     | 0.4%                 | 5.2%               |
| Other   | 0.3%                 | 3.7%               |
| Food/kitchen – scraps (other food)              | 0.2%                 | 2.9%               |
| Ceramics  | 0.2%                 | 2.1%               |
| Cobbles / boulders                              | 0.1%                 | 1.7%               |
| Hazardous – paint / fluoros / batteries         | 0.1%                 | 1.0%               |
| Nappies   | 0.1%                 | 0.7%               |
| Other organics / wood / timber                  | 0.0%                 | 0.6%               |
| Plastic bags – low-density barrier bags         | 0.0%                 | 0.2%               |
| Food/kitchen – edible food                      | 0.0%                 | 0.2%               |
| Plastic bags – lightweight, single-use shopping | 0.0%                 | 0.1%               |
| <b>Total recycling stream</b>                   | <b>7.8%</b>          | <b>100.0%</b>      |

#### 4.7.2 Recycling contamination – by housing type

Table 6 shows the contaminants in the recycling in SDs. Almost a third of contamination is miscellaneous materials, followed by containerised food and liquid, garden organics and textiles.

**Table 6: Detail of contaminants – SDs**

| Material  | % of total recycling | % of contamination |
|---|----------------------|--------------------|
| Residual / other miscellaneous                  | 2.4%                 | 30.8%              |
| Containerised food and liquid                   | 1.4%                 | 17.7%              |
| Garden / garden organics                        | 1.0%                 | 13.3%              |
| Textiles / clothing / footwear / carpet         | 0.9%                 | 11.0%              |
| Film, plastic soft                              | 0.5%                 | 6.2%               |
| Ferrous other                                   | 0.5%                 | 6.4%               |
| Food/kitchen – expired food                     | 0.2%                 | 2.9%               |
| Other   | 0.3%                 | 4.2%               |
| Food/kitchen – scraps (other food)              | 0.2%                 | 2.9%               |
| Ceramics  | 0.1%                 | 1.8%               |
| Cobbles / boulders                              | 0.0%                 | 0.0%               |
| Hazardous – paint / fluoros / batteries         | 0.1%                 | 1.2%               |
| Nappies   | 0.1%                 | 0.7%               |
| Other organics / wood / timber                  | 0.1%                 | 0.7%               |
| Plastic bags – low-density barrier bags         | 0.0%                 | 0.2%               |
| Food/kitchen – edible food                      | 0.0%                 | 0.0%               |
| Plastic bags – lightweight, single-use shopping | 0.0%                 | 0.1%               |
| <b>Total recycling stream</b>                   | <b>7.8%</b>          | <b>100.0%</b>      |

Table 7 shows the contaminants in the recycling in MUDs. The main contaminants are expired food, miscellaneous material, cobbles/boulders, plastic film, containerised food/liquid and textiles.

**Table 7: Detail of contaminants – MUDs**

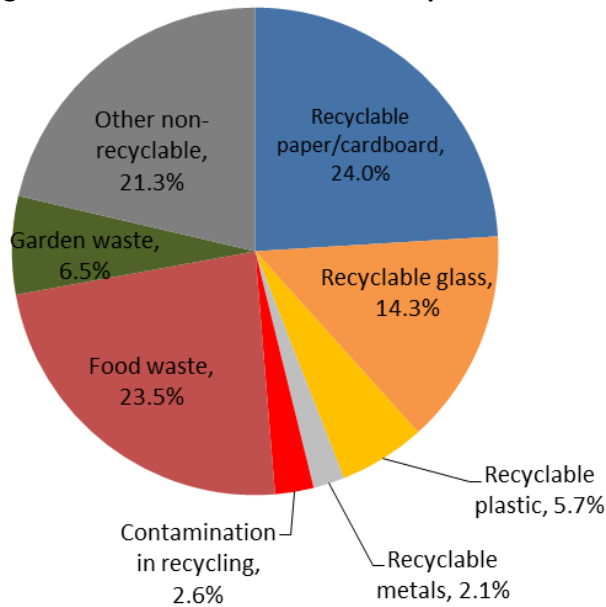
| Material                                | % of total recycling | % of contamination |
|---|----------------------|--------------------|
| Food/kitchen – expired food             | 1.7%                 | 21.8%              |
| Residual / other miscellaneous          | 1.5%                 | 18.3%              |
| Cobbles / boulders                      | 1.1%                 | 13.8%              |
| Film, plastic soft                      | 1.0%                 | 12.3%              |
| Containerised food and liquid           | 0.8%                 | 10.0%              |
| Textiles / clothing / footwear / carpet | 0.7%                 | 9.0%               |
| Ceramics                                | 0.4%                 | 4.9%               |
| Ferrous other                           | 0.4%                 | 4.8%               |
| Food/kitchen – scraps (other food)      | 0.2%                 | 2.9%               |
| Food/kitchen – edible food              | 0.1%                 | 1.4%               |
| Plastic bags – low-density barrier bags | 0.1%                 | 0.7%               |
| Other organics / wood / timber          | 0.0%                 | 0.1%               |
| <b>Total recycling stream</b>           | <b>7.9%</b>          | <b>100.0%</b>      |



### 4.8 Overall waste stream composition

Figure 10 shows the composition of the overall waste stream (general waste and recycling combined). Of the overall waste stream, 46% is recyclable and organics – food and garden comprises 31%.

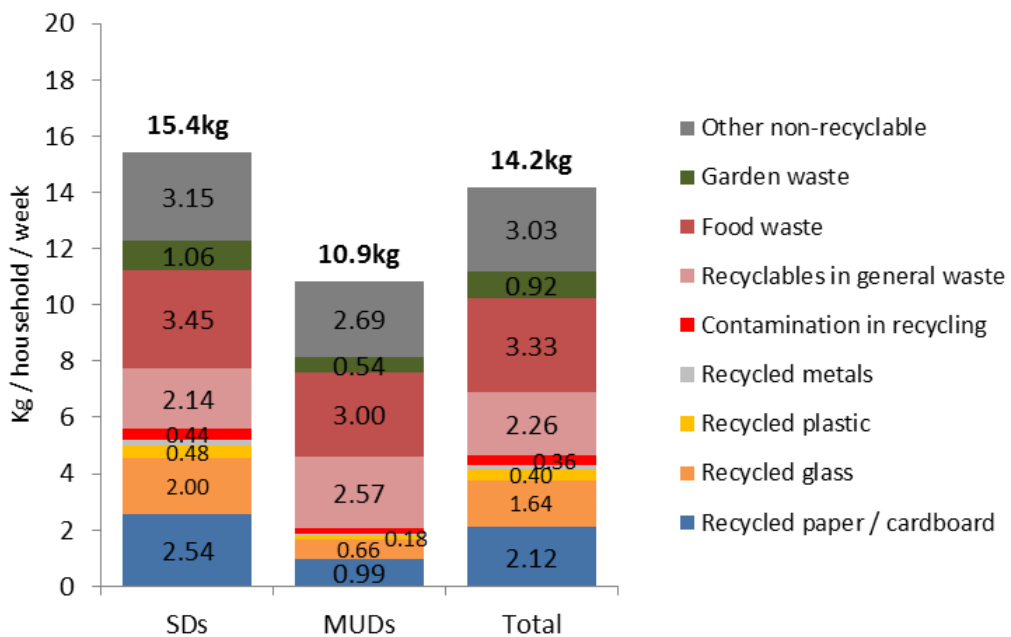
**Figure 10: Overall waste stream composition**



### 4.9 Overall waste generation

The average ACT household produces a total of 14.2kg per week of waste and recycling. SDs produce 15.4kg and MUDs 10.9kg. Figure 11 shows the breakdown of components.

**Figure 11: Total waste generation per stream per week**



#### 4.10 Plastic bags

The ACT implemented a ban on single-use, lightweight shopping plastic bags in November 2011. During the 2014 waste audit, a total of 3.9 tonnes of general waste and 1.9 tonnes of recycling was sorted. A total of 153 lightweight shopping bags was found – 142 in the garbage and 11 in the recycling. As shown in Table 8, this is an average of only 0.4 shopping bags in the waste and recycling bins per household per week.

Low-density barrier bags average 0.9 bags per household per week – SDs put 1.1 bags per week in the bins and MUDs only 0.4 bags.

Total plastic bags average 1.3 bags per household per week.

