NSW GOVERNMENT
Office of Environment & Heritage

Domestic Kerbside Waste and Recycling in NSW

Report on the results of waste audits of household kerbside collection systems 2007-2008

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Published by:

The Office of Environment and Heritage, Department of Premier and Cabinet
59–61 Goulburn Street
PO Box A290
Sydney South 1232
Ph: (02) 9995 5000 (switchboard)
Ph: 131 555 (environment information and publications requests)
Ph: 1300 361 967 (national parks information and publications requests)
Fax: (02) 9995 5999
TTY: (02) 9211 4723
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

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Executive summary

During 2007–2008, councils in the Sydney Metropolitan Area (SMA) and the Extended Regulated Area (ERA) carried out a household residual waste audit as part of the *Waste Service Performance Improvement Payment* program of the Office of Environment and Heritage (OEH). All of these included audits of household residual waste bins, and a number also included audits of household recycling and garden organics.

The results of statistical analysis of waste audit data collected from households across 51 local government areas (LGAs) in the Greater Sydney Region (GSR) are presented. Data from all three waste collection systems – residual waste, recycling, and garden organics – were analysed using routine statistical methodologies.

The main objective of the data analysis was to understand household waste generation characteristics, in terms of waste quantities generated and the composition of a 'typical' household bin, of both single unit dwellings (SUD) and multi-unit dwellings (MUD) in NSW across the three bin collection system.

Some analysis has been made to compare the waste characteristics between SUD and MUD households in the SMA and the ERA.

Additionally, one group of councils, the Groundswell Consortium[1] conducted an audit of household (SUD) residual waste only.

Due to limited data from the rest of the state, analysis of data aggregated for all audits and waste collection systems would not be representative of NSW as a whole. Analyses reported here are for the SMA and ERA and the Greater Sydney Region (GSR), which is the SMA and ERA combined. Information is separately reported for Groundswell councils' total waste and residual waste.

The generation rates in kilograms per week per household (kg/wk/HH) are summarised as follows:

Table 1: Household waste generation and recyclables, kg/week/household 2007–08

Generation rate	GSR Overall	SMA	ERA	GSR SUD (SMA + ERA)	GSR MUD (SMA + ERA)
Average total waste	17.7	17.6	17.7	19.9	9.7
Average residual waste	11.9	11.6	12.5	13.1	7.4
Average dry recycling	5.8	5.6	6.3	7.0	3.2
Average garden organics recycling	8.2	7.8	9.9	9.0	2.4

Note: While total waste generation for each council is calculated by adding the weight of all bins, the average total waste generation in not the sum of all bin averages because the calculation is based on all waste, recycling, organics bins respectively audited, therefore does not represent a three bin system.

The GSR, SMA and ERA generation rates for all three bin collection system have not changed significantly since the analysis of audits conducted by some NSW councils between 2002 and 2007.

1 Groundswell Consortium consists of the following councils: Goulburn Mulwaree, Palerang, Lachlan Shire and Queanbeyan.

The average composition profiles of household residual waste generated from the GSR audits show:

- organic compostable (food) makes up the largest component of a residual waste bin at 40.3%
- potentially dry recyclable materials account for 23.0% of the total residual waste composition. Recyclable Paper 8.8%, Recyclable Plastic 8.7% and Glass Packaging 3.6% make up the majority that could be recycled
- the average composition profiles for SUD and MUD households are similar and consistent with the overall residual waste profile
- however, the ERA council areas exhibit a lower food composition at 34.4%, compared to the SMA councils areas with a mean of 42.3%.

For recycling bin composition,

- recyclable paper is the largest component of a 'typical' household recycling bin at 59.5%, followed by recyclable glass at 26.4%
- the dry recyclable composition profiles from SUD and MUD households are indistinguishable
- SMA and ERA composition profiles differ with SMA recyclable paper at 61.1% is significantly higher than the ERA mean at 53.8%
- the SMA recyclable glass composition mean at 25.3% is significantly lower than the ERA mean of 30.8%
- the overall contamination level in the recycling bin is 5.4%
- SUD and MUD contamination levels are 5.1% and 6.2%, respectively
- SMA and ERA contamination levels are 5.4% and 5.5%, respectively.

For garden organics bin composition,

- garden and vegetation component make up an average of 96.7% of the garden organics composition profile
- the overall average contamination level is 3.3%
- the SMA and ERA garden organics contamination levels are 3.1% and 4.6% respectively.

The following observations are noteworthy:

- the overall household diversion rate[2] is 34.7% when only residual waste and dry recycling are considered. It increases to 55.9% when garden organics is included in the calculations
- The dry recyclables recovery rate[3] excluding garden organics between the SMA and ERA are similar with means of 66.6% and 66.2% respectively
- GSR dry recyclables recovery rate is 66.5%. The dry recyclables including garden organics increases to 82.7%

2 Household diversion rate is simply the weight in the recycling bins divided by the weight of all bins.

3 The dry recyclables recovery rate is the percentage of dry recyclables that are actually recycled. Calculated by the weight of the dry recycling from recycling bins divided by the weight of dry recycling from recycling bins plus the dry recyclables in the residual bins.

- SUD households are diverting more recyclable materials than the MUD households
- The SUD average dry recyclables recovery rate excluding garden organics is 71.5% and a MUD is 57.0%. SUD households exhibit better recycling behaviour than MUD households.

Of particular relevance is that only 66.5% of dry recyclables are being recovered and the rest is being disposed of in the residual bin. The residual bin therefore contains a large amount of potentially recoverable material with 23% dry recyclables and 40% food waste.

In relation to dwelling types, the recycling behaviour of a SUD household is better than a MUD household based on the resource recovery and diversion rates obtained in this study. However, the recycling bin contamination levels between MUD and SUD households are not different.

1 Introduction

This report outlines the results of 51 household kerbside waste audits carried out by Local Government Areas (LGAs) in NSW, in the Sydney Metropolitan Area (SMA)[4], Extended Regulated Area (ERA[5]) and one audit of four councils in the Groundswell consortium of councils.

Thirty eight councils in the SMA and 13 in the ERA areas undertook individual council audits as part of the *Waste Service Performance Improvement Payment (WaSIP)*[6] program of the Office of Environment and Heritage (OEH) in the 2007–2008 period. Under this program, each council was required to undertake an audit of residual waste only. 27 of those councils undertook additional audits of household dry recycling, and 19 undertook additional garden organics audits on a voluntary basis. A total of 18 councils undertook audits across all three of the residual, recycling and garden organics streams.

An additional audit was undertaken and funded by four individual councils in the Groundswell consortium – Goulburn-Mulwaree, Queanbeyan, Palerang and Lachlan. These councils are all outside the Greater Sydney Region. That audit provided data on SUD residual waste only.

The report provides information on the SMA, ERA and the combined two areas. It reports separately on the Groundswell councils

The aims of the project were to:

- provide a one-off snapshot of characteristics of household kerbside waste in the 51 LGAs in the SMA and ERA
- develop baseline data to contribute to future time series on NSW household waste generation and composition using a new sampling methodology
- understand waste generation characteristics, in terms of waste quantities generated and composition, of both single-unit and multi-unit dwellings in NSW
- compare contamination and resource recovery levels of household kerbside recycling and garden organics across the 51 councils areas
- compare composition profiles of residual waste, recycling and garden organics between households in the SMA and ERA
- use results in this report as a basis for a review of the methodology for sampling kerbside residual waste, recycling and garden organics
- use information to inform potential household waste reduction strategies.

The ultimate goal of all waste audits was to assist in monitoring OEH's progress towards targets outlined in the *NSW Waste Avoidance and Resource Recovery Strategy*, *2003 and 2007*[7].

4 SMA councils include: Ashfield, Auburn, Bankstown, The Hills Shire, Blacktown, Botany Bay, Burwood, Camden, Campbelltown, Canada Bay, Canterbury , Fairfield, Holroyd, Hornsby, Hunters Hill, Hurstville, Kogarah, Ku-ring-gai, Lane Cove, Leichhardt, Liverpool, Manly, Marrickville, Mosman, North Sydney, Parramatta, Penrith, Pittwater, Randwick, Rockdale, Ryde, Strathfield, Sutherland, Sydney, Warringah, Waverley, Willoughby, Woollahra

5 ERA councils include: Cessnock, Gosford, Hawkesbury, Kiama, Lake Macquarie, Maitland, Newcastle, Port Stephens, Shellharbour, Shoalhaven, Wingecarribee, Wollongong, Wyong

6 Department of Environment, Climate Change and Water NSW. *Waste and Sustainability Improvement Payments* Program http://www.environment.nsw.gov.au/resources/waste/09404WasteSusImpProg.pdf

7 Resource NSW 2003. *Waste Avoidance and Resource Recovery Strategy*, 2003 http://www.environment.nsw.gov.au/warr/WARRStrategy2007.htm

2 Audit methodologies

Statistical analyses were conducted on waste audit raw data sourced from 51 LGAs in the SMA and ERA and a special project (Groundswell) comprising data sourced from four NRA councils.

Waste audits in 43 council areas were carried out in accordance with the OEH procedures outlined in the *Guidelines for conducting household kerbside residual waste, recycling and garden organics audits in NSW Local Government Areas (2008)*[8] (the *Guidelines*) and the *Waste and Sustainability Improvement Payment*[9] initiative. The remaining 9 audits were conducted using the *EPA Waste Stream Data Collection Methodologies – Final Draft (1997)*[10] (the *EPA Methodology*) or a variant of the *Guidelines*.

Simple random sampling was used to select households to be audited. Both single unit dwelling (SUD) households and multi-unit dwelling (MUD) households were sampled for residual waste and recycling audits but the garden organics audits were confined to SUDs in the majority of the cases. The *Guidelines* stipulated that data was to be collected from 260 households in the case of residual waste in lieu of councils calculating their own sample sizes. The Guidelines also recommended that where possible councils should calculate sample sizes using the methods prescribed. The actual number of households sampled for residual waste varied from 191 to 439 (refer **Appendix A**). In the case of recycling audits the sample sizes varied from 127 to 416 households, and in the case of the garden organics audits the sample sizes fell in the range 43–350 households.

Five different audit companies conducted audits across the 51 councils and one group of councils.

Some calculated parameters in this report will differ from those calculated by auditors because the list of materials considered recyclable by individual councils and OEH differ. This is discussed further in **Section 2.1**.

2.1 Calculations of household generation and compositional analysis of residual waste, recycling and garden organics

All statistics reported were calculated using Microsoft Excel. Statistical analyses were carried out on raw data as supplied by the auditors with no further manipulation. The sample numbers for each waste stream audited in the individual council areas are given in **Appendix A**.

An average value and the associated standard deviation, median, minimum and maximum values are reported for contamination level, diversion and resource recovery rates for each LGA. Averages and standard deviations were calculated from audit data provided by 51 councils and 1 group of councils.

Contamination levels in kerbside recycling and garden organics collections were calculated based on weights of non-compliant materials in the respective bins, using the list OEH nominated recyclable materials given in **Table 2** for recycling and **Table 3** for garden organics streams.

8 Department of Environment and Climate Change NSW 2008. *Guidelines for conducting household kerbside residual waste, recycling and garden organics audits in NSW Local Government Areas (2008)*

9 Department of Environment, Climate Change and Water NSW. Waste and Sustainability Improvement Payments Program http://www.environment.nsw.gov.au/resources/waste/09404WasteSusImpProg.pdf

10 Environment Protection Authority NSW 1997. *Waste Stream Data Collection Methodologies Final Draft*, EPA, Sydney

Table 2: List of OEH nominated recyclable materials in recycling

AWD Code	Material name
A01	Newspaper
A02	Magazines/brochures
A03	Miscellaneous packaging
A04	Corrugated cardboard
A05	Package board
A06	Liquid paper containers
A07	Disposable paper product
A08	Print/writing/office paper
D01	Packaging/glass containers
D0121	Packaging/cullet white
D0122	Packaging/cullet green
D0123	Packaging/cullet brown
E01	PET
E02	HDPE
E03	PVC
E04	LDPE
E05	Polypropylene
E06	Polystyrene
E07	Other plastic
E071	Foams
E072	Plastic bags
E073	Film
F01	Steel food and pet cans
F011	Steel aerosols
F012	Steel paint cans
G01	Aluminium (cans and foil)

Table 3: List of OEH nominated recyclable materials in garden organics

AWD Code	Material name
B02	Garden and vegetation

Materials not listed in **Table 2** and **Table 3** but monitored in audits (refer Appendix B) are considered as contaminants in the recycling and garden organics streams, respectively.

The list of materials listed in **Table 2** was used in the calculation of percentage of potentially recyclable material in the residual waste stream. While other materials may be considered potentially recyclable only those materials considered as recyclables in the dry recycling stream have been used to calculate the percentage of potentially recyclable values in the residual waste bin. Similarly, any materials in the recycling bin not listed in **Table 1** were

considered contaminants, and any materials other than garden and vegetation were considered contaminants in garden organics bin.

As noted above individual councils have different lists of what are acceptable materials in kerbside recycling collection services and council reports have used those lists to calculate contamination levels and all other parameters that require the use of the bin recyclable material contents in the calculations. In this report the OEH nominated recyclable materials (refer **Table 2**) have been used in all calculations across all councils to allow comparisons of waste characteristics to be made even though not all councils accept these items in their kerbside recycling collections.

Note the weights of recyclable components and total bin contents weights in any of the collection systems were normalised to kg/wk/household for each SUD household or MUD building before using them in the equations given in the Guidelines for the calculations of parameters of percentage of resource recovery and percentage of diversion rates for combinations of (waste + recycling) and (waste + recycling + garden organics).

