

# Rethinking Rubbish and Recycling

Prepared for WasteMINZ TAO Forum

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## 1. INTRODUCTION

The WasteMINZ Territorial Authorities Officers Forum (TAO Forum) was established to create consistency and efficiency of service amongst territorial authorities through sharing knowledge and best practice. In 2019, the TAO Forum received funding from the Ministry for the Environment's Waste Minimisation Fund to undertake a two-year behaviour change campaign to reduce contamination in household kerbside recycling and to promote resource reuse and reduction messages.

The first stage of this research was an audit of domestic kerbside rubbish and recycling, at a number of locations across New Zealand. The purpose of the audit was to gather baseline information on recyclable materials that are disposed of by households via both domestic kerbside rubbish and recycling collections.

Research into domestic kerbside rubbish and recycling had never been undertaken at this scale in New Zealand before, and the audit provides important data that would inform future behaviour change programmes.

In May 2019, Sunshine Yates Consulting Limited (SYCL) was contracted to undertake these audits.

The research programme described in this report was designed to address questions relating to the implementation of a container return scheme in New Zealand and to understand more fully the opportunities for on-shore recycling of plastic and fibre in New Zealand. WasteMINZ also sought to gather information on the proportion of recyclable materials that were being disposed of through domestic kerbside rubbish collections (missed capture), and the quantity and types of contamination in domestic kerbside recycling bins.

Between June 2019 and October 2019, 25 days of auditing of domestic kerbside rubbish and recycling were undertaken at five locations around New Zealand and included rubbish and recycling from eight territorial authorities.

Altogether, the audit included rubbish from 652 households and recycling from 708 households, in Auckland, Dunedin, Gore, Invercargill, Hutt City, Milton (Clutha District), Whangarei, and Winton (Southland District).

The results of these audits are presented in this report.

## 2. METHODOLOGY

### 2.1. Overview

In the Project Brief, WasteMINZ outlined the project's key outcomes as:

1. Total tonnages of domestic kerbside rubbish and recycling, broken down by reporting categories recommended by the Ministry for the Environment's Solid Waste Analysis Protocol 2002 (SWAP).
2. A more detailed analysis of tonnages and types of plastic sent to landfill through domestic kerbside collections and tonnages and types of plastic recycled through household kerbside collection.
3. A more detailed analysis of tonnages and types of fibre sent to landfill through domestic kerbside collection and tonnages and types of fibre recycled through household kerbside collection.
4. Tonnages and count of containers that could be included in a container return scheme (CRS).
5. Missed capture by tonnage and count (i.e. items put in the general rubbish that are accepted for recycling locally)
6. Contamination (i.e. items put in the recycling that are not considered acceptable by local recycling operators)
7. For both missed capture and contamination, an analysis on a per household basis looking at desired behaviour.

This project has attempted to gather the above data, within the limitations of the methodology described in the following sections.

### 2.2. Framing Workshops

Framing workshops were planned between SYCL and WasteMINZ' TAO Forum before and after a one-day Auckland trial audit, to ensure that the methodology used for the trial was agreed by all parties, and to adjust the methodology as required before the bulk of the auditing was undertaken.

As it was not possible to bring all members of the TAO Forum together for a workshop, several teleconferences were held, with members of the TAO Forum, WasteMINZ, the Ministry for the Environment (MfE) and SYCL.

During these teleconferences, agreement was reached on key aspects of the project plan and methodology, including the territorial authority areas that would be included in the project to best reflect the range of rubbish and recycling collection systems in New Zealand.

Prior to the trial audit in Auckland, initial agreement was reached on the categories that would be used for sorting the rubbish and recycling during the audit.

A WasteMINZ representative attended the trial audit, to witness the methodology, and observe the quantity and quality of the data that was gathered.

Subsequent to the trial audit, a teleconference was held to discuss the trial, and slight changes were agreed to the categories that would be used, particularly for contamination in recycling.

A brief report was then prepared by SYCL, using the data gathered to outline the type of analysis that was expected to be able to be provided from the research.

It was decided, due to the project timeline, that it would not be possible to account for seasonality in the project, as all auditing was to be undertaken in winter and early spring (between June and October 2019). It was agreed that the audits in Dunedin and Southland were to be left until last to avoid collecting frozen rubbish and recycling samples.



## 2.3. Trial audit

The trial audit was undertaken at the Auckland Council owned Waitakere Rubbish and Recycling Centre in Henderson. The trial took place on Monday 17 June and took six hours. During that time the audit team was trained on the project methodology, and 15 wheelie bins of domestic kerbside recycling and five wheelie bins of domestic kerbside rubbish were sorted.