**Table 8: Plastic bags in the waste and recycling streams**

|  | Lightweight, single-use shopping bags |      |               | Low-density barrier bags |      |               | Total plastic bags |      |               |
|--|---------------------------------------|------|---------------|--------------------------|------|---------------|--------------------|------|---------------|
|  | SD                                    | MUD  | All dwellings | SD                       | MUD  | All dwellings | SD                 | MUD  | All dwellings |
| % of general waste stream                                | 0.1%                                  | 0.1% | 0.1%          | 0.2%                     | 0.1% | 0.2%          | 0.3%               | 0.2% | 0.3%          |
| % of recycling stream                                    | <0.1%                                 | 0.0% | <0.1%         | <0.1%                    | 0.1% | <0.1%         | <0.1%              | 0.1% | <0.1%         |
| General waste bin: number of bags per household per week | 0.4                                   | 0.2  | 0.3           | 1.0                      | 0.4  | 0.9           | 1.4                | 0.6  | 1.2           |
| Recycling bin: number of bags per household per week     | <0.1                                  | <0.1 | <0.1          | <0.1                     | <0.1 | <0.1          | 0.1                | <0.1 | 0.1           |
| <b>Total number of bags per household per week</b>       | 0.4                                   | 0.2  | 0.4           | 1.1                      | 0.4  | 0.9           | 1.5                | 0.6  | 1.3           |

### 4.11 Recovery rates

Recovery rates can be calculated by specific material, and overall (for example, the amount 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 materials that should be the focus of education initiatives.

Recovery rates are calculated as shown below:

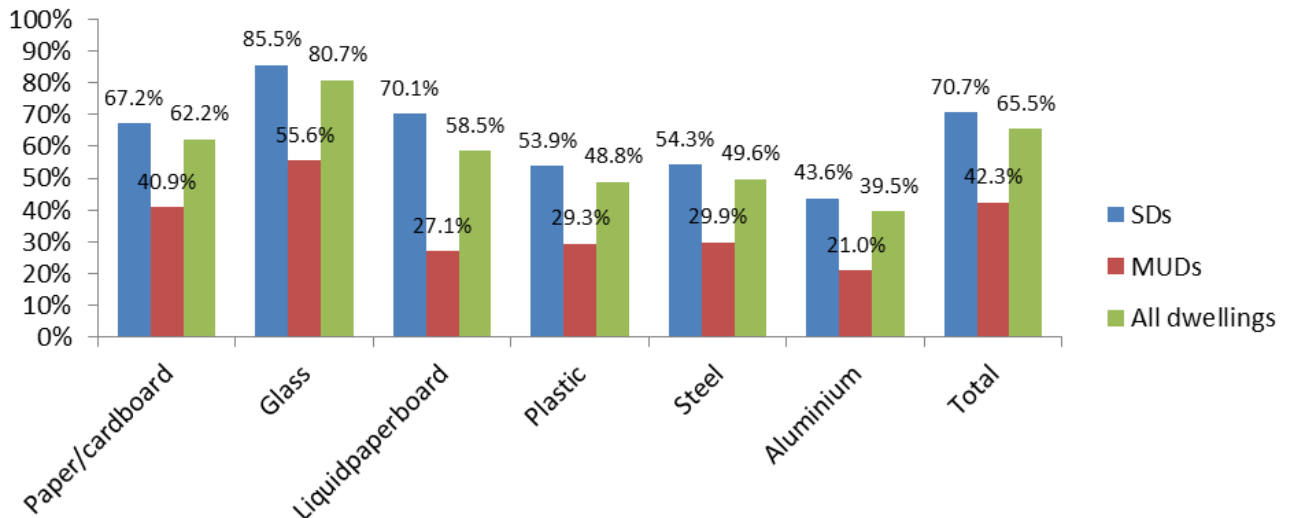
$$\text{Recovery rate} = \frac{\text{Weight of recyclables in recycling bin}}{(\text{Weight of recyclables in recycling bin} + \text{weight of recyclables in general waste bin})} \times 100$$

If the percentage is high (i.e. more than 90%), it means that the material is at a maximised recovery. If the rates are low (i.e. less than 60%), then these materials should be the focus of an education campaign to raise community awareness that those materials are recyclable.

Figure 12 shows the overall recovery rate is 66%. SDs achieve 71% and MUDs 42%. Overall, glass has the highest recovery rate, at 81%, followed by paper/cardboard at 62%.

All other materials are below 60%, with aluminium the lowest at 40%. Recovery rates for MUDs are low for all materials. At SDs, glass and liquidpaperboard are reasonably well recovered but the other materials do not perform as well.

**Figure 12: Recovery rates**



#### 4.12 Diversion rates

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

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

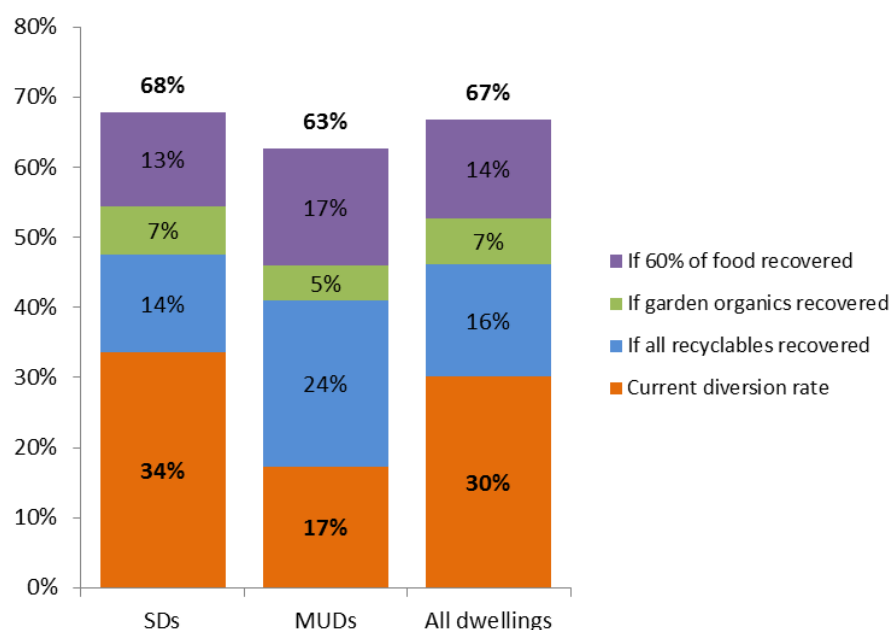
The diversion rate may be slightly different to that calculated using the overall general waste and recycling tonnages generated during the year. This is because the audit is conducted as a snapshot of that particular time period and it does not factor in seasonal fluctuations or other annual trends.

The analysis provides an indication of the additional diversion potential through either modified collection or processing systems, or by increasing education. However, it should be noted 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. As a consequence, these are maximum theoretical diversion rates. Councils may realistically aim to achieve 60% of the additional potential diversion for some of the targeted streams.

Figure 13 shows the current diversion rate for single dwellings, multi-unit dwellings and all dwellings, as well as potential diversion rates if certain other materials were recovered.

The current overall diversion rate is 30%. SDs currently achieve 34% and MUDs 17%. An extra 16% diversion could be achieved if all recyclables were put in the right bin. If all garden organics were recycled, a further 7% diversion could be achieved. Collecting 60% of all food waste for recycling would achieve another 14% landfill diversion. This makes a total potential landfill diversion of 67%.

**Figure 13: Current and potential landfill diversion**



The detailed diversion rates shown in Table 9 show the potential for additional landfill diversion by focusing on recovery of particular waste streams.