In the majority of audits different sets of SUD households and MUD buildings had been sampled for kerbside residual waste and recycling. For this reason, the percentage diversion and percentage resource recovery values for SUD households and MUD buildings sampled could not be calculated in each individual case. Instead these parameters were calculated using the overall council weights, and total SUD and MUD weights wherever appropriate.

2.1.1 Household generation

Household generation was calculated using the following formula:

$$\textit{Generation rate} = \frac{\textit{total weight of all bin contents}}{\textit{number of contributing households in unit time}}$$

Generation rates, expressed in kg/wk/household, were calculated using the total weights of all contributing collection systems.

It was assumed that total material weights recorded by the auditors were in kilograms per week for weekly collections (all residual waste audits), and in the cases where collections were on a fortnightly basis (some recycling and all garden organics) the weights were recorded as kilograms per fortnight.

The generation rate of each MUD household in an LGA was first calculated, by using the total waste weight derived from the MUD and dividing by the total number of households in the MUD complex, prior to taking an average of all MUD generation rates to yield a value for the LGA.

2.1.2 Compositional analysis

For calculations of compositions in a particular waste collection system the overall composition in a LGA was calculated using the total weights of individual waste components (refer **Appendix B**). For the composition of collections in SUDS and MUDS the summed contributions from all households in a LGA were used. To obtain the relevant statistics for all audits combined, the SMA and ERA, LGA averages were used.

Average compositions were used for the construction of pie charts for a visual display of the actual levels of materials present in residual waste, recycling and garden organics collections. Pie-on-pie

charts have been used for the depiction of identities and levels of potentially recyclable materials present in residual waste, and specific contaminants and their levels in the cases of recycling and garden organics.

2.2 Calculations of recycling performance indicators

While the composition profiles of residual waste, recycling and garden organics, percentage of potentially recyclable material in residual waste and percentage of contamination in recycling and garden organics collections from all council areas could be determined, overall resource recovery and diversion rates for Kogarah, Woollahra and Sydney City councils could not be calculated since the number of MUDs audited were not recorded in the audit data.

2.2.1 Potentially recyclable material in residual waste

The potentially recyclable material present in residual waste was calculated as:

$$\%\ potentially\ recyclable = \frac{weight\ recyclable\ material\ per\ dwelling\ per\ unit\ time\ \times\ 100}{weight\ residual\ waste\ per\ dwelling\ per\ unit\ time}$$

where materials considered recyclable are those listed in Tables 2 and 3. For this purpose only dry recyclables and garden organics are calculated, other organic waste such as food waste is not included. The dwelling in this context refers to a SUD household or a MUD complex (with more than one household). In the case of a townhouse / villa category the dwelling is an individual townhouse or villa.

This parameter was calculated first for each SUD or MUD complex using total bin weights, and the average for the whole LGA was calculated by averaging the percentage of potentially recyclable values from the individual SUD bin or MUD complex.

2.2.2 Contamination levels in recycling and garden organics

Contamination levels in recycling and garden organics collections were calculated as:

$$\%\ contamination = \frac{total\ weight\ non\text{-}recyclable\ material\ in\ recycling\ or\ organics\ bins\ per\ dwelling\ per\ unit\ time\ \times 100}{weight\ recycling\ or\ garden\ organics\ bin\ contents\ per\ dwelling\ per\ unit\ time}$$

Where materials considered recyclable are those listed in **Table 2** (recycling) and **Table 3** (garden organics). The definition of a 'dwelling' is given **Section 2.2.1**.

The contamination level for each dwelling was first calculated before an average for the whole LGA was determined by averaging the percentage of potentially recyclable values from the individual dwellings.

2.2.3 Diversion and resource recovery rates

The overall diversion rates and recyclabes recovery rates for LGAs where only residual waste and dry recycling were audited were calculated as follows:

$$\%\ \text{overall diversion rate (waste + recycling)} = \frac{\text{weight materials in the recycling bin per dwelling per unit time} \times 100}{\text{total weight (recycling + waste bin) contents per dwelling per unit time}}$$

$$\%\ \text{recyclables recovery rate (waste + recycling)} = \frac{\text{weight recyclable materials in recycling bin per dwelling per unit time} \times 100}{\text{weight recyclable materials (recycling + waste bin) contents per dwelling per unit time}}$$

The definition of a 'dwelling' is given in **Section 2.2.1**. Note that the diversion and recyclables recovery rates in this case (residual waste and recycling audits), and for the case noted below where all waste collection systems are audited, requires weights of residual waste and recycling from the same SUD households or MUD complex for these parameters to yield reliable results.

In cases where all three waste collection systems were audited the overall diversion and recyclables recovery rates for the LGA took into consideration the weights of recyclable materials in both dry recycling and garden organics collections and the potentially recyclable materials in the residual waste bin, and were calculated as follows:

$$\%\ \text{overall diversion rate (waste + recycling + garden organics)} = \frac{\text{total weight materials in recycling and organics bins per dwelling per unit time} \times 100}{\text{total weight (recycling + waste bin + organics) bin contents per dwelling per unit time}}$$

$$\%\ \text{resource recovery rate (waste + recycling + garden organics)} = \frac{\text{weight recyclable materials in recycling and organics bins per dwelling per unit time} \times 100}{\text{weight recyclable materials in (recycling + waste bin + organics) bins per dwelling per unit time}}$$

The overall diversion rate is the total amount of material in all recycling bins as a proportion of the overall waste (recycling plus residual waste) produced by the household. It does not take into account contamination found in the recycling bin or potential recycling in the residual waste bin.

The recyclables recovery rate on the other hand takes into account contamination in the recycling bins (dry recyclables and garden organics) and the amount of potentially recyclable material in the residual waste bin. It is a measure of the actual amount of resources recovered for recycling as a proportion of the overall amount of recycling available for recovery.

2.2.4 Coefficient of variation

The coefficient of variation is a statistical measure of the dispersion of data in a dataset around the mean (average). It is the ratio of the standard deviation to the mean and is usually represented as a percentage. It is a useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from each other.

In this report all coefficient of variation values are reported as a percentage (%), and calculated as follows:

$$\text{Coefficient of variation (\%)} = \frac{\text{standard deviation} \times 100}{\text{mean}}$$

Low coefficient of variation values (typically less than 30%) suggest a small underlying scatter in datasets while large values (typically greater than 60%) signal a large spread in the data. Values greater than 100% arise when the standard deviation is larger than the average. In this case reporting of the average is not appropriate, and median may be a better statistic to use.

2.2.5 t-Tests

To determine if the difference in the means obtained from two datasets are significant, t-test calculations were used to compare means of different datasets. The t-test calculates the probability of finding a difference in the datasets given the ('null') hypothesis, H_o, that there is no difference in the underlying mean values, (i.e. any differences arise from random effects only). If this probability falls below 5% we reject the null hypothesis and conclude that there is a significant difference at the 95% probability level.

The t-tests were conducted using the tool available in Microsoft Excel assuming unequal variances between the unpaired datasets of interest.

2.3 Limitations in data acquisition and analysis

Although data was acquired using the methodology outlined in the *Guidelines* (bin-by-bin for SUD households and MUD-by-MUD for MUD complexes) in 43 out of the 52 datasets used in this report, the data were actually analysed using the *EPA Waste Stream Data Collection Methodologies – Final Draft (1997)*, whereby total weights of individual material components from all households (SUDs and MUDs) were added together prior to any calculations being performed. This is not consistent with the *Guidelines*, which specifies that calculations be performed on individual household data prior to taking an average for an LGA, SMA, ERA or overall.

It was also found that not all samples collected formed 'matched pairs' for (residual waste + recycling) or (residual waste + recycling + garden organics), that is, the residual waste, recycling and garden organics bins did not necessarily come from the same SUD household or MUD building. Since both the diversion and resource recovery rates are properties of a household or a MUD building (and hence each MUD household in a particular MUD building) the same SUD household or MUD building needs to be audited for all three waste streams.

While in most cases the samples collected contained both SUD and MUD households the proportionate numbers of each type contributing to the total number of households audited did not reflect the ratio of SUD and MUD households in an LGA. This will skew the results across the board – both generation rates and waste composition means – and especially the projected annual waste generation in all three collection types.

Six councils (Lane Cove, Manly, Mosman, Pittwater, Shoalhaven, and Warringah) submitted audit data acquired using the *EPA Methodology*, while three councils (Bankstown, Holroyd, Parramatta) used a variant of the *Guidelines*. In the former case 2500 kg of waste was pooled first from a known number of households prior to segregation of the material components for analysis. For these council areas the overall generation rates and the overall compositions of waste collection systems could only be reported. SUD and MUD generation rates and the respective compositions for each collection system audited could not be determined, as the data were not split into these categories.

Some councils submitted audits using a variant methodology where waste collected each day from a known number of households (both SUD and MUD) were aggregated and subsequently segregated for component material analysis. SUD and MUD weights were not reported separately and hence SUD and MUD generation rates and composition profiles could not be determined.

For the datasets acquired using the *EPA Methodology* and the variant guideline methodology the standard deviation and the spread in the data around the mean (coefficient of variation) could not be determined for the individual council areas. However, data from these council areas could be used in the, SMA, ERA and overall generation rates and composition profiles.

Kogarah, Sydney City and Woollahra data, although acquired using the *Guidelines*, was incomplete; the numbers of MUD households were not provided by these councils. Hence, data from these councils could only be used for the calculation of composition profiles, percentage of contamination in recycling and garden organics streams, and percentage of potentially recyclable materials in residual waste. The overall, SUD and MUD generation rates, the percentage of resource recovery and percentage of diversion rates could not be calculated for audits from these council areas.

Although for the calculation of, SMA, ERA and overall statistics, data from 51, 27, 19 councils for residual waste, recycling and garden organics, respectively, were available, not all council audits could be used for SUD and MUD statistics since data was not split into SUD and MUD categories. This occurred in datasets acquired by the *EPA Methodology* and the variant methodology noted above.

In this report the total weights of the waste components were used for all calculations (that is using the *EPA Methodology)* due to the short-comings in the data acquisition noted above. In addition this was the only way that uniform calculations could be conducted on all council audits, especially as the data had not been acquired by all councils using the *Guidelines*, but had been gathered using the three different methodologies as described above.

3 Data analysis results

3.1 Generation rates of residual waste, recycling and garden organics collection systems

The generation rates for residual waste, recycling and garden organic collections systems along with the annual projected amounts for each category are given in **Table 4**. The average generation for all three systems were also calculated for SUDs and MUDs in each LGA, and these data are presented in **Table 5**.

The projected annual waste generated for each council area for the three collection systems shown in **Table 4** and **Table 5** were calculated using the total numbers of (SUDs + MUDs), SUD and MUD households present in each LGA. These numbers were obtained from the *Australian Bureau of Statistics (Community Profiles)*[11] for each LGA.

While the overall projected annual waste generated in each category may be good estimates, data pertaining to SUDs and MUDs may not be reliable. The main reason for the latter is that the individual council audits in most cases did not collect SUD and MUD samples in proportion to the number of the SUD and MUD households in the total population in an LGA. While this was recommended in the *Guidelines* for the collection of data, it was not mandatory.

In **Table 6** comparisons are made of the total waste, residual waste, recycling and garden organics generation rates for GSR (averaged over 48 audits), SMA (averaged over 35 audits) and ERA (averaged over 13 audits). Data from Kogarah, Sydney City and Woollahra could not be used for reasons explained in the section on data limitations. The corresponding values from audits conducted from 2004 to 2006 and prior to 2002 are also given in **Table 6**.

In **Table 7** comparisons of the overall, the SUD and MUD generation rates of all waste collection systems are made. The values were calculated using data from only 40 council areas for residual waste as not all audits submitted to OEH were conducted using the *Guidelines* (refer **Section 2.3**). Similarly, recycling data from 22 (out of 27) council areas and garden organics data from 15 (out of total 19) audits could be used for the determination of SUD and MUD generation rates.

The 2007/08 audit data shows:

Total waste generation

- Averages of total waste generated in the GSR, SMA and ERA are 17.7, 17.6 and 17.7 kilograms per week per household respectively. SMA and ERA averages are different by less than 5%, and hence indistinguishable especially given that the values have 10% uncertainty associated with them.
- The average total waste generation rates in SUDs and MUDs are 19.9 and 9.7 kilograms per week per household, respectively.
- In comparison with 2007 and 2002 values[12], 2007/08 total waste generation has changed little since those two audits analyses for the GSR, SMA and ERA, with the 2007/08 values being within 10% of the corresponding 2007 and 2002 values.

11 Australian Bureau of Statistics: *2006 Census Community Profiles by Location*

12 *The Domestic Waste Stream in New South Wales: Generation Rates, Profiles and Trends*, DECC December 2007

- Coefficients of variation values for the 2007/08 and 2007 analyses overall, and in the SMA, and ERA are all similar suggesting that, firstly waste generation is uniform across all councils areas, and secondly that this pattern has not changed since the 2007 analysis.

Residual waste

- The 2007/08 residual waste averages for the GSR, SMA and ERA are 11.9, 11.6, 12.5 kilograms per week per household respectively. SMA and ERA values are different by only 7%.
- The average for the Groundswell group of councils was 11.1 kilograms per week per household.
- Overall SUD and MUD averages of residual waste generation are 13.1 and 7.4 kilograms per week per household respectively. The difference between the two values is 44%.
- There is no marked difference in residual waste generation between the 2007/08 and 2007 analyses for the GSR, SMA and ERA regions. For each, the coefficient of variation values between the 2007 and 2007/08 analyses are similar, suggesting that residual waste generation characteristics have remained uniform throughout the regions.