The trial allowed SYCL and WasteMINZ to determine how much information was able to be gathered and the best way to set up the audit teams.

Several new audit categories were added to the data collection after the trial. For this reason, the results of the trial were not incorporated into the overall project data set.

## 2.4. Sample area selection

The Project Brief specified that the project was to gather national baseline information on recyclable materials collected via domestic kerbside rubbish and recycling collections. The rubbish and recycling was to be sampled from at least four geographic areas, and to include sufficient households to provide statistically robust national data, that could be scaled “to national level ensuring that the results reflect the variety of collection infrastructure in New Zealand”<sup>1</sup>.

There are a variety of rubbish and recycling collection methods employed throughout New Zealand. Differences in collection methods include weekly rubbish or recycling collections versus fortnightly rubbish or recycling collections, rubbish or recycling collections from wheelie bins or bags or crates, user-pays and rates funded collections, and private and territorial authority collections.

To ensure that a cross-section of these collection types was included in the project, research was undertaken into the most common collection methods in New Zealand, based on the population served by each particular collection service.

The following Table 2.1 provides an overview of rubbish and recycling systems in New Zealand’s ten largest territorial authority areas, along with their population and the proportion of the overall population of New Zealand that they represent.

**Table 2.1 – Rubbish and recycling systems in ten largest territorial authorities**

| City                     | Council rubbish collection  | Council recycling collection   | Comments   | Population               |
|--------------------------|---|--|--|--------------------------|
| <b>Auckland</b>          | Weekly<br>120- or 140- litre wheelie bin<br>User-pays or rates funded (depending on area of city) | Fortnightly<br>Fibre, glass, plastic and metal in 240-litre wheelie bin  | Private collections represent a significant proportion of domestic rubbish collections | 1,699,900<br>(35% of NZ) |
| <b>Christchurch City</b> | Fortnightly<br>140-litre wheelie bin<br>Rates funded  | Fortnightly<br>Fibre, glass, plastic and metal in 240-litre wheelie bin<br>AND<br>Weekly<br>Food and garden waste in 80-litre organics bin | Rubbish and recycling collected on alternate weeks, and food waste collection          | 387,200<br>(8% of NZ)    |

<sup>1</sup> From Project Brief, Section 9.2

|                              |                                       |  |  |                       |
|------------------------------|---------------------------------------|--|--|-----------------------|
| <b>Wellington City</b>       | Weekly<br>Bags<br>Rates funded        | Fortnightly, alternate weeks<br>One week fibre, plastic and metal in crate<br>Alternating week glass in crate                | Two recycling collections on alternate weeks   | 212,800<br>(4% of NZ) |
| <b>Hamilton City</b>         | Weekly<br>Bags<br>Rates funded        | Weekly<br>Plastic, glass and metal in crate<br>Fibre in bag  |  | 168,700<br>(3% of NZ) |
| <b>Tauranga City</b>         | Weekly<br>Bags<br>User pays           | Fortnightly<br>Glass in crate<br>Commingled recycling only provided by private contractors                                   | Private rubbish and recycling  | 134,600<br>(3% of NZ) |
| <b>Dunedin City</b>          | Weekly<br>Bags<br>User-pays           | Fortnightly, alternate weeks<br>One week fibre, plastic and metal in 240-or 80-litre wheelie bin<br>Next week glass in crate | Private collections represent a significant proportion of domestic rubbish collections<br><br>Two recycling collections on alternate weeks | 129,000<br>(3% of NZ) |
| <b>Hutt City</b>             | Weekly<br>Bags<br>User-pays           | Weekly<br>Fibre, glass, plastic and metal in crate   | Private collections represent a significant proportion of domestic rubbish collections   | 105,000<br>(2% of NZ) |
| <b>Whangarei District</b>    | Weekly<br>Bags<br>User-pays           | Weekly<br>Plastic, glass and metal in crate<br>Fibre in bag  | Private collections represent a significant proportion of domestic rubbish collections   | 90,600<br>(2% of NZ)  |
| <b>Palmerston North City</b> | Weekly<br>Bags<br>User-pays           | Fortnightly, alternate weeks<br>One week fibre, plastic and metal in 240-litre wheelie bin<br>Next week glass in crate       | Private collections represent a significant proportion of domestic rubbish collections<br><br>Two recycling collections on alternate weeks | 88,200<br>(2% of NZ)  |
| <b>New Plymouth District</b> | Weekly<br>Bags<br>Rates and user-pays | Fortnightly, alternate weeks<br>One week fibre, plastic and metal in 240-litre wheelie bin<br>Next week glass in crate       | Private collections represent a significant proportion of domestic rubbish collections<br><br>Two recycling collections on alternate weeks | 81,900<br>(2% of NZ)  |