**Table 9: Detailed potential diversion rates**

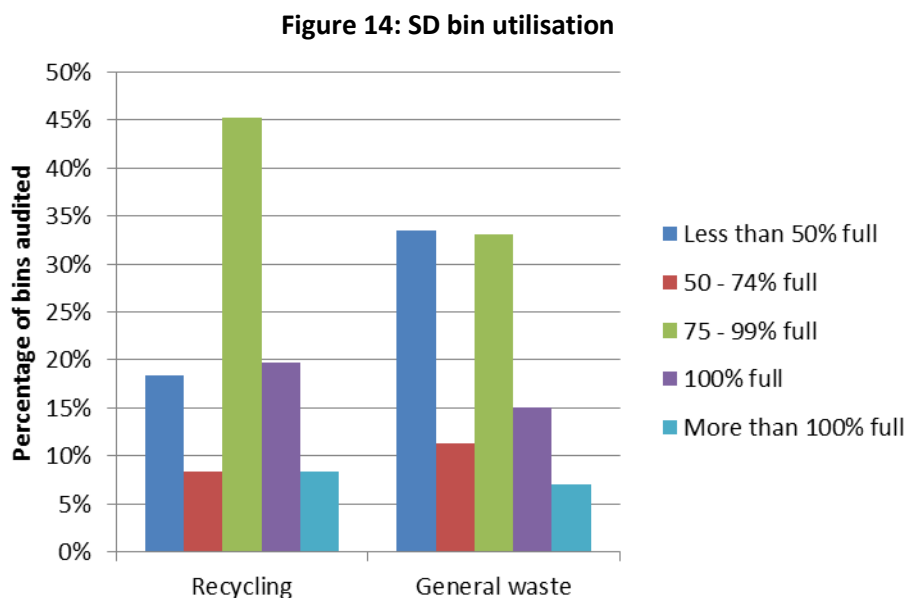
|                                  | Theoretical maximum diversion |     |               | Target diversion – all dwellings |           |                      |
|----------------------------------|-------------------------------|-----|---------------|----------------------------------|-----------|----------------------|
|                                  | SD                            | MUD | All dwellings | Proportion that can be recovered | Diversion | Cumulative diversion |
| Current diversion                | 34%                           | 17% | 30%           | 100%                             | 30%       | 30%                  |
| Paper/cardboard in general waste | 8%                            | 13% | 9%            | 100%                             | 9%        | 39%                  |
| Glass in general waste           | 2%                            | 5%  | 3%            | 100%                             | 3%        | 42%                  |
| Plastics in general waste        | 3%                            | 4%  | 3%            | 100%                             | 3%        | 45%                  |
| Metals in general waste          | 1%                            | 1%  | 1%            | 100%                             | 1%        | 46%                  |
| Garden organics                  | 7%                            | 5%  | 7%            | 100%                             | 7%        | 53%                  |
| Food waste                       | 22%                           | 28% | 24%           | 60%                              | 14%       | 67%                  |
|                                  |                               |     |               |                                  |           | <b>67%</b>           |

## 4.13 Bin capacity utilised

### 4.13.1 Single dwelling bin capacity utilisation

Figure 14 and the accompanying Table 10 and Table 11 show the volumes used in each of the bins sampled for single dwellings.

The median volume of bin used is 85% for general waste and 93% for recycling. Only 7% of general waste bins and 8% of recycling bins were over-full. A third of general waste bins were less than half full.



**Table 10: Volume of general waste bins used (SDs)**

| Volume used             | Number     | Per cent    |
|-------------------------|------------|-------------|
| Less than 50%           | 100        | 33%         |
| 50–74%                  | 34         | 11%         |
| 75–99%                  | 99         | 33%         |
| 100%                    | 45         | 15%         |
| More than 100%          | 21         | 7%          |
| <b>Total</b>            | <b>299</b> | <b>100%</b> |
| <b>Average (median)</b> |            | <b>85%</b>  |

**Table 11: Volume of recycling bins used (SDs)**

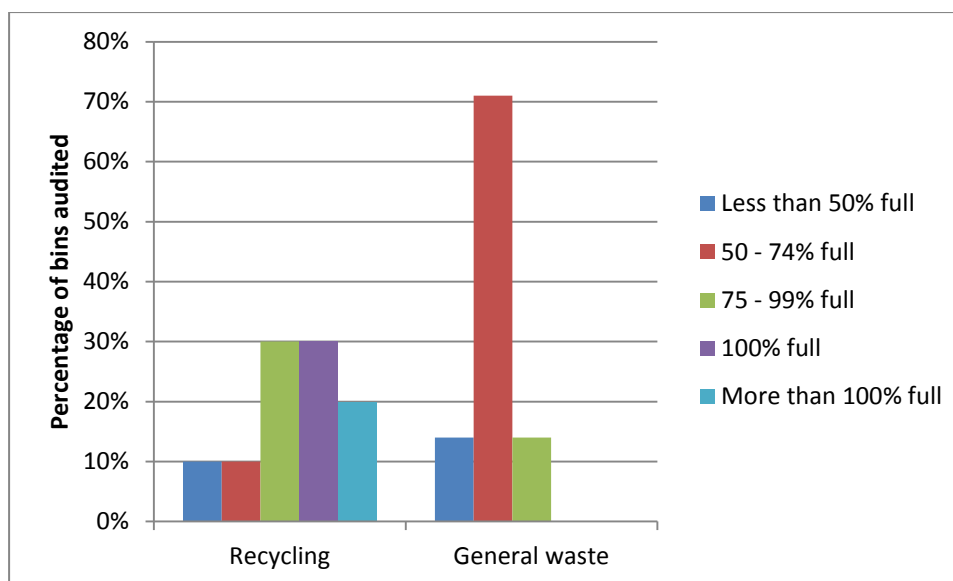
| Volume used             | Number     | Per cent    |
|-------------------------|------------|-------------|
| Less than 50%           | 55         | 18%         |
| 50–74%                  | 25         | 8%          |
| 75–99%                  | 135        | 45%         |
| 100%                    | 59         | 20%         |
| More than 100%          | 25         | 8%          |
| <b>Total</b>            | <b>299</b> | <b>100%</b> |
| <b>Average (median)</b> |            | <b>93%</b>  |

#### 4.13.2 Multi-unit dwelling bin capacity utilisation

Figure 15 and the accompanying Table 12 and Table 13 show the volumes used in each of the bins sampled for multi-unit dwellings.

The median volume of bin used is 60% for general waste and 98% for recycling. None of general waste bins were 100% full but 20% of recycling bins were over 100% full and half of the recycling bins were full to overflowing in MUDs, indicating capacity issues.

**Figure 15: MUD bin utilisation**



**Table 12: Volume of general waste bins used (MUDs)**

| Volume used             | Number   | Per cent    |
|-------------------------|----------|-------------|
| Less than 50%           | 1        | 14%         |
| 50–74%                  | 5        | 71%         |
| 75–99%                  | 1        | 14%         |
| 100%                    | 0        | 0%          |
| More than 100%          | 0        | 0%          |
| <b>Total</b>            | <b>7</b> | <b>100%</b> |
| <b>Average (median)</b> |          | <b>60%</b>  |

**Table 13: Volume of recycling bins used (MUDs)**

| Volume used             | Number    | Per cent    |
|-------------------------|-----------|-------------|
| Less than 50%           | 1         | 10%         |
| 50–74%                  | 1         | 10%         |
| 75–99%                  | 3         | 30%         |
| 100%                    | 3         | 30%         |
| More than 100%          | 2         | 20%         |
| <b>Total</b>            | <b>10</b> | <b>100%</b> |
| <b>Average (median)</b> |           | <b>98%</b>  |

### 5. COMPARISON WITH PREVIOUS AUDIT DATA

Data in this section has been compared with previous audit results where relevant data was available. Slightly different methodologies and categories have been used in each audit and this can account for some of the differences in the results.

#### 5.1 General waste composition

Figure 16 shows the consolidated composition of the general waste stream in 2014 compared with previous audits. There is a downward trend in food waste since 2003, although food waste in 2014 is slightly higher than in 2011. Recyclable materials in the general waste have fallen since 2011, however are still much higher than in 2007 and 2009. This is partly because disposable/contaminated paper, other/miscellaneous glass, and other plastics were not considered recyclable in 2007 and 2009 audits, but were considered recyclable in the 2011 and 2014 analysis. Garden organics have fluctuated – this may be influenced by weather conditions around the time of the audits or increased costs of ‘trash packs’ as a disposal option.