Recycling

- The averages of dry recycling collected for the GSR, SMA and ERA in the 2007/08 audit are 5.8, 5.6 and 6.3 kilograms per week per household respectively. SMA and ERA values are different by about 13%.
- The coefficient of variation values for the GSR and the SMA for recycling in 2007/08 and 2007 are similar and small, indicating that overall recycling is uniform in all councils areas and that this pattern has not changed since the 2007 audit analysis.
- For the ERA there is a difference between the coefficient of variation for recycling in the 2007 and 2007/08 analyses, suggesting less scatter in the data from the latter analysis.
- The overall average recycling collected in SUDs and MUDs is 7.0 and 3.2 kilograms per week per household, respectively. The average SUD recycling collected is more than twice the MUD generation rate.
- SMA and ERA recycling values for SUDs are 7.1 and 6.6 kilograms per week per household, respectively while the corresponding MUD values are 2.8 and 4.4 kilograms per week per household.

Garden organics

- Average garden organics collection for the GSR, SMA and ERA are 8.2, 7.8 and 9.9 kilograms per week per household, respectively.
- The GSR, SMA and ERA averages of SUD garden organics collection are 9.0, 8.8 and 9.8 kilograms per week per household, while the corresponding MUD values in the SMA is 2.4 kilograms per week per household. The MUD values have extremely large coefficient of variation values associated with them (139%) and are not reliable.

It should be noted that, since only one residual waste audit in the rest of NSW was available (from the four council areas in the Groundswell project), no comparisons of this data against SMA and ERA values were conducted.

Median values for all waste collection systems in the GSR, SMA and ERA were also determined and are listed in **Table 6**, along with average values. The median values are comparable to the corresponding average values. No median values from the 2007 or 2002 analyses were available to allow discussions on variations in this statistic between the 2007/08 values and those from previous audits.

3.2 Average composition profiles for residual waste, recycling and garden organics

The composition profiles of residual waste, recycling and garden organics kerbside collections in individual council areas are presented in **Table 8**, **Table 9** and **Table 10**, respectively. Only data for the major material components in each of the three categories are reported.

3.2.1 Residual waste composition

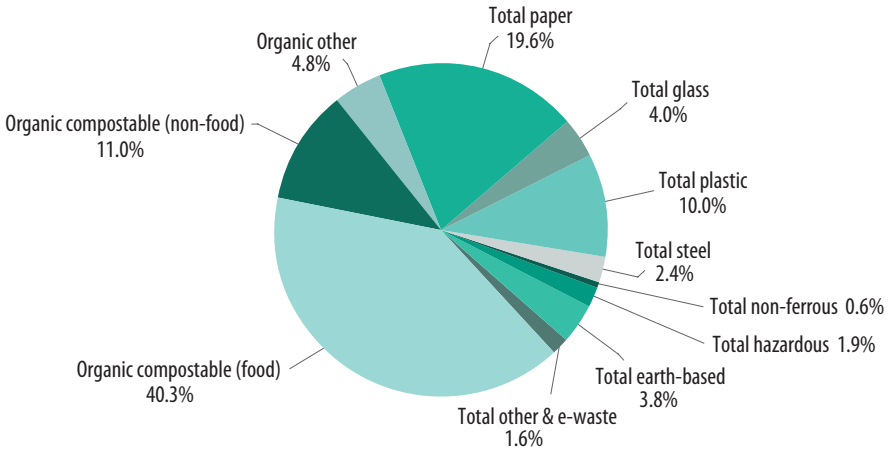
The composition of major component materials in residual waste collections for each audit was analysed. Composition profiles from the 51 councils audited in the SMA and ERA were averaged to give an overall residual waste composition for the GSR. Averages were further apportioned into SUD and MUD components, based on the number of SUD and MUD households audited in each LGA. Averages for the SMA and ERA regions were also calculated in a similar manner.

Table 11 gives the average GSR residual waste stream composition as well as averages for the SMA and ERA, while **Table 12** gives the average SUD and MUD composition profiles.

In **Figure 1** the major categories of material components and their average GSR compositions is shown. The major component in the residual waste is Organic compostable (food) at 40.3%. This overall food average includes data from SMA, ERA and NRA audits.

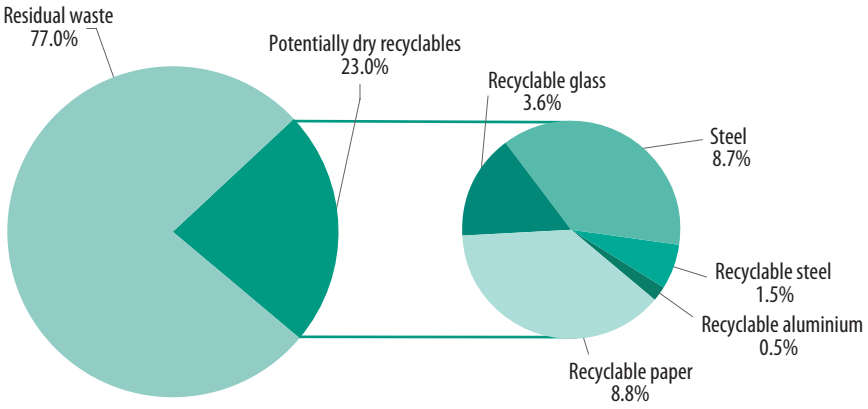
Total paper makes up 19.6% (both recyclable and non-recyclable) of the residual waste while Organic compostable (non-food) makes up the third largest component at 11.0%. All other components contribute 10% or less each to the total waste composition of residual waste collections from households.

Figure 1: GSR residual waste composition profile



Of the total residual waste composition, 23% is potentially recyclable material comprising Recyclable Paper, Glass, Plastic, Steel and Aluminium at levels shown in **Figure 2**. The SUD value is 20.9% while the MUD value is 27.1%.

Figure 2: Potentially dry recyclable materials in residual waste



The average food component for the SMA is 42.4% (averaged over 38 council areas) and for ERA is 34.4% (averaged over 13 council areas). A t-test showed that the difference between these two values is significant at 95% confidence level ($p = 0.011$).

The food component for SUDs and MUDs is similar at 41.0% and 42.9%, respectively, and both types of dwellings generally exhibit the same material composition distribution. It should be noted that these values are higher than the GSR food component average at 40.3%. There is a reason for this discrepancy. While the GSR value has been obtained from 51 audits, the SUD and MUD values were only obtained from 40 audits as 12 sets of audit data could not be de-convoluted into SUD and MUD components, either because the audits did not provide the relative SUD and MUD household numbers or were not conducted using the *Guidelines* (refer **Section 2.3**).

The coefficient of variation values calculated in all cases is low and in the majority of cases is less than 100% (with the exception of minor component materials such as total hazardous and

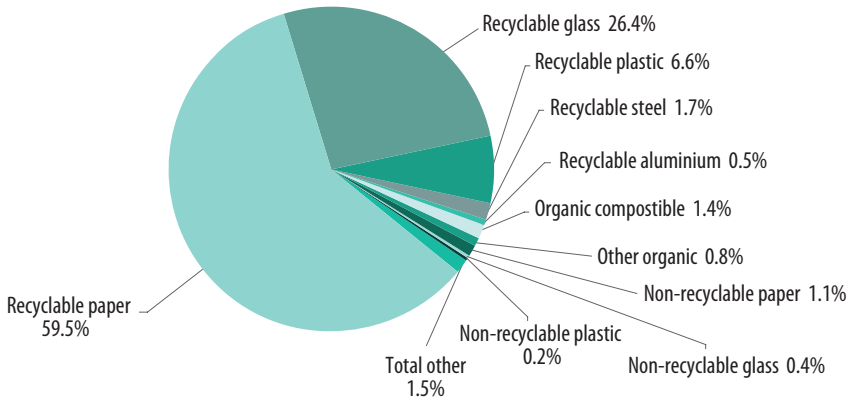
total earth-based materials). This indicates that the standard deviations are smaller than the mean compositions. These low values suggest that the variation in the composition of major components in residual waste between SUDs, MUDs, the SMA and ERA are small, and that the material distributions have a small underlying scatter across all audits.

3.2.2 Dry recycling composition

Analyses of dry recycling data were conducted similar to that described above for residual waste. Dry recycling data is presented in **Table 13** for the average GSR, SMA and ERA compositions while in **Table 14**, the SUD and MUD composition profiles are presented with the GSR dry recycling profile.

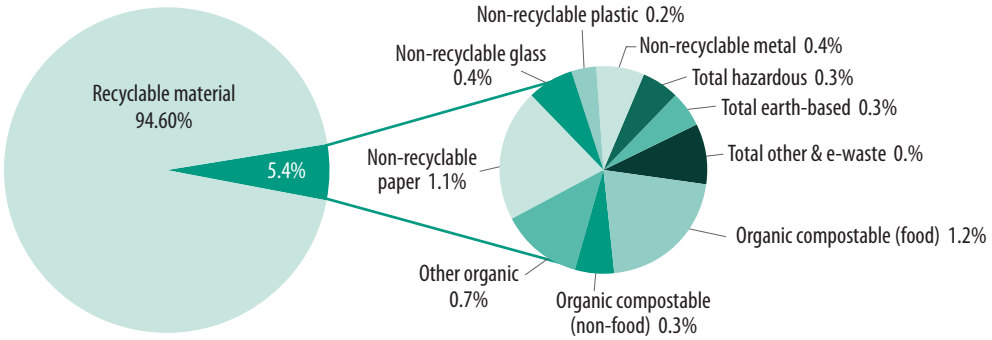
The average GSR dry recycling profile for household kerbside collections is depicted in **Figure 3.** Recyclable paper at an average value of 59.5% makes up the largest component, followed by recyclable glass at 26.4%, and recyclable plastic at 6.6%. All other components present comprising both recyclable and non-recyclable materials each make up less than 2% by weight in the individual categories.

Figure 3: GSR dry recycling composition profile



As shown in **Figure 4** contaminants in the dry recycling collections make up 5.4% of the overall total. Non-recyclable paper and organic compostable (food) categories are the larger contaminant categories at 1.1% and 1.15%, respectively. The remaining 4.3% is distributed between other non-compliant materials shown in the figure.

Figure 4: Contaminant levels in dry recycling



The coefficient of variation values associated with the major components in dry recycling such as recyclable paper, recyclable glass and recyclable plastic are very small due to little variation in these compositions across the councils which undertook the recycling audits. As expected minor components have large coefficient of variation values due to large uncertainties associated with their measurements.

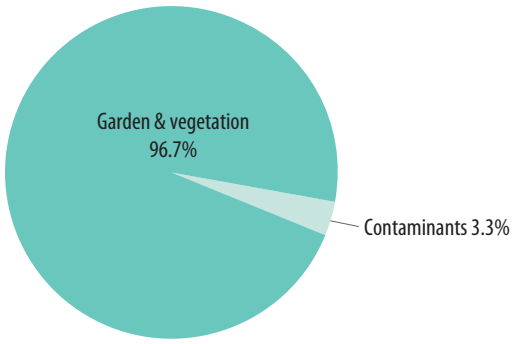
The largest difference in the composition profiles between ERA and SMA is in the recyclable paper category with values of 53.8% and 61.1%, respectively. A t-test showed the difference is significant ($p = 0.009$) at 95% confidence level. Similarly, the difference in the recyclable glass component, is extremely significant ($p = 0.05$) with averages of 25.3% for the SMA and 30.8% for the ERA. Based on these two material components only, the recycling composition profiles for the ERA and SMA appear to be different. Only data from six ERA council areas were available for the calculation of the ERA material component averages, whereas data from 21 council areas were available for SMA averages.

SUD and MUD dry recycling profiles are very similar, and not too different from the GSR composition profile in all material categories for household kerbside collections. As for the residual waste, the individual material components in SUDs and MUDs could be slightly higher (for example recyclable paper) than the GSR value because the latter was calculated from all 27 councils that undertook recycling audits whereas not all the audits had both SUD and MUD components.

3.2.3 Garden organics composition

Only 19 council areas audited garden organics kerbside collections. The overall proportions of major material components are presented in **Table 15**, and depicted as a pie chart in **Figure 5**. The average garden and vegetation component made up 96.7% of the GSR garden organics composition profile while the contaminants make up the remaining 3.3%.

Figure 5: GSR garden organics composition profile



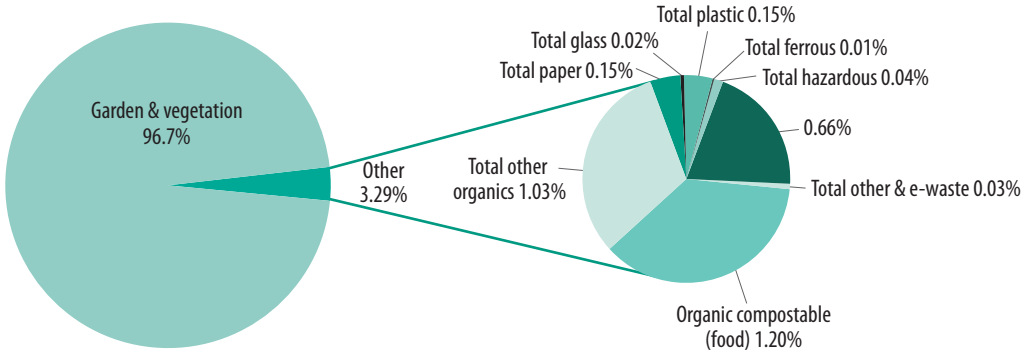
In **Figure 6** the contaminants present in garden organics collections and their levels are identified. Organic compostable (food) at 1.2% is the largest contaminant in garden organics kerbside collections, similar to recycling collections. Other organic material at 1% of the total composition is the second largest contaminant. The remaining 1.3% is distributed amongst other common non-complaint materials found in recycling and garden organics kerbside collections.

Table 15 also gives the SMA and ERA composition profiles, which shows that the profiles from the two regions are not too different, with the SMA garden and vegetation component being 96.9% and the ERA value being 95.4%. The level of contamination is 4.6% in the ERA and 3.1% for

the SMA. However, a t-test showed that the difference between the SMA and ERA values is not significant at 95% confidence level.

No effort was made to elucidate the SUD and MUD composition profiles for garden organics. This is because the majority of garden organics audits were conducted on SUD households and it is not possible to determine SUD and MUD profiles from the current data for garden organics.

Figure 6: Contaminant levels in garden organics



The coefficient of variation value for the garden and vegetation component is extremely small at 4%. This suggests that the spread in the composition of this component is extremely narrow across all councils which undertook audits. The contaminants exhibit very high coefficient of variation values and this is not surprising as the proportions of these materials are small and uncertainties associated with them are large. This results in large scatter in these constituent compositions.

3.2.4 Comparison to 2007 composition profiles

To identify variations in composition profiles of the various kerbside waste collection systems between the 2007 audit analysis and the most recent audits, the percentage difference in the individual major components of residual waste and recycling profiles between the audits were determined. The results for residual waste in the GSR are presented in **Table 16** and in **Table 17** for the recycling.

As highlighted in **Table 16** the residual waste composition profiles show that that there is a slight increase in the organic compostable (food) category in the 2007/08 analysis, up from 37.1% in 2007 to 40.3%. There have been changes in other material components including the recyclable material categories. The percentage of potentially recyclable value has decreased slightly from 24.4% in 2007 to 23.0%. However, it is not possible to conclude that these changes are significant from these data sets alone, especially as the changes in most material components are quite small.

In **Table 17** it can be seen that for total dry recyclable materials the overall change between the 2007 and 2007/08 analyses is insignificant, showing only a 2% increase, although the individual material categories show changes from 3% to 58%. For non-recyclable materials (contaminants) the percentage change ranges from 0% to 200%. The percentage of contamination value decreases from 6.8% observed in 2007 to 5.4% in 2007/08. However, without t-tests on the percentage contamination values in datasets from the two audits it cannot be assumed that the difference in the two contamination values is significant, that is, that there has been a drop in contamination levels in recycling since the 2007 audit.

Changes in the garden organics composition of household kerbside collections between the 2007 and 2007/08 analyses could not be done as data was not available from the 2007 audit.

3.2.5 Impact of availability of garden organics service in an LGA on the residual waste composition profile

A comparison between the average residual waste composition profiles of councils with collection services for garden organics and councils with no garden organics service (refer **Table 18**) showed that the former had a lower percentage of organic compostable (garden and vegetation) at 4.5% compared to 22.1%. A t-test between the two datasets showed that the two averages are significantly different ($p = 2x10^{-5}$), and suggests that council areas with no garden organics collection service tend to use residual waste collections for the disposal of garden and vegetation materials.

The median values of the organic compostable (garden and vegetation) component for councils with and without a garden organics service are 5.2% and 23.2%, respectively. The corresponding coefficient of variation values are 99% and 43%, suggesting that the garden and vegetation compositions in residual waste collection services of councils with no garden organics service are evenly distributed around the overall mean from all councils. The same cannot be said about the councils with a garden organics collection service, which shows a large coefficient of variation value (99%), suggesting that there is a large scatter in the organic compostable (garden and vegetation) category in the residual waste from council areas with facilities for garden organics collection.

4 Recycling behaviour discussions

To gauge household recycling behaviour in the council areas audited, a number of parameters were used as indicators of recovered/unrecovered resources in the three waste collection systems. For residual waste, percentage of potentially recyclable material present, as nominated in **Table 2**, was calculated. Diversion rate and resource recovery rates were used as indicators of levels of overall recycling when either two (residual waste, dry recycling) collection systems or three (residual waste, dry recycling, garden organics) collection systems were audited in a particular council area.

Table 19 lists percentage of potentially recyclable values for all councils, contamination levels in dry recycling and garden organics collections, and diversion and resource recovery rates for those councils that audited recycling and garden organics kerbside collections. The average of each calculated parameter in an LGA, its standard deviation, the median and the coefficient of variation values were calculated in the first instance. The overall average from all audited councils, the SMA and ERA averages were calculated using the LGA values.

SUD and MUD averages could only be calculated for councils that used the household by household approach in the *Guidelines* as a basis for auditing. The audits conducted using the aggregated approach did not allow separation of SUDs and MUDs data within the SMA and ERA.

Aggregated audit approaches are limited in their ability to calculate the difference between SUD and MUD households along with the ability to measure household bin capacity, household generation and resource recovery rates. The aggregated method does not account for outliers which produces a reduced level of accuracy, and has potential to mislead results, particularly with contamination.

4.1 Unrecovered resources in residual waste

Unrecovered resources in residual waste were calculated as percentage of potentially recyclable materials, and the average over all audits was 23.0%, while the median was 21.6%. The standard deviation was small and hence the coefficient of variation at 27% is considered very small, suggesting that the majority of council areas exhibited similar values for the amount of potentially recyclable material available.

The SMA, ERA, SUD and MUD percentage of potentially recyclable values are 22.0%, 25.6%, 20.9% and 27.1%, respectively with t-tests showing, that at a 95% confidence level, the:

- ERA and SMA % potentially recyclable means are not different ($p = 0.23$)
- SUD and MUD % potentially recyclable means are not different ($p = 0.09$).

4.2 Contamination levels in recycling and garden organics

The overall combined contamination level in GSR recycling collections is 5.4%. The SMA and ERA values of 5.3% and 5.6%, respectively, are consistent with the GSR value, and suggest that the recycling contamination levels in the SMA and ERA are not different from each other.

SUD and MUD averages were 5.1% and 6.2% respectively. A t-test between SUD and MUD datasets showed a high probability value ($p = 0.30$) suggesting that the means for SUDs and MUDs are not

different.

The median values for GSR, SMA and ERA recycling contamination levels are 4.2%, 4.3% and 4.2%, respectively. Coefficient of variation values ranged from 55% to 67% suggesting that the percentage contamination values exhibit little scatter in each recycling material category. Across all council areas audited, the minimum contamination level was 2.1% and the maximum value was 13.1%.

The average contamination levels in garden organics collections for GSR, SMA and ERA are 3.3%, 2.9% and 4.6% respectively. A t-test on SMA and ERA datasets showed that the two means are not different ($p = 0.49$), that is, garden organics composition profiles are not different between SMA and ERA council areas.

4.3 Resource recovery and diversion rates in recycling and garden organics

The overall GSR resource recovery rate, averaged over 24 council areas, yielded a value of 66.5%. The SMA and ERA averages are 66.6% and 66.2%, respectively. The corresponding median values are 71.7%, 71.7% and 69.1%. Although 27 councils conducted audits of recycling the resource recovery rates for Kogarah, Sydney City and Woollahra could not be calculated since the numbers of MUDs audited in each council area were not available (refer to section on the limitations of the data).

The very small standard deviation and coefficient of variation values suggest that there is little scatter in resource recovery rates between those councils which undertook recycling audits. While there is no significant difference between the ERA and SMA resource recovery averages, there is a significant difference between SUD average recovery rate of 71.5% and the MUD average of 57.0% at 95% confidence level ($p = 0.0001$).

The average GSR SMA and ERA resource recovery rates increased to 82.6%, 81.5%, 88.0%, respectively, when garden organics collections are included in the calculations. The very low coefficient of variation values suggest councils that undertook audits for both recycling and garden organics exhibited similar resource recovery values.

The GSR, SMA and ERA resource recovery medians at 86.2%, 85.5% and 87.4%, respectively, are very similar.

The average GSR diversion rate when only residual waste and recycling material is considered is 34.7%, and when both the garden organics and recycling collections are considered in addition to residual waste then the diversion rate is higher at 55.9%.

SMA and ERA diversion rates (residual waste and dry recycling only) are 34.1% and 36.5%, respectively. The values increase to 54.4% and 63.1%, when the recyclable materials from garden organics collections are included.

Mean SMA and ERA diversion rates (residual waste and dry recycling only) at 34.1% and 36.5%, respectively, are not significantly different at a 95% confidence level ($p = 0.55$). However SUD and MUD diversion rate means at 37.7% and 29.4%, respectively, are significantly different ($p = 0.005$), suggesting that MUD households have a lower diversion rate than SUD households.

5 Conclusions

This report outlines the results of statistical analysis of waste audit data collected from households across 51 councils and 1 group of councils. While 43 councils used the *Guidelines* to acquire data, 3 used a variant of these *Guidelines* and 6 submitted data that had been acquired using the *EPA Methodology*. Data analyses in this report have been conducted using the *EPA Methodology*.

Data was analysed for household generation rates and composition profiles for the three waste collection systems: residual waste, dry recycling and garden organics recycling. The level of potentially recyclable material in residual waste, contamination in dry recycling and garden organics, were determined. Resource recovery and diversion rates were also determined. Comparisons of these statistics were made for the SMA and ERA, and between SUD and MUD households, wherever possible and appropriate. Similarly, an effort was made to determine changes in the waste generation and composition profiles of residual waste and recycling between the current audits and those undertaken between 2002 and 2007, as well as audits undertaken pre 2002.

Data analysis revealed that the average total waste generation rates were as follows:

- The GSR, SMA and ERA total household waste generated were 17.7, 17.6 and 17.7 kilograms per week per household, and the values are consistent with values obtained previously in the 2007 audit analysis.
- SUD and MUD rates for total waste generated are 19.9 and 9.7 kilograms per week per household, respectively.

Household residual waste data acquired from 51 audits showed:

- The average residual waste generation rate for GSR combined audits is 11.9 kilograms per week per household, and 11.6 and 12.5 kilograms per week per household, respectively for SMA and ERA.
- The rest of NSW was represented by one group of 4 councils in the consortium know as Groundswell. The average residual waste generation rate for this group is 11.1 kilograms per week per household, in line with both the SMA and ERA.
- SUD and MUD average residual waste generation rates are 13.1 and 7.4 kilograms per week per household.
- The GSR composition profile showed that organic compostable (food) made up the largest material component of a household residual bin at 40.3%, followed by paper at 19.6%. The ERA organic compostable (food) composition mean of 34.4% is significantly lower than the SMA mean of 42.3%. Conversely bin composition profiles for SUDs and MUDs are remarkably similar.
- 23.0% of the overall residual waste composition was recyclable material.
- The level of organic compostable (garden and vegetation) in residual waste was dependent on whether or not the council area had a garden organics collection service available. When a collection service was available the average garden and vegetation component of residual waste made up only 4.5% of the total composition but this value increased to 22.1% when the council area did not have a garden organics collection service available.

- The 2007/08 overall GSR residual waste composition profile did not differ from the 2007 profile, and the branching ratio of individual material components is very similar for the two audits.

Household dry recycling data acquired through 27 audits showed:

- The GSR average dry recycling generation rate is 5.8 kilograms per week per household, while the SMA and ERA averages are 5.6 and 6.3 kilograms per week per household, respectively.
- Overall SUD and MUD dry recycling generation rates are 7.0 and 3.2 kilograms per week per household respectively.
- The dry recycling composition profile in the GSR shows that recyclable paper makes up the largest component in a typical household dry recycling bin at 59.5%, followed by recyclable glass at 26.4%. SUD and MUD dry recycling composition profiles are similar and resemble the overall profile.
- The mean SMA recyclable paper composition at 61.1% is significantly higher than the ERA mean at 53.8%. However, the mean SMA recyclable glass composition at 25.3% is significantly lower than the ERA mean of 30.8%.
- Overall for the SMA and ERA combined the average dry recycling contamination level is 5.4%. The two major contaminants are organic compostable (food and non-food) material at 1.5% and non-recyclable paper at 1.1%. There appears to be a decrease in the overall recycling contamination level from 6.8% (2007) to 5.4% (2007/08). Whether the decrease is genuine could not be elucidated as the 2007 datasets were not available for conducting t-tests to determine if the difference is significant at 95% confidence level.
- The average contaminant levels of SUDs and MUDs are 5.1% and 6.2%, and a t-test showed the values are indistinguishable. The corresponding SMA and ERA values are 5.6% and 5.4%, and are again indistinguishable.
- The 2007/08 dry recycling profile did not differ from the 2007 dry recycling profile suggesting that the recycling characteristics between the analyses have not changed significantly.

Household garden organics data acquired through audits in 13 councils areas showed:

- The overall combined SMA and ERA average generation rate is 8.2 kilograms per week per household, while the SMA and ERA garden organics generation rates are 7.8 and 9.9 kilograms per week per household respectively.
- Overall SUD and MUD garden organics generation rates are 9.0 and 2.4 kilograms per week per household respectively.
- Overall for the GSR, the average contamination level is 3.3%. The garden and vegetation component makes up 96.7% of the garden organics composition profile.
- The two major contaminants in a typical garden organics bin are organic compostable (food) at 1.2% and total other organics at 1.0%
- SMA and ERA garden organics composition profiles are similar to the combined profile.

Recycling behaviour is consistent throughout the SMA and ERA, but different in SUD and MUD households. A number of observations were made:

- The overall kerbside diversion rate is 34.7% when only residual waste and dry recycling collections are considered and it increases to 55.9% when the garden organics collections are included in the calculations.
- Mean SMA and ERA diversion rates (residual waste and dry recycling only) at 34.1% and 36.5%, are not significantly different at a 95% confidence level ($p = 0.55$).
- SUD and MUD diversion rate means at 37.7% and 29.4% are significantly different from each other. The values suggest that SUD households are diverting more dry recyclable materials than MUD households.
- Overall resource recovery is 66.5% when only dry recycling is used in calculations in conjunction with residual waste. This value increases to 82.7% when the recyclable material from garden organics collections is included in the calculations. Resource recovery values are consistent throughout the SMA and ERA.
- The SUD average resource recovery is 71.5% and a MUD is 57.0%. A t-test shows that the difference is extremely significant, that is, SUD households exhibit better recycling behaviour than MUD households, if resource recovery is only used as an indicator of the recycling behaviour of households.