**Figure 16: Consolidated composition of general waste – previous audits**

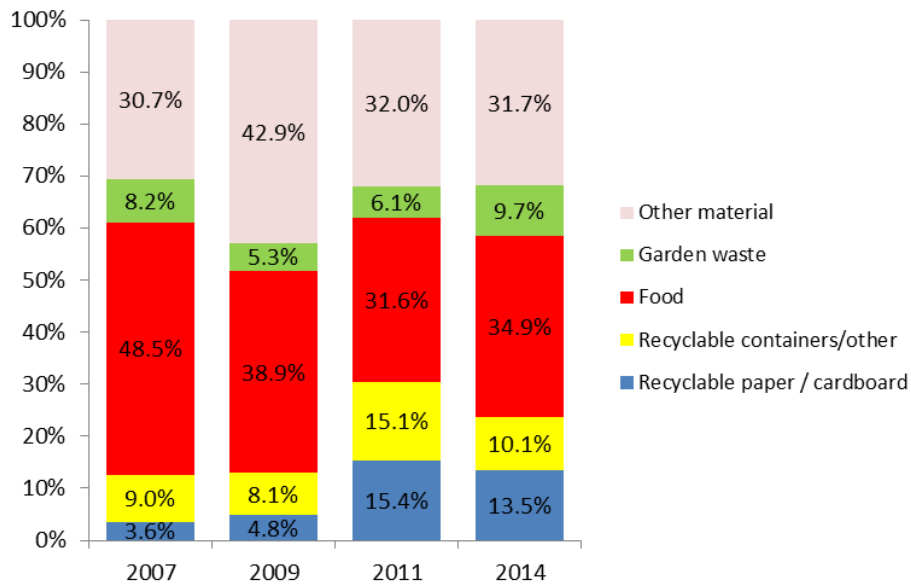


Table 14 shows a detailed comparison of material categories in the general waste in 2011 and 2014. The main increases have been in the proportion of garden organics, food/kitchen waste, other organics/wood/timber, and textiles. The main decreases have been in residual/miscellaneous materials, concrete and disposable/contaminated paper.



**Table 14: Detailed comparison of general waste composition 2011–2014**

| Material                                | 2011         | 2014          | Difference |
|---|--------------|---------------|------------|
|   | Per cent     | Per cent      |            |
| Garden / garden organics                | 6.1%         | 9.7%          | 3.6%       |
| Food/Kitchen                            | 31.6%        | 34.9%         | 3.3%       |
| Other organics / wood / timber          | 2.0%         | 3.7%          | 1.6%       |
| Textiles / clothing / footwear / carpet | 3.5%         | 4.8%          | 1.3%       |
| Other                                   | 0.1%         | 0.9%          | 0.8%       |
| Cobbles / boulders                      | 0.0%         | 0.5%          | 0.5%       |
| Ferrous other                           | 0.4%         | 0.9%          | 0.5%       |
| Nappies                                 | 5.9%         | 6.1%          | 0.2%       |
| Hazardous - paint / fluoros / batteries | 0.1%         | 0.3%          | 0.2%       |
| Aluminium – cans, trays and foil        | 0.5%         | 0.6%          | 0.1%       |
| Newspapers and magazines                | 2.0%         | 2.1%          | 0.1%       |
| Corrugated cardboard                    | 0.6%         | 0.7%          | 0.1%       |
| Polypropylene                           | 1.0%         | 1.1%          | 0.1%       |
| Steel packaging                         | 1.0%         | 1.0%          | 0.1%       |
| Plastic 2 HDPE                          | 0.6%         | 0.6%          | 0.0%       |
| Naturally excavated soil                | 0.0%         | 0.0%          | 0.0%       |
| Liquidpaperboard                        | 0.3%         | 0.3%          | 0.0%       |
| Plasterboard                            | 0.0%         | 0.0%          | 0.0%       |
| Medical / sharps                        | 0.1%         | 0.1%          | 0.0%       |
| Glass packaging / glass containers      | 3.7%         | 3.7%          | 0.0%       |
| Plastic 1 PET                           | 0.9%         | 0.8%          | -0.1%      |
| Asbestos                                | 0.1%         | 0.0%          | -0.1%      |
| Plastic 3 PVC                           | 0.2%         | 0.1%          | -0.2%      |
| Film, plastic bags                      | 6.5%         | 6.3%          | -0.2%      |
| Glass miscellaneous / other glass       | 0.7%         | 0.4%          | -0.3%      |
| Chemicals                               | 0.4%         | 0.1%          | -0.3%      |
| Other paper                             | 3.0%         | 2.6%          | -0.4%      |
| Ceramics                                | 1.3%         | 0.6%          | -0.7%      |
| Non-expanded polystyrene                | 0.8%         | 0.1%          | -0.7%      |
| Other plastic                           | 2.6%         | 1.8%          | -0.8%      |
| Soil / rubble / inert                   | 1.2%         | 0.4%          | -0.8%      |
| Disposable / contaminated paper         | 9.4%         | 7.9%          | -1.5%      |
| Concrete                                | 3.1%         | 0.0%          | -3.1%      |
| Residual / other miscellaneous          | 7.6%         | 4.2%          | -3.4%      |
| <b>Total material</b>                   | <b>97.2%</b> | <b>100.0%</b> |            |

## 5.2 Recycling composition

Figure 17 shows the consolidated composition of the recycling stream in 2014 compared with previous audits. The 2014 results show a higher proportion of recyclable containers and a lower proportion of recyclable paper/cardboard than the previous two audits. The paper data is consistent with market conditions. Contamination has increased slightly since 2011.

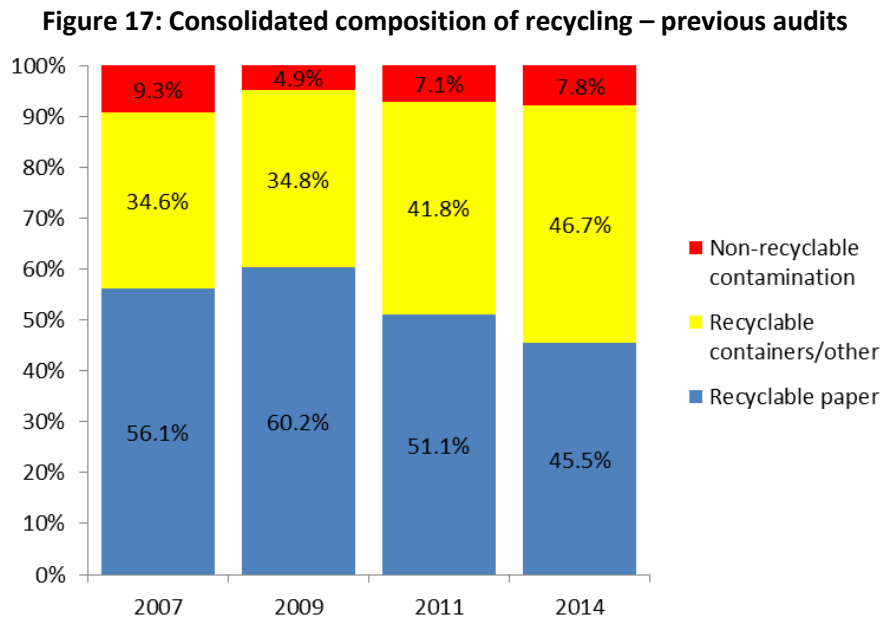


Table 15 shows a detailed comparison of material categories in the recycling in 2011 and 2014. The main increases have been in the proportion of non-packaging glass, corrugated cardboard and HDPE. The main decreases have been in other paper, newspapers/magazines and disposable/contaminated paper.

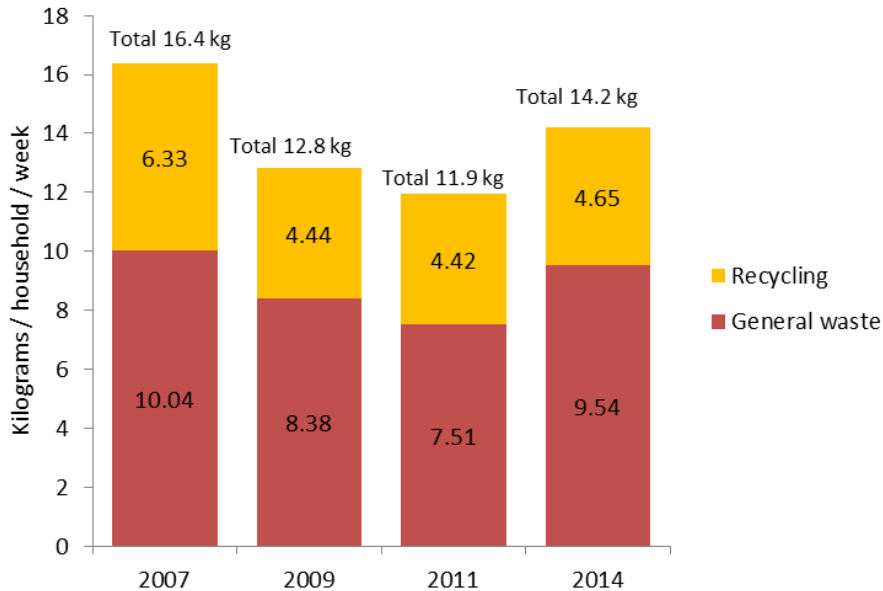
**Table 15: Detailed comparison of recycling composition 2011–2014**