Table 4: Generation rates and projected annual waste generated in councils for residual waste, recycling and garden organics

Council	Region	Audit date	Total dwellings	Residual waste in kg/wk/HH	Dry recycling in kg/wk/HH	Garden organics in kg/wk/HH	Total waste in kg/wk/HH	Projected annual total waste/kilo tonnes	Projected annual residual waste/kilo tonnes	Projected annual dry recycling stream/kilo tonnes	Projected annual garden organics/kilo tonnes
Ashfield	SMA	Sep-08	17402	8.1	4.1	5.4	17.6	16.0	7.3	3.7	4.9
Auburn	SMA	Nov-08	22342	12.9	No audit	9.2	22.1	25.7	15.0		10.7
Bankstown	SMA	Nov-07	56764	12.4	No audit	No audit	12.4	36.7	36.7		
Baulkham Hills	SMA	Nov-08	57232	13.5	7.1	12.4	33.0	98.1	40.1	21.2	36.8
Blacktown	SMA	Aug-07	94430	16.5	6.2	No service	22.7	111.3	81.0	30.3	
Botany Bay	SMA	Jul-07	13147	12.8	2.6	13.8	29.2	20.0	8.7	1.8	9.5
Burwood	SMA	Nov-08	10718	9.4	5.1	6.3	20.8	11.6	5.3	2.8	3.5
Camden	SMA	Nov-08	16561	10.6	No audit	No audit	10.6	9.1	9.1		
Campbelltown	SMA	Oct-08	50598	9.8	No audit	No audit	9.8	25.7	25.7		
Canada Bay	SMA	Nov-07	30380	9.1	6.9	8.3	24.2	38.3	14.3	10.8	13.1
Canterbury	SMA	May-08	50475	10.7	4.8	9.2	24.6	64.5	28.0	12.5	24.0
Cessnock	ERA	Jul-08	18197	13.7	No audit	No service	13.7	13.0	13.0		
Fairfield	SMA	Apr-08	58428	21.4	No audit	No service	21.4	65.0	65.0		
Gosford	ERA	Nov-08	73066	10.0	7.1	8.4	25.4	96.7	37.9	27.0	31.8
Groundswell	NRA	Jul-08	34,020	11.1	No audit	No audit	11.1	19.7	19.7		
Hawkesbury	ERA	May-08	23974	17.8	6.7	No service	24.6	30.6	22.2	8.4	
Holroyd	SMA	Dec-07	32177	22.4	No audit	No service	22.4	37.4	37.4		
Hornsby	SMA	Feb-08	53892	10.1	7.1	No audit	17.2	48.3	28.4	19.8	
Hunters Hill	SMA	Dec-08	4711	9.5	No audit	No audit	9.5	2.3	2.3		
Hurstville	SMA	Aug-08	29640	9.6	5.9	8.5	24.0	37.0	14.8	9.2	13.1
Kiama	ERA	Nov-08	8328	9.2	6.9	No audit	16.1	7.0	4.0	3.0	

Council	Region	Audit date	Total dwellings	Residual waste in kg/wk/HH	Dry recycling in kg/wk/HH	Garden organics in kg/wk/HH	Total waste in kg/wk/HH	Projected annual total waste/kilo tonnes	Projected annual residual waste/kilo tonnes	Projected annual dry recycling stream/kilo tonnes	Projected annual garden organics/kilo tonnes
Kogarah	SMA	Dec-08	21062	9.8	6.2	No audit	16.0	17.5	10.7	6.8	
Ku-ring-gai	SMA	Sep-08	36752	10.2	No audit	No audit	10.2	19.4	19.4		
Lake Macquarie	ERA	Jul-08	73533	15.6	No audit	No service	15.6	59.8	59.8		
Lane Cove	SMA	May-07	12517	15.1	5.8	4.6	25.5	16.6	9.8	3.8	3.0
Leichhardt	SMA	Jun-08	24414	8.1	7.1	7.7	22.9	29.1	10.3	9.0	9.8
Liverpool	SMA	Sep-07	57180	20.1	6.3	No service	26.4	78.6	59.8	18.8	
Maitland	ERA	Aug-08	24376	15.9	No audit	No service	15.9	20.1	20.1		
Manly	SMA	Feb-07	17700	8.3	No audit	No audit	8.3	7.7	7.7		
Marrickville	SMA	May-08	34193	10.3	5.9	7.3	23.5	41.7	18.3	10.5	13.0
Mosman	SMA	Feb-07	12339	10.5	No audit	No audit	10.5	6.7	6.7		
Newcastle	ERA	Jul-08	58254	14.2	No audit	No service	14.2	43.0	43.0		
North Sydney	SMA	Nov-08	32255	5.8	No audit	No audit	5.8	9.7	9.7		
Parramatta	SMA	Nov-07	57533	13.9	No audit	No audit	13.9	41.5	41.5		
Penrith	SMA	Jun-08	62858	17.0	No audit	No service	17.0	55.6	55.6		
Pittwater	SMA	Feb-07	21595	12.4	No audit	No audit	12.4	13.9	13.9		
Port Stephens	ERA	Jul-08	28306	14.1	No audit	No service	14.1	20.8	20.8		
Randwick	SMA	Nov-08	54665	7.8	6.0	8.0	21.8	62.1	22.1	17.2	22.8
Rockdale	SMA	Sep-08	35590	13.2	2.8	No service	16.0	29.6	24.4	5.2	
Ryde	SMA	Nov-08	39806	7.8	No audit	No audit	7.8	16.1	16.1		
Shellharbour	ERA	Nov-08	22848	14.8	5.2	No audit	20.0	23.8	17.6	6.2	
Shoalhaven	ERA	May-07	44100	12.2	No audit	No service	12.2	28.1	28.1		
Strathfield	SMA	Nov-08	11770	9.7	No audit	No audit	9.7	6.0	6.0		

Council	Region	Audit date	Total dwellings	Residual waste in kg/wk/HH	Dry recycling in kg/wk/HH	Garden organics in kg/wk/HH	Total waste in kg/wk/HH	Projected annual total waste/kilo tonnes	Projected annual residual waste/kilo tonnes	Projected annual dry recycling stream/kilo tonnes	Projected annual garden organics/kilo tonnes
Sutherland	SMA	Sep-08	79696	9.7	3.9	5.5	19.1	79.0	40.0	16.2	22.8
Sydney City	SMA	Sep-08	84213	5.3	2.9	10.4	18.6	81.5	23.1	12.8	45.6
Warringah	SMA	Feb-07	50598	10.0	No audit	No audit	10.0	26.2	26.2		
Waverley	SMA	Sep-08	28917	9.0	6.3	3.6	19.0	28.5	13.6	9.5	5.4
Willoughby	SMA	Aug-08	27650	9.6	6.8	No audit	16.4	23.6	13.9	9.8	
Wingecarribee	ERA	Oct-08	24457	7.4	No audit	No service	7.4	9.5	9.5		
Wollongong	ERA	Nov-08	74686	8.6	5.6	12.4	26.5	103.0	33.4	21.6	48.0
Woollahra	SMA	Jun-08	25712	7.7	5.9	9.3	22.9	30.7	10.3	7.9	12.5
Wyong	ERA	Nov-08	58508	8.8	6.4	8.8	24.0	73.1	26.9	19.5	26.7

kg/wk/HH is kilograms per week per household

Table 5: Generation rates and projected annual waste generated in council SUD and MUD households for residual waste and dry recycling

Council	Number single unit dwellings (SUDs)	Number multi-unit dwellings (MUDs)	SUDs waste in kg/wk/ HH	MUDs waste in kg/wk/ HH	SUDs dry recycling in kg/wk/HH	MUDs dry recycling in kg/wk/HH	SUDs garden organics in kg/wk/HH	MUDs garden organics in kg/wk/HH	Projected annual SUDs residual waste/ kilo tonnes	Projected annual MUDs residual waste/ kilo tonnes	Projected annual SUDs dry recycling/kilo tonnes	Projected annual MUDs dry recycling/ kilo tonnes
Ashfield	10,359	7,043	12.5	4.9	6.8	1.8	5.4		6.8	1.8	3.7	0.7
Auburn	12,464	9,878	12.9				9.2		8.4			
*Bankstown	46,161	10,603							29.8			
Baulkham Hills	53,236	3,996	13.5		7.1		12.4		37.3		19.7	
Blacktown	85,614	8,726	16.8	13.1	6.4	4.9			74.6	5.9	28.4	2.2
Botany Bay	7,530	5,617	17.1	7.5	4.0	1.7			6.7	2.2	1.5	0.5
Burwood	6,766	3,952	11.8	6.1	6.8	2.6	9.4	0.6	4.2	1.3	2.4	0.5
Camden	16,062	499	10.6						8.9			
Campbelltown	50,351	5,536	9.8						25.6			
Canada Bay	17,416	13,234	10.1	7.4	7.8	5.4	8.2	9.1	9.2	5.1	7.1	3.7
Canterbury	27,527	22,948	13.4	6.6	6.9	1.8	11.2	1.2	19.2	7.9	9.9	2.1
Cessnock	18,197	0	13.7						13.0			
Fairfield	47,402	11,026	22.3	14.2					55.1	8.1		
Gosford	70,270	2,796	10.0		7.1		8.4		36.4		26.0	
Groundswell	28769	5251	11.1						16.6			
Hawkesbury	21,427	2,547	17.9	15.8	6.7	5.9			20.0	2.1	7.5	0.8
*Holroyd	24,455	7,722										
Hornsby	46,404	7,488	11.2	6.2	7.8	4.5			27.0	2.4	18.9	1.7
Hunters Hill	4,154	557	11.2	7.3					2.4	0.2		
Hurstville	21,585	8,055	10.6	7.7	7.6	2.0	8.5		11.9	3.2	8.5	0.9
Kiama	8,328	1,043	9.2	9.0	6.8	7.3			4.0	0.5	3.0	0.4

Council	Number single unit dwellings (SUDs)	Number multi-unit dwellings (MUDs)	SUDs waste in kg/wk/ HH	MUDs waste in kg/wk/ HH	SUDs dry recycling in kg/wk/HH	MUDs dry recycling in kg/wk/HH	SUDs garden organics in kg/wk/HH	MUDs garden organics in kg/wk/HH	Projected annual SUDs residual waste/ kilo tonnes	Projected annual MUDs residual waste/ kilo tonnes	Projected annual SUDs dry recycling/kilo tonnes	Projected annual MUDs dry recycling/ kilo tonnes
Kogarah	13,788	7,274										
Ku-ring-gai	31,665	5,087	10.7	6.8					17.6	1.8		
Lake Macquarie	68,153	5,380	16.2	8.0					57.3	2.2		
**Lane Cove	6,846	5,671										
Leichhardt	14,966	9,448	9.6	4.3	8.8	0.7	13.4	1.0	7.5	2.1	6.9	0.3
Liverpool	47,694	9,486	21.9	13.2					54.3	6.5		
Maitland	23,052	1,324	15.9	3.8					19.0	0.3		
**Manly	9,000	8,700										
Marrickville	21,427	12,766	12.4	6.9	7.2	3.7	8.8	1.5	13.8	4.6	8.0	2.5
**Mosman	5,597	6,742										
Newcastle	49,386	8,868	15.5	7.3					39.7	3.4		
North Sydney	32,255	22,520	7.7	5.5					12.8	6.4		
*Parramatta	33,369	24,164										
Penrith	52,978	9,880	17.0						46.9			
**Pittwater	17,783	3,812										
Port Stephens	23,449	4,857	14.1						17.2			
Randwick	21,586	33,079	9.7	5.7	8.8	3.1	8.0		10.9	9.8	9.9	5.3
Rockdale	23,537	12,053	19.4	4.8	3.6	1.5			23.7	3.0	4.5	0.9
Ryde	24,469	15,337	10.5	2.1					13.4	1.7		
Shellharbour	22,848	0	14.8		5.3	2.9			17.6		6.3	
**Shoalhaven	41,251	2,849										
Strathfield	6,407	5,363	10.9	7.8					3.6	2.2		

Council	Number single unit dwellings (SUDs)	Number multi-unit dwellings (MUDs)	SUDs waste in kg/wk/ HH	MUDs waste in kg/wk/ HH	SUDs dry recycling in kg/wk/HH	MUDs dry recycling in kg/wk/HH	SUDs garden organics in kg/wk/HH	MUDs garden organics in kg/wk/HH	Projected annual SUDs residual waste/ kilo tonnes	Projected annual MUDs residual waste/ kilo tonnes	Projected annual SUDs dry recycling/kilo tonnes	Projected annual MUDs dry recycling/ kilo tonnes
Sutherland	59,999	19,697	10.6	7.3	4.5	2.0	5.5		32.9	7.5	14.0	2.0
Sydney City	27,208	57,005										
**Warringah	31,799	18,799										
Waverley	10,360	18,557	11.8	7.4	9.3	3.9	6.0	0.9	6.4	7.1	5.0	3.8
Willoughby	15,143	12,507	12.4	7.5	10.6	2.6			9.7	4.9	8.4	1.7
Wingecarribee	22,849	1,608	7.4						8.8			
Wollongong	53,122	21,564	10.3	3.4	7.0	1.6	12.4		28.5	3.8	19.2	1.8
Woollahra	10,799	14,913										
Wyong	49,908	8,600	8.8		6.4		8.8		22.9		16.6	

* Data acquired using variant Guideline methodology; SUD/MUD components could not be determined.

** Data acquired using old EPA methodology; SUD/MUD components could not be determined.

kg/wk/HH is kilograms per week per household

Table 6: Comparison of average, standard deviation, coefficient of variation and median values for total waste, residual waste, dry recycling and garden organics generation in 2007/08, 2007* and 2002** audits

Generation rates	GSR			SMA			ERA		
	2007/08	2007	2002	2007/08	2007	2002	2007/08	2007	2002
Average total waste in kg/wk/household	17.7	16.5	17.0	17.6	16.4	16.9	17.7	16.4	16.9
Standard deviation in kg/wk/household	6.6	5.1	1.4	6.9	5.1	1.4	5.9	4.6	2.0
Median of total waste in kg/wk/household	17.1			17.6			15.9		
Coefficient of variation (%) in total waste generation	37	31	7	39	31	8	33	28	12
Average residual waste in kg/wk/household	11.9	10.7	12.8	11.6	10.7	12.8	12.5	12.5	13.8
Standard deviation in kg/wk/household		3.1	1.1	3.9	4.0	1.1	3.3	3.1	1.3
Median of residual waste in kg/wk/household	10.4			10.2			13.7		
Coefficient of variation (%) in residual waste generation	1	34	7	33	37	8	27	25	10
Average recycling in kg/wk/household	5.8	5.8	4.5	5.6	5.8	4.5	6.3	3.9	4.9
Standard deviation in kg/wk/household	1.3	1.1	0.6	1.4	1.1	0.6	0.8	1.5	1.4
Median of recycling in kg/wk/household	6.1			6.0			6.6		
Coefficient of variation (%) in recycling generation	23	26	11	25	19	13	12	38	29
Average garden organics in kg/wk/household	8.2			7.8			9.9		
Standard deviation in kg/wk/household	2.8			2.8			2.2		
Median of garden organics in kg/wk/household	8.3			7.9			8.8		
Coefficient of variation (%) in garden organics generation	34			36			22		

* '2007 audit' was from audits conducted from February 2004 - September 2006

** '2002 audit' was from audits conducted prior to 2002

Table 7: Comparison of average, standard deviation, coefficient of variation values for residual waste, dry recycling and garden organics generation in SUDs and MUDs

Generation rates	SUDs waste in kg/wk/HH	MUDs waste in kg/wk/HH	SUDs dry recycling in kg/wk/HH	MUDs dry recycling in kg/wk/HH	SUDs garden organics in kg/wk/HH	MUDs garden organics in kg/wk/HH
GSR average in kg/wk/household	13.1	7.4	7.0	3.2	9.0	2.4
Standard deviation in kg/wk/household	3.8	3.2	1.7	1.8	2.4	3.3
GSR coefficient of variation (%)	29	43	24	56	27	139
SMA average in kg/wk/household	13.2	7.3	7.1	2.8	8.8	2.4
SMA standard deviation in kg/wk/household	4.0	2.9	1.9	1.4	2.5	3.3
SMA coefficient of variation (%)	30	39	27	49	29	139
ERA average in kg/wk/household	13.3	7.9	6.6	4.4	9.8	
ERA standard deviation in kg/wk/household	3.5	5.0	0.6	2.6	2.2	
ERA coefficient of variation (%)	27	64	10	60	22	
NRA average in kg/wk/household	11.1					

Table 8: Average composition profiles of residual waste in audited councils (% by weight)

Council	% Organic compostable (food)	% Organic compostable (non-food)	% Organic other	% Total paper	% Total glass	% Total plastic	% Total steel	% Total non-ferrous	% Total hazardous	% Total earth-based	% Total other & e-waste
Ashfield	42.70	15.37	3.15	17.19	2.82	9.86	1.76	0.67	2.73	2.06	1.69
Auburn	51.09	7.11	5.83	17.51	2.60	7.55	1.49	0.51	1.25	4.38	0.69
Bankstown	53.85	3.40	5.24	17.66	2.70	8.79	1.58	0.68	2.88	2.19	1.04
Baulkham Hills	37.85	11.30	4.80	20.53	2.64	10.97	2.59	0.50	2.38	4.39	2.05
Blacktown	30.38	21.23	4.98	17.03	3.75	7.08	3.79	0.49	0.87	9.52	0.88
Botany Bay	35.76	11.52	5.11	21.75	3.96	10.72	2.20	0.71	4.67	2.51	1.08
Burwood	51.15	5.42	4.10	18.38	3.26	10.05	1.49	0.46	1.03	3.49	1.16
Camden	46.15	9.05	5.54	18.52	3.24	7.66	2.45	0.33	1.07	5.33	0.69
Campbelltown	50.49	11.71	5.70	14.73	2.56	5.97	2.11	0.35	1.17	4.69	0.52
Canterbury	51.58	2.74	4.24	20.72	2.78	9.04	1.79	0.67	1.29	3.90	1.23
Cessnock	26.63	18.34	6.33	23.40	6.53	9.60	3.61	0.71	1.14	1.68	2.05
Canada Bay	55.62	3.66	4.52	16.31	4.13	7.10	1.48	0.31	1.12	5.37	0.38
Fairfield	31.61	32.14	5.66	13.20	3.14	5.88	1.60	0.47	0.74	5.09	0.47
Gosford	38.34	5.55	5.78	20.32	3.85	11.01	3.13	0.70	4.01	4.59	2.72
Groundswell	32.14	15.04	4.01	20.54	6.52	9.34	2.27	0.63	2.42	5.04	2.06
Hawkesbury	27.43	18.15	5.19	21.03	9.14	10.43	3.12	0.73	0.96	2.74	1.08
Holroyd	23.96	42.27	3.82	14.30	2.11	5.42	1.54	0.35	3.83	1.51	0.90
Hornsby	51.99	5.62	6.44	16.24	2.59	7.85	2.20	0.30	0.89	5.16	0.72
Hunters Hill	44.63	12.14	4.52	17.98	2.80	7.69	2.60	0.47	1.02	4.89	1.27
Hurstville	50.08	2.69	3.13	20.83	2.24	10.67	1.90	0.60	3.03	3.77	1.06
Kiama	39.14	2.80	5.16	19.05	5.75	15.43	3.61	1.63	0.40	6.43	0.61
Kogarah	49.91	2.60	4.47	20.68	2.43	11.15	1.72	0.66	2.45	2.49	1.43

Council	% Organic compostable (food)	% Organic compostable (non-food)	% Organic other	% Total paper	% Total glass	% Total plastic	% Total steel	% Total non-ferrous	% Total hazardous	% Total earth-based	% Total other & e-waste
Ku-ring-gai	59.09	4.69	4.73	11.43	2.10	7.06	2.42	0.24	1.17	6.69	0.44
Lane Cove	23.67	6.84	2.11	38.75	10.39	7.29	3.91	0.27	0.83	4.05	1.90
Lake Macquarie	25.08	25.43	6.25	16.09	5.28	7.22	2.09	0.44	4.72	5.43	1.97
Leichhardt	43.24	6.57	4.81	23.01	3.05	10.81	1.90	0.47	1.37	2.77	2.02
Liverpool	27.99	27.77	5.04	16.42	4.09	6.33	2.00	0.50	0.62	8.23	1.02
Maitland	25.79	29.00	4.60	18.56	5.11	8.35	2.60	0.82	0.53	2.04	2.58
Manly	38.79	1.73	4.09	21.18	3.51	16.53	2.70	1.20	1.34	6.30	2.61
Marrickville	43.95	6.81	5.32	21.36	4.08	9.62	2.27	0.43	1.33	2.94	1.89
Mosman	38.73	3.12	3.87	21.52	5.93	15.40	3.45	0.90	1.30	2.87	2.90
Newcastle	30.73	24.86	4.48	16.68	4.97	8.63	2.65	0.49	1.86	2.60	2.05
North Sydney	46.90	9.11	3.79	19.64	2.78	9.49	1.62	0.33	2.80	2.73	0.80
Parramatta	43.45	2.29	4.86	22.38	3.25	14.30	2.60	0.52	2.52	1.54	2.29
Penrith	30.59	22.40	5.81	17.21	3.60	7.70	2.15	0.52	1.55	7.37	1.10
Pittwater	39.09	5.89	4.66	17.83	4.32	15.45	3.24	1.08	2.80	3.68	1.96
Port Stephens	25.98	32.28	6.26	13.97	3.78	7.61	2.20	0.92	1.42	4.20	1.38
Randwick	38.45	5.18	3.84	25.18	4.17	12.29	2.15	0.72	2.21	1.69	4.13
Rockdale	31.88	19.86	4.61	19.04	3.54	8.14	1.48	0.54	4.27	4.44	2.21
Ryde	48.17	6.08	4.23	18.33	2.44	9.33	2.00	0.54	1.90	6.21	0.78
Shellharbour	46.12	11.87	4.89	16.53	4.37	8.49	1.73	0.49	1.49	2.85	1.16
Shoalhaven	30.17	14.08	5.27	18.72	5.02	11.23	2.99	0.27	2.38	7.15	2.71
Strathfield	47.42	6.50	3.43	21.19	3.31	10.93	1.86	0.46	2.09	0.77	2.05
Sutherland	42.62	5.81	4.72	20.53	3.72	12.35	2.41	0.61	2.52	3.45	1.28
Sydney City	36.56	4.34	4.02	26.27	8.61	12.46	2.11	0.44	1.12	0.79	3.27
Warringah	39.24	3.75	3.67	21.67	4.42	16.48	2.45	1.20	0.91	4.54	1.67

Council	% Organic compostable (food)	% Organic compostable (non-food)	% Organic other	% Total paper	% Total glass	% Total plastic	% Total steel	% Total non-ferrous	% Total hazardous	% Total earth-based	% Total other & e-waste
Waverley	42.11	3.97	3.95	26.54	3.95	12.14	2.55	0.66	1.28	1.43	1.43
Willoughby	49.48	5.01	5.95	18.88	3.44	9.86	1.46	0.78	1.97	0.93	2.24
Wingecarribee	54.19	5.24	4.88	15.53	2.86	9.43	2.77	0.29	0.94	3.20	0.67
Wollongong	38.87	7.11	4.54	20.35	4.29	11.30	3.40	0.67	4.37	2.74	2.35
Woollahra	39.94	4.59	4.94	25.97	6.60	12.06	2.18	0.57	0.87	1.70	0.57
Wyong	38.20	4.96	5.42	23.58	4.32	11.14	3.78	1.01	2.89	2.26	2.44
Average	40.17	11.10	4.74	19.66	4.09	9.97	2.37	0.60	1.90	3.85	1.57
Standard deviation	9.38	9.50	0.90	4.25	1.75	2.74	0.69	0.27	1.13	1.98	0.83
Coefficient of variation (%)	23	86	19	22	43	28	29	45	60	52	53

Table 9: Average composition profiles of dry recycling in audited councils (% by weight)

Council	% Recyclable paper	% Recyclable glass	% Recyclable plastic	% Recyclable steel	% Recyclable aluminium	% Organic compostable	% Other organics	% Non-recyclable paper	% Non-recyclable glass	% Non-recyclable plastic	% Total other
Ashfield	59.53	26.51	7.76	2.63	0.45	0.99	0.27	0.57	0.61	0.00	0.67
Baulkham Hills	63.11	23.06	7.19	1.19	0.58	0.50	1.17	0.75	0.65	0.25	1.56
Blacktown	55.09	23.16	7.00	1.90	0.81	4.36	1.42	1.75	1.43	1.02	2.06
Botany Bay	60.70	28.04	6.45	0.86	0.34	0.16	0.24	2.13	0.23	0.55	0.31
Burwood	59.24	20.94	9.20	1.90	0.48	1.01	1.39	2.19	0.81	0.28	2.57
Canterbury	55.58	22.17	8.67	1.91	0.72	1.72	1.04	0.71	0.33	0.05	7.10
Canada Bay	61.73	25.22	5.09	1.33	0.28	1.15	0.50	1.88	0.58	0.52	1.70
Gosford	62.83	24.26	6.32	2.12	0.67	1.87	0.47	0.13	0.04	0.18	1.10
Hawkesbury	51.65	24.60	7.91	1.64	1.07	3.54	2.13	1.45	0.96	0.05	5.01
Hornsby	64.63	23.77	5.33	1.53	0.40	0.70	0.75	1.37	0.23	0.51	0.80
Hurstville	63.87	20.30	6.67	1.54	0.36	1.75	1.19	2.49	0.05	0.03	1.73
Kiama	51.40	35.01	6.31	2.09	0.94	1.18	0.91	0.75	0.35	0.20	0.86
Kogarah	62.69	21.79	8.07	1.61	0.98	0.50	1.70	0.92	0.74	0.15	0.86
Lane Cove	85.74	8.78	1.67	0.52	0.08	0.59	0.11	1.71	0.14	0.00	0.66
Leichhardt	62.46	27.40	5.97	1.65	0.46	0.40	0.07	0.41	0.36	0.27	0.55
Liverpool	61.38	24.58	8.18	1.59	0.79	1.20	0.17	0.53	0.34	0.41	0.83
Marrickville	57.59	31.61	6.07	1.45	0.61	0.72	0.59	0.34	0.13	0.00	0.89
Randwick	54.06	34.43	5.44	1.32	0.42	0.80	0.79	1.01	0.13	0.24	1.37
Rockdale	55.75	25.20	8.32	2.04	0.40	3.20	1.08	1.46	0.30	0.05	2.21
Shellharbour	53.47	30.65	7.85	2.85	0.85	1.45	0.43	0.76	0.27	0.27	1.15
Sutherland	59.17	30.03	5.71	1.93	0.42	0.93	0.14	1.21	0.11	0.01	0.33
Sydney City	53.50	29.27	5.94	1.51	0.15	5.43	0.95	1.40	0.02	0.44	1.39