| Material                                | 2011          | 2014          | Difference |
|---|---------------|---------------|------------|
|   | Per cent      | Per cent      |            |
| Glass miscellaneous / other glass       | 0.6%          | 4.4%          | 3.8%       |
| Corrugated cardboard                    | 7.0%          | 9.3%          | 2.2%       |
| Plastic 2 HDPE                          | 2.3%          | 2.9%          | 0.6%       |
| Food/kitchen                            | 1.5%          | 2.0%          | 0.5%       |
| Textiles / clothing / footwear / carpet | 0.4%          | 0.8%          | 0.4%       |
| Glass packaging / glass containers      | 30.4%         | 30.8%         | 0.4%       |
| Polypropylene                           | 0.7%          | 1.0%          | 0.4%       |
| Plastic 1 PET                           | 2.7%          | 3.0%          | 0.3%       |
| Other                                   | 0.0%          | 0.3%          | 0.3%       |
| Aluminium – cans, trays and foil        | 0.6%          | 0.9%          | 0.3%       |
| Garden / garden organics                | 0.7%          | 0.9%          | 0.2%       |
| Cobbles / boulders                      | 0.0%          | 0.1%          | 0.1%       |
| Hazardous – paint / fluoros / batteries | 0.0%          | 0.1%          | 0.1%       |
| Nappies                                 | 0.0%          | 0.1%          | 0.0%       |
| LDPE                                    | 0.0%          | 0.1%          | 0.0%       |
| Other plastic                           | 1.4%          | 1.4%          | 0.0%       |
| Liquidpaperboard                        | 0.8%          | 0.8%          | 0.0%       |
| Residual / other miscellaneous          | 2.3%          | 2.3%          | -0.1%      |
| Plastic 3 PVC                           | 0.2%          | 0.1%          | -0.1%      |
| Concrete                                | 0.1%          | 0.0%          | -0.1%      |
| Non-expanded polystyrene                | 0.2%          | 0.1%          | -0.1%      |
| Ceramics                                | 0.4%          | 0.2%          | -0.2%      |
| Film, plastic bags                      | 0.8%          | 0.6%          | -0.2%      |
| Ferrous other                           | 0.9%          | 0.5%          | -0.4%      |
| Steel packaging                         | 2.6%          | 2.1%          | -0.5%      |
| Disposable / contaminated paper         | 2.7%          | 1.4%          | -1.3%      |
| Newspapers and magazines                | 28.8%         | 26.4%         | -2.4%      |
| Other paper                             | 11.8%         | 7.7%          | -4.1%      |
| <b>Total material</b>                   | <b>100.0%</b> | <b>100.0%</b> |            |

### 5.3 Waste generation

Figure 18 shows the weight of general waste and recycling generated per household per week for all dwelling types. For both waste streams, 2014 generation is higher than 2009 and 2011, but lower than 2007.

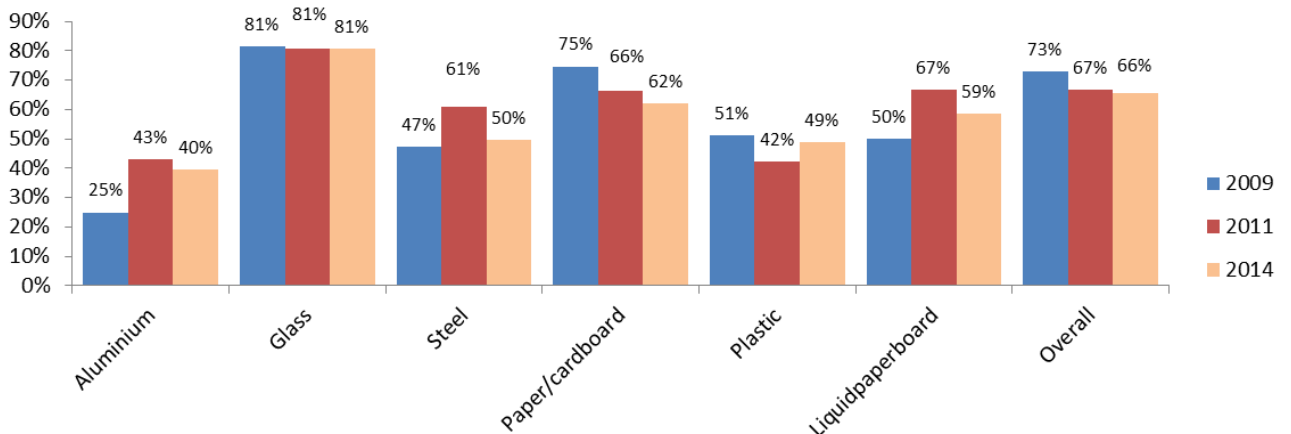
**Figure 18: Weekly weight of waste stream by household – previous audits**



### 5.4 Recovery rates

Figure 19 shows the recovery rates from all dwellings compared with previous audits. The overall recovery rate in 2014 remains similar to 2011. As paper and cardboard make up a large proportion of recyclable materials, the overall recovery rate is strongly influenced by the recovery of paper/cardboard, which has dropped over time. Glass recovery remains steady and other materials have fluctuated over the five-year period.

**Figure 19: Recovery rates – all dwellings – previous audits**



## 5.5 Diversion rate

Figure 20 shows the diversion rates compared with previous audits. The overall diversion, and the diversion from MUDs, is lower in 2014 than previous audits. Diversion from SDs is less variable, with only a slight drop in 2014.

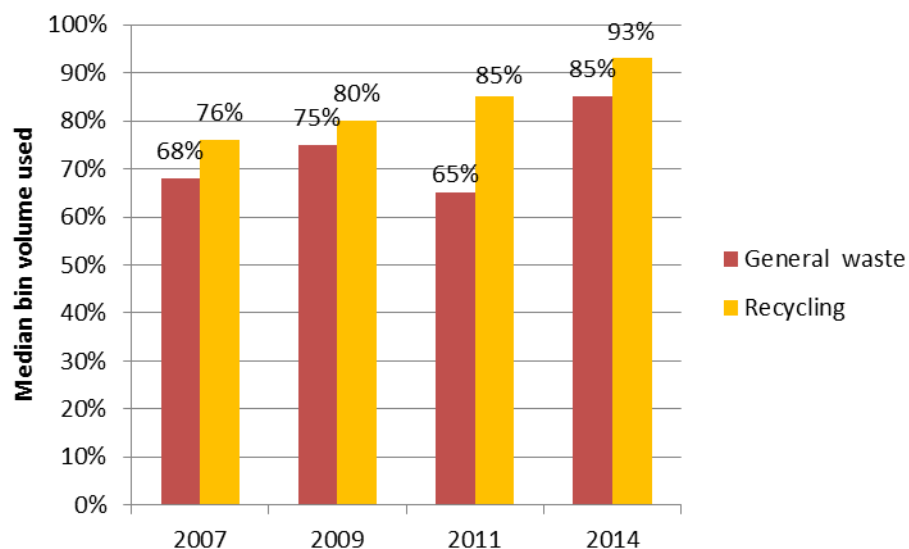
**Figure 20: Diversion rates – previous audits**



## 5.6 Bin volume utilisation

Average bin utilisation has generally risen over time for both waste streams, as shown in Figure 21.

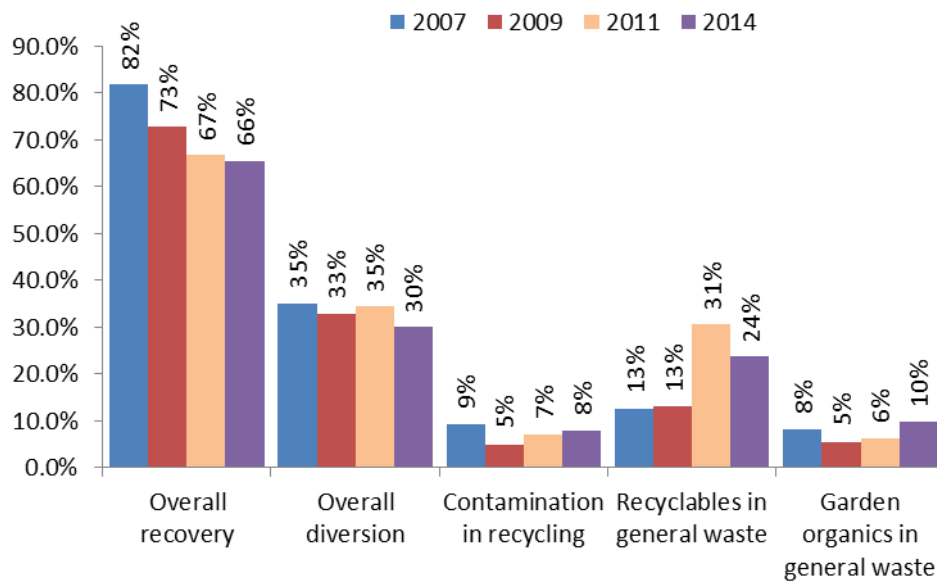
**Figure 21: Volume of bins used – previous audits – all dwellings**



## 5.7 Key performance indicators comparison with previous audits

Figure 22 shows a summary of the changes in some key indicators over time, as discussed in the above sections.