Council	% Recyclable paper	% Recyclable glass	% Recyclable plastic	% Recyclable steel	% Recyclable aluminium	% Organic compostable	% Other organics	% Non-recyclable paper	% Non-recyclable glass	% Non-recyclable plastic	% Total other
Waverley	63.67	26.03	5.60	1.05	0.24	0.98	0.16	1.27	0.27	0.01	0.73
Willoughby	61.77	26.66	5.19	1.86	0.33	0.87	0.81	0.47	0.60	0.25	1.19
Wollongong	50.24	37.44	6.18	1.94	0.62	0.30	0.69	0.92	0.04	0.34	1.28
Woollahra	62.31	28.65	5.76	0.85	0.08	1.32	0.33	0.12	0.26	0.08	0.23
Wyong	52.98	32.52	7.04	2.45	0.77	1.11	1.09	0.81	0.36	0.06	0.82
Average	59.49	26.37	6.55	1.68	0.53	1.43	0.76	1.09	0.38	0.23	1.48
Standard deviation	6.87	5.66	1.51	0.53	0.27	1.27	0.53	0.64	0.33	0.23	1.47
Coefficient of variation (%)	12	21	23	32	51	88	70	59	85	102	99

Table 10: Average composition profiles of garden organics in audited councils (% by weight)

Council	% Garden & vegetation	% Organic compostable (food)	% Total other organics	% Total paper	% Total glass	% Total plastic	% Total ferrous	% Total non-ferrous	% Total hazardous	% Total earth-based	% Total other & e-waste
Ashfield	99.32	0.41	0.05	0.04	0.02	0.08	0.00	0.00	0.09	0.00	0.00
Auburn	96.67	0.47	0.85	0.42	0.06	0.19	0.03	0.01	0.56	0.70	0.05
Baulkham Hills	98.58	0.24	0.48	0.13	0.04	0.09	0.01	0.00	0.00	0.41	0.00
Botany Bay	97.94	0.11	0.20	0.44	0.12	0.89	0.06	0.04	0.01	0.20	0.01
Burwood	98.23	0.95	0.34	0.27	0.00	0.12	0.00	0.00	0.00	0.05	0.03
Canterbury	98.84	0.05	0.77	0.12	0.02	0.16	0.00	0.01	0.03	0.00	0.00
Canada Bay	93.70	0.72	2.74	0.13	0.01	0.09	0.03	0.00	0.01	2.56	0.00
Gosford	97.40	0.09	2.20	0.15	0.03	0.08	0.03	0.00	0.00	0.01	0.01
Hurstville	98.54	0.05	1.22	0.03	0.00	0.01	0.00	0.00	0.00	0.15	0.00
Lane Cove	81.30	18.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leichhardt	97.65	0.03	0.08	0.01	0.00	0.02	0.00	0.00	0.00	2.21	0.00
Marrickville	96.93	0.03	0.22	0.02	0.00	0.06	0.02	0.00	0.00	2.64	0.09
Randwick	96.52	0.07	1.44	0.52	0.08	0.32	0.02	0.00	0.00	0.86	0.18
Sutherland	97.19	0.49	2.32	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sydney City	99.90	0.00	0.00	0.04	0.05	0.01	0.00	0.00	0.00	0.00	0.00
Waverley	99.72	0.00	0.00	0.11	0.00	0.12	0.00	0.00	0.00	0.05	0.00
Wollongong	97.16	0.16	1.39	0.37	0.01	0.35	0.01	0.01	0.00	0.27	0.28
Woollahra	99.85	0.11	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Wyong	91.73	0.18	5.35	0.01	0.01	0.19	0.02	0.00	0.00	2.50	0.01
Average	96.69	1.20	1.03	0.15	0.02	0.15	0.01	0.004	0.037	0.66	0.04
Standard deviation	4.25	4.25	1.36	0.17	0.03	0.20	0.02	0.009	0.130	1.00	0.07
Coefficient of variation (%)	4	353	131	114	141	140	129	212	349	150	210

Table 11: Comparison of GSR, SMA and ERA residual waste bin composition profiles

Waste categories	GSR			Sydney Metropolitan Area (SMA)			Extended Regulated Area (ERA)		
	Average % by weight	Standard deviation	Coefficient of variation	Average % by weight	Standard deviation	Coefficient of variation	Average % by weight	Standard deviation	Coefficient of variation
Organic compostable (food)	40.3	9.4	23	42.4	8.7	21	34.4	9.0	26
Organic compostable (non-food)	11.0	9.5	86	9.5	9.1	95	15.4	10.1	66
Organic other	4.8	0.9	19	4.6	0.9	20	5.3	0.7	12
Total paper	19.6	4.2	22	19.9	4.7	23	18.8	3.0	16
Total glass	4.0	1.8	43	3.7	1.7	45	5.0	1.6	31
Total plastic	10.0	2.7	27	10.0	3.0	30	10.0	2.2	22
Total steel	2.4	0.7	29	2.2	0.6	28	2.9	0.6	22
Total non-ferrous	0.6	0.3	45	0.6	0.2	41	0.7	0.4	50
Total hazardous	1.9	1.1	60	1.8	1.0	56	2.1	1.5	71
Total earth-based	3.8	2.0	52	3.8	2.1	56	3.7	1.7	47
Total other & e-waste	1.6	0.8	53	1.5	0.8	58	1.8	0.8	42
Potentially recyclable materials (%)	**23.0**			**22.0**			**25.6**		

Table 12: Comparison of overall, SUD and MUD residual waste bin composition profiles

Waste category	Overall			Single Unit Dwelling (SUD)			Multi Unit Dwelling (MUD)		
	Average % by weight	Standard deviation	Coefficient of variation (%)	Average % by weight	Standard deviation	Coefficient of variation (%)	Average % by weight	Standard deviation	Coefficient of variation (%)
Organic compostable (food)	40.2	9.3	23	41.0	10.0	24	42.9	7.7	18
Organic compostable (non-food)	11.1	9.5	86	12.7	8.2	65	6.1	4.3	71
Organic other	4.7	0.9	19	4.9	0.9	17	4.5	4.2	93
Total paper	19.7	4.2	22	18.4	3.1	17	22.1	4.9	22
Total glass	4.1	1.8	43	3.4	1.5	43	5.1	2.4	47
Total plastic	10.0	2.7	27	9.2	2.2	24	10.4	2.5	24
Total steel	2.4	0.7	29	2.2	0.6	29	1.9	0.8	42
Total non-ferrous	0.6	0.3	45	0.6	0.2	41	0.5	0.3	52
Total hazardous	1.9	1.1	60	2.0	1.4	68	1.8	2.1	114
Total earth-based	3.8	2.0	52	3.9	2.0	52	3.2	6.7	210
Total other & e-waste	1.6	0.8	53	1.5	1.0	69	1.4	1.1	80
Potentially recyclable materials (%)	**23.0**			**20.9**			**27.1**		

Table 13: Comparison of GSR, SMA and ERA dry recycling bin composition profiles

Waste category	GSR			SMA			ERA		
	Average % by weight	Standard deviation	Coefficient of variation	Average % by weight	Standard deviation	Coefficient of variation	Average % by weight	Standard deviation	Coefficient of variation
Recyclable paper	59.5	6.9	12	61.1	6.6	11	53.8	4.6	9
Recyclable glass	26.4	5.7	21	25.1	5.2	21	30.7	5.4	18
Recyclable plastic	6.6	1.5	23	6.4	1.7	26	6.9	0.8	11
Recyclable steel	1.7	0.5	32	1.5	0.5	31	2.2	0.4	19
Recyclable aluminium	0.5	0.3	51	0.5	0.2	53	0.8	0.2	20
Organic compostable	1.4	1.3	88	1.4	1.3	96	1.6	1.1	69
Other organics	0.8	0.5	70	0.7	0.5	71	1.0	0.6	66
Non-recyclable paper	1.1	0.6	59	1.2	0.7	57	0.8	0.4	52
Non-recyclable glass	0.4	0.3	85	0.4	0.3	84	0.3	0.3	99
Non-recyclable plastic	0.2	0.2	102	0.2	0.3	107	0.2	0.1	62
Total other	1.5	1.5	99	1.4	1.5	103	1.7	1.6	96
Contamination level (%)	**5.4**			**5.3**			**5.6**		

Table 14: Comparison of GSR, SUD and MUD dry recycling bin composition profiles

Waste category	GSR			SUD			MUD		
	Average % by weight	Standard deviation	Coefficient of variation (%)	Average % by weight	Standard deviation	Coefficient of variation (%)	Average % by weight	Standard deviation	Coefficient of variation (%)
Recyclable paper	59.5	6.9	12	58.9	5.0	9	59.0	9.4	16
Recyclable glass	26.4	5.7	21	26.9	4.6	17	26.1	9.3	36
Recyclable plastic	6.6	1.5	23	6.8	0.9	14	6.6	1.0	15
Recyclable steel	1.7	0.5	32	1.7	0.5	32	1.7	0.8	49
Recyclable aluminium	0.5	0.3	51	0.6	0.3	49	0.5	0.3	70
Organic compostable	1.4	1.3	88	1.1	1.1	94	2.4	2.8	117
Other organics	0.8	0.5	70	0.7	0.5	73	1.0	1.5	146
Non-recyclable paper	1.1	0.6	59	1.1	0.7	67	1.4	1.7	120
Non-recyclable glass	0.4	0.3	85	0.4	0.4	93	0.2	0.2	106
Non-recyclable plastic	0.2	0.2	102	0.2	0.3	113	0.2	0.3	137
Total other	1.5	1.5	99	1.6	0.3	16	1.0	0.2	21
Contamination level (%)	**5.4**			**5.1**			**6.2**		

Table 15: GSR, SMA and ERA garden organics bin composition profiles

Waste category	GSR % by weight	Standard deviation	Coefficient of variation (%)	SMA % by weight	Standard deviation	Coefficient of variation (%)	ERA % by weight	Standard deviation	Coefficient of variation (%)
Garden & vegetation	96.69	4.25	4	96.93	4.46	5	95.43	3.21	3
Organic compostable (food)	1.20	4.25	353	1.40	4.62	330	0.14	4.62	3228
Total other organics	1.03	0.61	59	0.67	0.34	50	2.98	1.30	44
Total paper	0.15	0.17	114	0.14	0.17	120	0.18	0.18	103
Total glass	0.02	0.03	141	0.03	0.04	142	0.01	0.01	82
Total plastic	0.15	0.21	140	0.14	0.22	160	0.21	0.14	66
Total ferrous	0.01	0.02	129	0.01	0.02	154	0.02	0.01	41
Total non-ferrous	0.00	0.00		0.00	0.01	218	0.00	0.00	149
Total hazardous	0.04	0.13	349	0.04	0.14	322	0.00	0.00	0
Total earth-based	0.66	0.99	150	0.61	0.96	157	0.92	1.37	148
Total other & e-waste	0.03	0.07	210	0.02	0.05	209	0.10	0.15	156
Contamination level (%)	**3.31**			**3.07**			**4.57**		

Table 16: Comparison of residual waste composition profiles in the GSR from 2007/08 and 2007 audits

Waste category	2007 Average % by weight	2007/08 Average % by weight	% Change in component composition
Organic compostable (food)	37.1	40.3	9
Organic compostable (non-food)	10.4	11.0	6
Other organic, non-wood	3.1	3.4	10
Wood/timber products	0.9	1.3	44
Total organics (%)	**51.5**	**56.0**	**9**
Recyclable paper	7.9	8.7	10
Recyclable glass	4.6	3.6	-22
Recyclable plastic	8.6	8.7	1
Recyclable steel	2.7	1.5	-44
Recyclable aluminium	0.6	0.5	-17
Potentially dry recyclable materials (%)	**24.4**	**23.0**	**-6**
Non-recyclable paper	10.2	10.9	7
Non recyclable plastic	2.4	1.3	-46
Non-recyclable glass	-	0.5	-
Total hazardous	1.5	1.9	27
Total earth-based	3.7	3.8	3
Total other & e-waste	-	1.6	-
Total other	6.3	1.0	-84
General waste (%)	**24.1**	**21.0**	**-13**

Table 17: Comparison of recycling composition profiles in the GSR from 2007/08 and 2007 audits

Waste category	2007 Overall % by weight	2007/08 Overall % by weight	% Change in component composition
Recyclable paper	55.0	59.5	8
Recyclable glass	27.2	26.4	-3
Recyclable plastic	6.8	6.6	-3
Recyclable ferrous	3.0	1.7	-43
Recyclable aluminium	1.2	0.5	-54
Dry recyclable materials (%)	**93.2**	**94.6**	**2**
Organic compostable (non-food)	0.3	0.3	0
Other organic, non-wood	0.4	0.5	38
Wood/timber products	0.2	0.2	0
Organic compostable (food)	0.8	1.1	38
Non-recyclable paper	2.7	1.1	-59
Non-recyclable plastic	0.4	0.2	-50
Total hazardous	0.1	0.3	200
Total earth-based	0.2	0.3	50
Total other	1.7	1.3	-21
Contamination level (%)	**6.8**	**5.4**	**-21**

Table 18: Comparison of residual waste composition profiles for councils with and without a garden organics service

Waste category	Average % by weight in councils with no garden organics service	Average % by weight in councils with garden organics service
Organic compostable (food)	30.4	43.7
Organic compostable (garden/vegetation)	22.1	4.5
Organic compostable (other)	2.2	2.0
Organic other	5.2	4.6
Total paper	16.9	20.6
Total glass	4.1	4.0
Total plastic	7.9	10.7
Total steel	2.4	2.4
Total non-ferrous	0.5	0.6
Total hazardous	1.9	1.9
Total earth-based	4.8	3.5
Total other & e-waste	1.5	1.6