Figure 22: Summary of key indicators over time



## 6. KEY FINDINGS

**Presentation rates** – MUDs presented 100% of general waste and recycling bins. Ninety per cent (90%) of SDs presented a general waste bin, and 88% presented a recycling bin.

**Overall waste generation** – The average ACT household produces 14.2kg of waste and recycling per household per week. This is more than 2009 and 2011, but less than 2007. SDs produce 15.4kg and MUDs 10.9kg per household per week.

**General waste generation** – The average ACT household produces 9.54kg of general waste per household per week, which is higher than 2009 and 2011, but lower than 2007. SDs average 9.81kg and MUDs average 8.81kg.

**Composition of general waste stream** – The general waste stream comprises 35% food waste. Twenty-four per cent (24%) of general waste is recyclable items that could be placed in the co-mingled bin, down from 31% in 2011. MUDs have a higher proportion of recyclable material in the general waste.

**Vegetation in the general waste stream** – The proportion of vegetation in the general waste is 10%, which is higher than previous audits. SDs produce more garden organics than MUDs.

**General waste-bin capacity** – The average (mean) volume of general waste bins used in single dwellings in 2014 is 85%. This is an increase on previous audits.

**Recycling generation** – The amount of recycling generated from the average household is 4.65kg per week, which is higher than 2011 and 2009 but lower than 2007. SDs generate significantly more recycling than MUDs (5.62kg/week/household at SDs compared with 2.05kg/week/household at MUDs).

**Composition of the recycling stream** – The recycling stream comprised 46% paper and cardboard, which is lower than previous audits. Recyclable plastic, glass and metals comprised 47%, which is higher than previous audits.

**Recycling bin capacity** – The average volume of recycling bin used in single dwellings in 2014 is 93%, an increase on previous audits. The median volume of recycling bin in MUDs is 98% with 20% of recycling bins over-full and 30% full. Effectively half of the recycling bins in units are full to overflowing, which indicates capacity issues.

**Contamination** – Contamination in the recycling system was 7.8%, compared with 7.1% in 2011. SDs and MUDs have a similar proportion of contamination in their recycling bins. The main contaminants common to all dwelling types are containerised food/liquid, packaged food, plastic film, garden organics and textiles.

**Plastic bags** – Plastic shopping bags account for only 0.1% of the general waste (low-density barrier bags are 0.2%). Plastic bags make up an insignificant proportion of the recycling stream. The average household puts only 0.4 lightweight shopping bags in the bin per week – mostly in the general waste bin. SDs average 0.4bags/week and MUDs 0.2 bags/week. Low-density barrier bags average 0.9 bags per household per week – SDs put 1.1 bags per week in the bins and MUDs only 0.4 bags. Total plastic bags in the waste stream average 1.3 bags per household per week.

**Recovery rates** – Overall recovery in 2014 is 66%, continuing a downward trend in recovery rates over time. Glass has the highest recovery rate, at 81%, followed by paper/cardboard at 62%. All other materials are below 60%, with aluminium the lowest at 40%. Recovery rates at MUDs are much lower than SDs (71% at SDs, 42% at MUDs).

**Diversion from landfill** – The 2014 diversion rate is 30%, which is a decrease from previous years. SDs currently achieve 34% and MUDs 17%. The potential additional diversion possible if all recyclables were put in the yellow bin is 16%. Recovering garden organics would achieve another 7% diversion. Recovering 60% of food waste would add another 14% diversion, making maximum potential landfill diversion of 67%.



## 7. DISCUSSION

As a result of this waste audit, APC suggests the following key aspects require further consideration.

### 7.1 The ACT Waste Strategy 2011–2015

This strategy sets an ambitious target of 90% resource recovery by 2025. This means that the ACT Government is working towards diverting over 90% of all waste generated in the ACT from landfill. This target includes domestic waste, commercial, construction and demolition, and garden waste. Domestic kerbside waste makes up about one quarter of total waste sent to landfill in the ACT, while commercial waste accounts for about half. Domestic waste is one waste stream being targeted by the ACT Government in its efforts to meet the 90% resource recovery target as part of a broader optimisation of the existing waste system.

At present, recovery of recyclables from domestic kerbside waste is at 66%, meaning that 33% of recyclable materials are incorrectly placed in the general waste bin and are therefore lost from the recycling stream. Overall resource recovery for domestic waste (of food organics, recyclables and garden organics) is presently at 30%. The potential additional diversion possible if all recyclables were put in the yellow bin is 16%. Recovering garden organics would achieve another 7% diversion. Recovering 60% of food waste would add another 14% diversion, making maximum potential landfill diversion of 67% for domestic kerbside waste, based on current waste composition.

Considering recycling alone, the best possible performance is 46% diversion from landfill of domestic kerbside waste, based on 100% participation with 100% correct presentation of materials (which is maximum theoretical diversion rates). Additional diversion of domestic waste, beyond increasing the recovery of recyclables, will not be possible without substantial policy interventions to address the various organics components (e.g. food organics, soiled paper and garden organics). In combination these account for almost half of the general waste bin contents. Diverting organics from landfill is also key to the Government achieving its goal of a carbon neutral waste sector by 2020 and a carbon neutral city by 2060.

### 7.2 Recycling diversion

In a quest to reduce recyclable materials in the general waste, new and innovative methods should be employed to encourage residents to place all recyclable paper, cardboard and recyclable containers in the co-mingled recycling bin. A specific focus on MUDs will help lift both recovery and diversion rates because these sites appear to be generally poorer performers than SDs.

### 7.3 Contamination management strategies

Residents need to be aware of the impact of placing the incorrect items in the recycling bins. Future education messages should target food waste, containerised food and liquid, plastic film, textiles and garden organics, which are commonly placed in the recycling bins and are therefore not recovered. A contamination management strategy should be developed and implemented in conjunction with a communication plan.

#### 7.4 Organics management

Garden organics make up 11% of SD general waste and 6% of MUD general waste. There needs to be a reiteration to residents that garden organics are not permitted in the general waste bin, and that free alternatives are available at Corkhill Bros., Mugga Resource Management Centre or Parkwood Canberra Sand and Gravel. Alternatively, as the general waste bin comprises 45% organics (food, 35% and garden, 10%), APC suggests undertaking a pilot organics collection to ascertain the amount of recovery and diversion achievable. We understand Corkhill Brothers were investigating processing options for an organics collection.

#### 7.5 Alternative Waste Technology (AWT)

Given the current general waste stream comprises between 22% (MUDs) and 29% (SDs) recycling and between 44% (SDs) and 28% (MUDs) food and garden waste, the ACT should investigate an Alternative Waste Technology (AWT) process that can recover the recyclables and create an organic by-product. Greater recovery could be achieved with energy recovery of the residual.

#### 7.6 Education in MUDs

There is substantial opportunity to improve the recycling performance at MUD properties. In many cases we observed there was no information to tell residents what goes where and no stickers on the front of bins and when recycling bin lids are open no obvious colour coding evident. While there is signage on the wall in some garbage storage areas, it is inconsistent. It is imperative that clear signage is placed on the front and side of every bin to indicate the materials being targeted. These actions will assist in reducing contamination and increase recovery.

**Image 10: Waste storage area in MUD block**



#### 7.7 Adequate recycling bin capacity in MUDs

The fact that half of the recycling bins in the MUDs sampled were full to overflowing indicates capacity issues. APC suggests a full visual audit of all MUD properties to determine those in need of additional capacity by way of increased bins or increased frequency of services where space constraints exist.