Table 19: Summary of calculated parameters of % recyclable materials in residual waste, % contamination in dry recycling and garden organics, % resource recovery and % diversion rates

Council	% Potentially dry recyclable materials in residential waste bins	% Contamination in dry recycling bins	% Contamination in garden organics bins	% Resource Recovery (waste + recycling)[1]	% Resource Recovery (waste + recycling + garden organics)[2]	%Diversion (waste + recycling)[3]	% Diversion (waste + recycling + garden organics)[4]
Ashfield	20.0	3.1	0.7	71.3	85.3	33.8	54.2
Auburn	17.5		3.3		79.8		41.8
Bankstown	15.2						
Baulkham Hills	20.1	4.9	1.4	71.4	87.5	34.6	59.1
Blacktown	20.7	12.0		61.4		27.2	
Botany Bay	24.5	3.6	2.1	44.3	83.7	16.8	56.2
Burwood	19.5	8.2	1.8	71.6	85.5	34.9	54.7
Camden	17.2						
Campbelltown	14.0						
Canada Bay	19.9	6.3	6.3	78.0	88.7	43.0	62.5
Canterbury	19.9	10.9	1.2	66.6	86.2	30.8	56.6
Cessnock	33.4						
Fairfield	16.7						
Gosford	21.6	3.8	2.6	76.1	87.4	41.6	60.0
Hawkesbury	33.9	13.1		49.1		27.3	
Holroyd	12.4						
Hornsby	18.1	4.4		78.7		41.1	
Hunters Hill	18.5						
Hurstville	19.3	7.3	1.5	74.9	88.3	38.3	59.6
Kiama	38.4	4.2		65.1		42.8	

1 See formula in section 2.2.3
2 See formula in section 2.2.3
3 See formula in section 2.2.3
4 See formula in section 2.2.3

Council	% Potentially dry recyclable materials in residential waste bins	% Contamination in dry recycling bins	% Contamination in garden organics bins	% Resource Recovery (waste + recycling)[1]	% Resource Recovery (waste + recycling + garden organics)[2]	%Diversion (waste + recycling)[3]	% Diversion (waste + recycling + garden organics)[4]
Kogarah	18.3	4.9	0.7				
Ku-ring-gai	15.0						
Lake Macquarie	23.2						
Lane Cove	45.3	3.2	18.7	20.3	28.2	19.0	23.2
Leichhardt	22.2	2.1	2.3	79.5	89.0	46.8	64.0
Liverpool	20.8	3.5		59.3		23.0	
Maitland	25.3						
Manly	22.5						
Marrickville	20.9	2.7	3.1	72.6	85.6	36.3	55.2
Mosman	31.1						
Newcastle	26.4						
North Sydney	20.5						
Parramatta	26.2						
Penrith	22.2						
Pittwater	24.7						
Port Stephens	21.4						
Randwick	24.3	4.3	3.5	75.3	87.7	43.7	64.3
Rockdale	19.3	8.3		50.2		17.5	
Ryde	19.7						
Shellharbour	23.1	4.3		59.3		26.0	
Shoalhaven	18.6						
Strathfield	22.6						
Sutherland	23.4	2.7	2.8	77.0	85.1	44.6	57.2

1 See formula in section 2.2.3
2 See formula in section 2.2.3
3 See formula in section 2.2.3
4 See formula in section 2.2.3

Council	% Potentially dry recyclable materials in residential waste bins	% Contamination in dry recycling bins	% Contamination in garden organics bins	% Resource Recovery (waste + recycling)[1]	% Resource Recovery (waste + recycling + garden organics)[2]	%Diversion (waste + recycling)[3]	% Diversion (waste + recycling + garden organics)[4]
Sydney City	33.9	9.6	0.1				
Warringah	25.3						
Waverley	26.3	3.4	0.3	71.9	80.3	41.1	52.3
Willoughby	23.5	4.2		74.2		41.3	
Wingecarribee	21.0						
Wollongong	21.6	3.6	2.8	74.3	90.3	39.2	66.3
Woollahra	34.2	2.3	0.2				
Wyong	25.4	4.3	8.3	73.2	86.3	42.0	63.2
Average GSR	22.9	5.4	3.2	66.5	82.6	34.7	55.9
Standard deviation	6.3	3.0	4.2	13.9	14.3	9.1	10.2
Median overall	21.6	4.3	2.2	71.7	86.2	37.3	57.2
Coefficient of variation (%) Overall	27	57	131	21	17	26	18
Average SMA	22.0	5.3	2.9	66.6	81.5	34.1	54.4
Standard deviation	6.1	2.9	4.3	15.1	15.6	9.7	10.6
Median SMA	20.7	4.3	1.8	71.7	85.5	35.6	56.4
Coefficient of variation (%) SMA	28	55	148	23	19	28	19
Average ERA	26.0	5.6	4.6	66.2	88.0	36.5	63.1
Standard deviation	6.1	3.7	3.2	10.5	2.1	7.7	3.1
Median ERA	24.3	4.3	2.8	69.1	87.4	40.4	63.2
Coefficient of variation (%) ERA	23	67	71	16	2	21	5
Groundswell	27.8						

1 See formula in section 2.2.3
2 See formula in section 2.2.3
3 See formula in section 2.2.3
4 See formula in section 2.2.3

APPENDIX A
Sample sizes in audits

Audit sample sizes used by councils in the residual waste, dry recycling and garden organics bins

Council	Residual waste/number households	Recycling/number households	Garden organics/number households
Ashfield	286	183	93
Auburn	260	0	350
Bankstown	261	0	0
Baulkham Hills	261	172	177
Blacktown	350	355	0
Botany Bay	259	402	103
Burwood	299	186	170
Camden	260	0	0
Campbelltown	260	0	0
Canada Bay	370	352	350
Canterbury	284	182	138
Cessnock	258	0	0
Fairfield	260	0	0
Gosford	257	127	130
Groundswell	260	0	0
Hawkesbury	275	350	0
Holroyd	260	0	0
Hornsby	426	416	0
Hunters Hill	260	0	0
Hurstville	270	186	175
Kiama	256	346	0
*Kogarah	173+MUD numbers	116+MUD numbers	145
Ku-ring-gai	278	0	0
Lake Macquarie	260	0	0
Lane Cove	320	500	50
Leichhardt	259	304	224
Liverpool	439	320	0
Maitland	260	0	0
Manly	212	0	0
Marrickville	270	175	117
Mosman	206	0	0
Newcastle	260	0	0
North Sydney	260	0	0
Parramatta	252	0	0
Penrith	260	0	0

Council	Residual waste/number households	Recycling/number households	Garden organics/number households
Pittwater	377	0	0
Port Stephens	260	0	0
Randwick	260	160	92
Rockdale	295	192	0
Ryde	295	0	0
Shellharbour	260	350	0
Shoalhaven	191	0	0
Strathfield	262	0	0
Sutherland	273	175	137
*Sydney City	72+MUD numbers	148+MUD numbers	43+MUD numbers
Warringah	320	0	0
Waverley	264	325	43
Willoughby	260	187	0
Wingecarribee	259	0	0
Wollongong	259	173	141
*Woollahra	134+MUD numbers	154+MUD numbers	63+MUD numbers
Wyong	257	128	131
**Total households	13560	6246	2766

* Data from these council areas were only used for compositional analysis of all three waste collection systems and contamination levels in recycling and garden organics collection systems.

** does not include household numbers from councils marked with *.

APPENDIX B
Audit waste components

List of materials audited

AWD Code	Material type	Material items
	PAPER	
A01	Newspaper	Newspapers, newspaper like pamphlets
A02	Magazines, brochures	Magazines (glossy and non-glossy), pamphlets,
A03	Miscellaneous packaging	Wrapping paper, labels, paper packaging (no plastic or wax coatings)
A04	Corrugated cardboard	Cardboard with corrugation
A05	Package board	Cardboard without corrugation (glossy and non glossy), cereal boxes, business cards
A06	Liquid paper containers	Soy milk cartons, some fruit juice cartons, UHT/long life milk
A07	Disposable paper product	Hand towels, tissues, coffee cups, paper napkins, paper food bags (unsoiled)
A08	Printing, writing and office paper	A4 document paper, writing pads, letters, envelopes, books
A09	Composite (mostly paper)	Composite paper items where the weight of the paper is estimated to be greater than the weight of the other materials
A90	Nappies	Used disposable nappies
A092	Contaminated soiled paper	Paper not suitable for recycling, mixed and other paper, used tissues, soiled paper
	ORGANIC (COMPOSTABLES)	
B01	Food and kitchen	Vegetable scraps, meat scraps, animal food, left over food
B02	Garden and vegetation	Grass clippings, tree trimmings/prunings, flowers, tree wood (<20mm)
B03	Other putrescible	Animal excrement, mixed compostable items, cellophane
	OTHER ORGANIC	
C01	Wood and timber	Milled wood/timber, children's wooden toys, wooden skewers, garden tree (>20mm)
C02	Organic – textile, rags, carpet	Wool, cotton and natural fibre materials
C03	Leather	Leather clothing, craft leather, some shoes, belts with belt buckle
C04	Rubber	Rubber bands, rubber toys, shoes, latex gloves
C05	Oils	Used car oil, motor and other, vegetable, cooking oil
	GLASS	
D01	Recyclable glass	Beer bottles, wine bottles, food and sauce jars other than clear, green or brown
D0121	Glass Packaging containers clear	Beer bottles, wine bottles, food and sauce jars (clear glass)
D0122	Glass Packaging containers green	Beer bottles, wine bottles, food and sauce jars (green glass)
D0123	Glass packaging containers brown and blue	Beer bottles, wine bottles, food and sauce jars (amber/brown glass)
D050	Mixed glass fines	Mixed Glass or Glass fines <4.75mm - non recyclable
D02	Miscellaneous and other glass	Plate glass (window and windscreen), Pyrex, corning ware, light globes, laboratory and medical glass, white opaque glass (e.g Malibu alcohol bottles)

AWD Code	Material type	Material items
	PLASTIC	
E01	PET #1	(Polyethylene) soft drink bottles, juice bottles, some food containers (e.g. jam & sauce bottles), mouthwash containers, peanut butter jars
E02	HDPE #2	(High Density Polyethylene) milk and cream bottles, shampoo and cleaner bottles
E03	PVC #3	(Polyvinyl Chloride) clear cordial and juice bottles, blister packs, plumbing pipes and fittings
E04	LDPE #4	(Low Density Polyethylene) ice cream container lids, cream bottle lids, squeeze bottles, lids, poly pipe, black mulch film, plant nursery bags, builders black plastic, bread bags
E05	Polypropylene #5 (Polypropylene)	Ice cream containers, drinking straws, plant pots, some bottle caps, microwave oven ware, plastic garden settings, potato crisp bags, compost bins, worm farms
E06	Polystyrene #6 (Polystyrene and expanded polystyrene)	Yoghurt/sour cream containers, plastic cutlery, imitation crystal glassware, clothes pegs, coat hangers, office accessories, video/CD boxes, hot drink cups, take away containers, meat trays, packaging foam
E07	Other plastic	Tupperware, mixed unidentifiable plastics, low cost brittle toys, all other resins and multi-blend plastic materials, synthetic textiles, all other containers
E071	Foams	Foam
E072	Plastic bags	Plastic shopping bags
E073	Film	Film, office film, cling film
E08	Composite (mostly plastic)	Cigarette butts, composite plastic items where the weight of the plastic is estimated to be greater than the other material items
	FERROUS	
F01	Steel Packaging food & pet cans	Food cans, pet food cans, tins
F011	Steel aerosols	Aerosol cans
F012	Steel paint cans	Empty paint tins
F03	Composite (mostly ferrous)	Beer bottle tops, Jar lids, composite ferrous items where the weight of the ferrous metal is estimated to be greater than the other material items
F02	Other (specify)	100% ferrous items that are not cans/tins/packaging materials, any other steel
	NON-FERROUS	
G01	Aluminium	Beer and soft drink cans, clean foil
G03	Composite (mostly non-ferrous)	Composite non-ferrous metal items where the weight of the metal is estimated to be greater than the other material items
G02	Other (specify)	Copper/brass/bronze items, other metals (not ferrous/ aluminium)
	HAZARDOUS	
H01	Paint	Paint (dry or wet)
H02	Fluorescent tubes *	Fluorescent tubes; compact fluorescent lamps (CFLs)
H03	Dry cell batteries *	Common batteries, AAA, AA etc, single use or rechargeable
H04	Car batteries *	Car batteries
H05	Household chemicals	Bleach, shampoo, cleaning products, unused medical pills
H06	Asbestos/building materials	Asbestos or building materials not earth based or wood

AWD Code	Material type	Material items
H07	Clinical (medical)	Sharps, human tissue, bulk bodily fluids and blood, any blood stained disposable material or equipment
	Gas bottles *	Gas bottles
	Hazardous other	Any other hazardous material
	EARTH BASED	
I01	Ceramics	Cups, bowls, pottery items
I02	Dust/dirt/rock/inert	Vacuum bag contents, soil, rocks, dirt, concrete, plasterboard
I03	Ash/earth based	Ash
	OTHER & E-WASTE	
Q53	Other household items	Other household items, candles, candle wax, cosmetics
Y57	Toner cartridges *	Printer and toner cartridges
	Computer parts *	Keyboard, monitor, cables, printers etc.
	Electrical items *	Toaster, radio, ipod, gameboys, stereos, speakers, TVs, VCR, DVD players, small electrical, power tools, wiring and cables
	Mobile phones *	Mobile phones
XX00	Other	Other please specify

* Part of bin items count; number of items are counted for this category