## 8. RECOMMENDATIONS

Based on the findings from this waste audit we made the following recommendations:

1. That additional diversion is not possible without substantial policy changes to address the organics fraction, which is now almost half of the general waste bin contents. Organics should be separated from the waste stream through targeted community education and a clear plan to separately process them.
2. That diverting organics from landfill is also key to the Government achieving its goal of a carbon neutral waste sector by 2020 and a carbon neutral city by 2060.
3. That to increase recycling diversion, ACT NOWaste should employ new and innovative methods focusing on targeted community education to reduce the 24% recycling in the general waste bin. In particular additional bin capacity should be provided to MUD properties where currently 20% of all recycling bins are overflowing.
4. That contamination management strategies focused targeted community education messages should target food waste, containerised food and liquid, plastic film, textiles and garden organics.
5. That ongoing education is required to communicate that garden organics are banned from the general waste bin as they currently comprise 11% of SDs and 6% of MUDs bins.
6. That to investigate Alternative Waste Technology (AWT) processes that can recover the recyclables and create an organic by-product. Greater recovery could be achieved with energy recovery of the residual.
7. That all MUD blocks should be inspected to determine if adequate wall and bin signage is provided indicating the materials being targeted. When bin lids are open all bins appears to be the same so clear signage should be placed on front and side of every bin.
8. That a full visual audit of all MUD properties should be undertaken to determine where additional capacity is required

**APPENDIX A: LIST OF ACCEPTED MATERIALS**

| <b>Audit sorting category</b>                   | <b>Status</b>  |
|---|----------------|
| Disposable / contaminated paper                 | Recyclable     |
| Glass miscellaneous / other glass               | Recyclable     |
| Other plastic                                   | Recyclable     |
| Newspapers and magazines                        | Recyclable     |
| Corrugated cardboard                            | Recyclable     |
| Other paper                                     | Recyclable     |
| Glass packaging / glass containers              | Recyclable     |
| Plastic 1 PET                                   | Recyclable     |
| Plastic 2 HDPE                                  | Recyclable     |
| Plastic 3 PVC                                   | Recyclable     |
| LDPE  | Recyclable     |
| Polypropylene                                   | Recyclable     |
| Non-expanded polystyrene                        | Recyclable     |
| Other rigid plastic containers                  | Recyclable     |
| Liquidpaperboard                                | Recyclable     |
| Aluminium – cans, trays and foil                | Recyclable     |
| Steel packaging                                 | Recyclable     |
| Food/kitchen – edible food                      | Not recyclable |
| Food/kitchen – expired food                     | Not recyclable |
| Food/kitchen – scraps (other food)              | Not recyclable |
| Containerised food and liquid                   | Not recyclable |
| Garden / garden organics                        | Not recyclable |
| Other organics / wood / timber                  | Not recyclable |
| Textiles / clothing / footwear / carpet         | Not recyclable |
| Film, plastic soft                              | Not recyclable |
| Plastic bags – low-density barrier bags         | Not recyclable |
| Plastic bags – lightweight, single-use shopping | Not recyclable |
| Ferrous other                                   | Not recyclable |
| Fibreglass                                      | Not recyclable |
| Residual / other miscellaneous                  | Not recyclable |
| Hazardous – paint / fluoros / batteries         | Not recyclable |
| Medical / sharps                                | Not recyclable |
| Nappies   | Not recyclable |
| Chemicals                                       | Not recyclable |
| Ceramics  | Not recyclable |
| Naturally excavated soil                        | Not recyclable |
| Soil / rubble / inert                           | Not recyclable |
| Cobbles / boulders                              | Not recyclable |
| Concrete  | Not recyclable |
| Asbestos  | Not recyclable |
| Plasterboard                                    | Not recyclable |
| Asphalt / road construction                     | Not recyclable |
| Fibrous cement sheet                            | Not recyclable |
| Other   | Not recyclable |
| Non-glass fines                                 | Not recyclable |

**APPENDIX B: AGREED SORTING CATEGORIES**

| <b>AWD Code</b> | <b>Material</b>  |
|-----------------|--|
| A01/02          | Newspaper and magazines                                |
| A04             | Corrugated cardboard                                   |
| A091            | Other paper  |
| A07             | Disposable/contaminated paper                          |
| B01             | <b>Food/kitchen – edible food</b>                      |
|                 | <b>Food/kitchen – expired food</b>                     |
|                 | <b>Food/kitchen – scraps</b>                           |
|                 | Containerised food and liquid                          |
| B02             | Garden/garden organics                                 |
| C01             | Other organic – wood/timber                            |
| C02             | Textiles/clothing/footwear/carpet                      |
| D01             | Glass packaging / glass containers                     |
| D02             | Glass misc. /other glass                               |
| E01             | Plastic 1 PET  |
| E02             | Plastic 2 HDPE   |
| E03             | Plastic 3 PVC  |
| E04             | LDPE   |
| E05             | Polypropylene  |
| E06             | Non-expanded polystyrene                               |
|                 | Other rigid plastic containers                         |
| E073            | Film, plastic soft                                     |
|                 | <b>Plastic bags – low-density barrier bags</b>         |
|                 | <b>Plastic bags – lightweight, single-use shopping</b> |
| E074            | Other plastic  |
| A06             | Liquidpaperboard                                       |
| G01             | Aluminium – cans, trays and foil.                      |
| F01             | Steel packaging  |
| F02             | Ferrous other  |
| E08             | Fibreglass   |
| 0               | Residual/other miscellaneous                           |
| H               | Hazardous – paint, fluorescent, lights, batteries      |
| H07             | Medical/sharps   |
| H               | Nappies  |
| H05             | Chemicals  |
| I01             | Ceramics   |
| I02             | Naturally excavated soil                               |
| I02             | Soil/rubble/inert                                      |
| 1022            | Cobbles/boulders                                       |
| I04             | Concrete   |
| I041            | Asbestos   |
| I06             | Plasterboard   |
| I07             | Asphalt/road construction                              |
| I08             | Fibrous cement sheet                                   |
|                 | Other – specify  |

## APPENDIX C: DETAILED WASTE COMPOSITION

## General waste stream composition

| Material                           | SDs            |               | MUDs         |               | Total          |               |
|------------------------------------|----------------|---------------|--------------|---------------|----------------|---------------|
|                                    | Weight (kg)    | %             | Weight (kg)  | %             | Weight (kg)    | %             |
| Newspapers and magazines           | 53.6           | 1.8%          | 29.6         | 3.0%          | 83.2           | 2.1%          |
| Corrugated cardboard               | 8.2            | 0.3%          | 19.3         | 2.0%          | 27.5           | 0.7%          |
| Other paper                        | 61.5           | 2.1%          | 39.7         | 4.1%          | 101.2          | 2.6%          |
| Disposable / contaminated paper    | 239.8          | 8.2%          | 67.1         | 6.9%          | 306.9          | 7.9%          |
| Food/kitchen – edible food         | 15.4           | 0.5%          | 15.7         | 1.6%          | 31.0           | 0.8%          |
| Food/kitchen – expired food        | 164.9          | 5.6%          | 33.6         | 3.4%          | 198.5          | 5.1%          |
| Food/kitchen – scraps              | 851.2          | 29.0%         | 284.0        | 29.1%         | 1,135.1        | 29.0%         |
| Containerised food and liquid      | 70.2           | 2.4%          | 39.1         | 4.0%          | 109.3          | 2.8%          |
| Garden / garden organics           | 318.1          | 10.8%         | 60.4         | 6.2%          | 378.5          | 9.7%          |
| Other organics / wood / timber     | 103.1          | 3.5%          | 39.6         | 4.1%          | 142.7          | 3.7%          |
| Textiles/clothing/footwear/carpet  | 132.1          | 4.5%          | 54.7         | 5.6%          | 186.8          | 4.8%          |
| Glass packaging / glass containers | 87.9           | 3.0%          | 56.5         | 5.8%          | 144.5          | 3.7%          |
| Glass miscellaneous / other glass  | 13.9           | 0.5%          | 1.7          | 0.2%          | 15.7           | 0.4%          |
| Plastic 1 PET                      | 19.1           | 0.7%          | 11.3         | 1.2%          | 30.5           | 0.8%          |
| Plastic 2 HDPE                     | 13.2           | 0.5%          | 8.5          | 0.9%          | 21.7           | 0.6%          |
| Plastic 3 PVC                      | 1.3            | 0.0%          | 0.7          | 0.1%          | 2.0            | 0.1%          |
| LDPE                               | 0.7            | 0.0%          | 0.5          | 0.0%          | 1.1            | 0.0%          |
| Polypropylene                      | 32.7           | 1.1%          | 8.9          | 0.9%          | 41.7           | 1.1%          |
| Non-expanded polystyrene           | 1.9            | 0.1%          | 0.7          | 0.1%          | 2.6            | 0.1%          |
| Other rigid plastic containers     | 19.7           | 0.7%          | 4.4          | 0.4%          | 24.1           | 0.6%          |
| Film, plastic soft                 | 183.0          | 6.2%          | 51.0         | 5.2%          | 234.0          | 6.0%          |
| Plastic bags – low-density barrier | 6.5            | 0.2%          | 1.4          | 0.1%          | 7.9            | 0.2%          |
| Plastic bags – single-use shopping | 2.5            | 0.1%          | 0.5          | 0.1%          | 3.0            | 0.1%          |
| Other plastic                      | 33.3           | 1.1%          | 13.9         | 1.4%          | 47.2           | 1.2%          |
| Liquidpaperboard                   | 5.7            | 0.2%          | 5.2          | 0.5%          | 10.9           | 0.3%          |
| Aluminium – cans, trays and foil   | 19.0           | 0.6%          | 6.0          | 0.6%          | 25.0           | 0.6%          |
| Steel packaging                    | 29.4           | 1.0%          | 10.8         | 1.1%          | 40.2           | 1.0%          |
| Ferrous other                      | 27.4           | 0.9%          | 8.0          | 0.8%          | 35.4           | 0.9%          |
| Fibreglass                         | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Residual / other miscellaneous     | 133.0          | 4.5%          | 31.8         | 3.3%          | 164.9          | 4.2%          |
| Hazardous – paint//batteries       | 10.7           | 0.4%          | 1.9          | 0.2%          | 12.6           | 0.3%          |
| Medical / sharps                   | 1.5            | 0.1%          | 2.9          | 0.3%          | 4.4            | 0.1%          |
| Nappies                            | 202.6          | 6.9%          | 34.4         | 3.5%          | 237.0          | 6.1%          |
| Chemicals                          | 4.6            | 0.2%          | 0.6          | 0.1%          | 5.3            | 0.1%          |
| Ceramics                           | 21.2           | 0.7%          | 3.0          | 0.3%          | 24.2           | 0.6%          |
| Naturally excavated soil           | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Soil / rubble / inert              | 14.8           | 0.5%          | 0.0          | 0.0%          | 14.8           | 0.4%          |
| Cobbles / boulders                 | 0.0            | 0.0%          | 20.8         | 2.1%          | 20.8           | 0.5%          |
| Concrete                           | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Asbestos                           | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Plasterboard                       | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Asphalt / road construction        | 0.0            | 0.0%          | 0.0          | 0.0%          | 0.0            | 0.0%          |
| Fibrous cement sheet               | 1.4            | 0.0%          | 0.0          | 0.0%          | 1.4            | 0.0%          |
| Other – specify                    | 12.5           | 0.4%          | 0.0          | 0.0%          | 12.5           | 0.3%          |
| Non-glass fines                    | 14.3           | 0.5%          | 9.1          | 0.9%          | 23.4           | 0.6%          |
| <b>Total material</b>              | <b>2,932.2</b> | <b>100.0%</b> | <b>977.4</b> | <b>100.0%</b> | <b>3,909.5</b> | <b>100.0%</b> |

## Detailed recycling composition

| Material  | SDs            |               | MUDs         |               | Total          |               |
|---|----------------|---------------|--------------|---------------|----------------|---------------|
|   | Weight (kg)    | Per cent      | Weight (kg)  | Per cent      | Weight (kg)    | Per cent      |
| Glass packaging / glass containers              | 514.9          | 30.6%         | 72.0         | 31.7%         | 587.0          | 30.8%         |
| Newspapers and magazines                        | 469.1          | 27.9%         | 33.8         | 14.9%         | 502.8          | 26.4%         |
| Corrugated cardboard                            | 126.0          | 7.5%          | 50.4         | 22.2%         | 176.4          | 9.3%          |
| Other paper                                     | 126.4          | 7.5%          | 19.7         | 8.7%          | 146.1          | 7.7%          |
| Glass miscellaneous / other glass               | 83.4           | 5.0%          | 0.9          | 0.4%          | 84.3           | 4.4%          |
| Plastic 1 PET                                   | 49.7           | 3.0%          | 7.6          | 3.4%          | 57.4           | 3.0%          |
| Plastic 2 HDPE                                  | 48.4           | 2.9%          | 6.9          | 3.0%          | 55.3           | 2.9%          |
| Residual / other miscellaneous                  | 40.4           | 2.4%          | 3.3          | 1.5%          | 43.7           | 2.3%          |
| Steel packaging                                 | 34.9           | 2.1%          | 4.6          | 2.0%          | 39.6           | 2.1%          |
| Disposable / contaminated paper                 | 23.8           | 1.4%          | 3.7          | 1.6%          | 27.5           | 1.4%          |
| Containerised food and liquid                   | 23.3           | 1.4%          | 1.8          | 0.8%          | 25.1           | 1.3%          |
| Other plastic                                   | 19.0           | 1.1%          | 1.7          | 0.7%          | 20.7           | 1.1%          |
| Polypropylene                                   | 17.2           | 1.0%          | 2.6          | 1.1%          | 19.8           | 1.0%          |
| Garden / garden organics                        | 17.4           | 1.0%          | 0.0          | 0.0%          | 17.4           | 0.9%          |
| Aluminium – cans, trays and foil                | 14.7           | 0.9%          | 1.6          | 0.7%          | 16.3           | 0.9%          |
| Textiles / clothing / footwear / carpet         | 14.4           | 0.9%          | 1.6          | 0.7%          | 16.0           | 0.8%          |
| Liquidpaperboard                                | 13.4           | 0.8%          | 1.9          | 0.8%          | 15.3           | 0.8%          |
| Film, plastic soft                              | 8.1            | 0.5%          | 2.2          | 1.0%          | 10.3           | 0.5%          |
| Ferrous other                                   | 8.4            | 0.5%          | 0.9          | 0.4%          | 9.2            | 0.5%          |
| Food/kitchen – expired food                     | 3.8            | 0.2%          | 3.9          | 1.7%          | 7.7            | 0.4%          |
| Other rigid plastic containers                  | 4.9            | 0.3%          | 0.6          | 0.3%          | 5.6            | 0.3%          |
| Other – specify                                 | 5.5            | 0.3%          | 0.0          | 0.0%          | 5.5            | 0.3%          |
| Food/kitchen – scraps (other food)              | 3.9            | 0.2%          | 0.5          | 0.2%          | 4.4            | 0.2%          |
| Ceramics  | 2.3            | 0.1%          | 0.9          | 0.4%          | 3.2            | 0.2%          |
| Cobbles / boulders                              | 0.0            | 0.0%          | 2.5          | 1.1%          | 2.5            | 0.1%          |
| Plastic 3 PVC                                   | 1.7            | 0.1%          | 0.2          | 0.1%          | 1.9            | 0.1%          |
| Hazardous – paint / fluoros / batteries         | 1.6            | 0.1%          | 0.0          | 0.0%          | 1.6            | 0.1%          |
| Non-expanded polystyrene                        | 1.0            | 0.1%          | 0.2          | 0.1%          | 1.2            | 0.1%          |
| LDPE  | 0.6            | 0.0%          | 0.5          | 0.2%          | 1.1            | 0.1%          |
| Nappies   | 1.0            | 0.1%          | 0.0          | 0.0%          | 1.0            | 0.1%          |
| Other organics / wood / timber                  | 0.9            | 0.1%          | 0.0          | 0.0%          | 0.9            | 0.0%          |
| Plastic bags – low-density barrier bags         | 0.2            | 0.0%          | 0.1          | 0.1%          | 0.3            | 0.0%          |
| Food/kitchen – edible food                      | 0.1            | 0.0%          | 0.3          | 0.1%          | 0.3            | 0.0%          |
| Plastic bags – lightweight, single-use shopping | 0.1            | 0.0%          | 0.0          | 0.0%          | 0.1            | 0.0%          |
| <b>Total material</b>                           | <b>1,680.4</b> | <b>100.0%</b> | <b>227.0</b> | <b>100.0%</b> | <b>1,907.4</b> | <b>100.0%</b> |

Grey = contaminant