Based on the information in Table 2.1, four territorial authority areas were selected for the audit: Auckland, Dunedin, Hutt City, and Whangarei. Combined, these four territorial areas represent 42% of New Zealand's population, and represent households that use:

- rubbish wheelie bins and recycling wheelie bins (Auckland)
- rubbish bags and alternate collections of glass in crates and commingled recycling in wheelie bins (Dunedin)
- rubbish bags and commingled recycling crates (Hutt City)
- rubbish bags, commingled recycling crates and separate paper (Whangarei)

In Dunedin and Hutt City, a significant proportion of the rubbish collection was provided by the private sector, in wheelie bins.

Based on WasteMINZ research into recycling collection systems in New Zealand, these four recycling collection systems combined are available to 79% of New Zealand's population that has access to kerbside recycling.

Following the selection of these four territorial authority areas, WasteNet Southland requested to be included in the research, and provided the funding necessary to do so.

Rubbish and recycling from three more territorial authorities were added through the inclusion of WasteNet Southland – Invercargill City, Gore District and Southland District. These territorial authorities provide rubbish wheelie bins and recycling wheelie bins. In Invercargill the rubbish collection is weekly, while in Gore and Southland the rubbish collection is fortnightly. The recycling collection is fortnightly in all three areas.

## 2.5. Sample selection

Once the territorial authorities had been selected for inclusion in the project, SYCL selected the specific areas within each territorial authority area from which to collect rubbish and recycling within each territorial authority. This was undertaken in consultation with territorial authority staff and attempted to ensure that a range of household deprivation levels were selected as well as both urban and rural areas.

Household income, as measured by Statistics NZ, was deemed to be the most reliable measure by which to select sample areas. Information was gained on the average household income in specific meshblocks (a meshblock is the smallest geographic unit for which statistical data is collected and processed by Statistics NZ) within each territorial authority.

Information on the range of household incomes in each territorial authority was used to create income quartiles for that territorial area. A selection of one or two adjacent meshblocks was then selected for each day's collection. Average household meshblock incomes were matched with the average income of a quartile in that territorial area, ensuring that a different quartile was targeted each day, and that the meshblocks were aligned with that day's rubbish and recycling collection schedule. On the fifth day, a rural area was selected. Council staff approved all selections.

In Dunedin, two weeks of sampling and auditing were required to collect data on both commingled recycling wheelie bins and glass crates, as these are collected on alternate weeks.

## 2.6. Collection methodology

The sampling of rubbish and recycling in each territorial authority area was undertaken by SYCL. The number of household samples collected in each area is outlined in Table 2.2. The number of samples collected varied between areas, based on the size of receptacles used in that area, and the frequency with which they are collected. The collection truck would collect samples until it was full each day.

**Table 2.2 – Number of samples collected (rubbish and recycling)**

| <b>Territorial area</b>     | <b>Rubbish</b> | <b>Recycling</b> | <b>Glass</b> |
|-----------------------------|----------------|------------------|--------------|
| Auckland                    | 99             | 113              |              |
| Dunedin                     | 91             | 120              | 76           |
| Gore                        | 33             | 32               |              |
| Invercargill                | 62             | 69               |              |
| Hutt City                   | 145            | 163              |              |
| Milton (Clutha District)    | 30             | 26               |              |
| Whangarei                   | 162            | 153              |              |
| Winton (Southland District) | 30             | 32               |              |
| <b>TOTAL</b>                | <b>652</b>     | <b>708</b>       | <b>76</b>    |

Territorial authorities contacted the private waste collectors in their area prior to the audit and requested permission to collect rubbish from their clients in the selected streets. Permission was provided by all collectors, bar one minor collector.

The sample collection was undertaken in the morning of the day of the households’ usual waste collection. The collection was undertaken in a box truck by a driver and two runners. The driver transported the runners to the selected meshblocks for that day’s collection, and the runners emptied the wheelie bins and crates into bags and loaded materials into the truck. The runners attached two identical unique IDs to each sample using a cable tie, and the driver took note of the unique ID numbers. The collection continued until the truck was full.

The contents of waste and recycling bins, bags or crates were collected from the households in one to two meshblocks each day. All materials set out by each household were collected. Each household had either:

- Rubbish bags or bins set out
- Recycling bins or crates set out
- Rubbish bags or bins and recycling bins or crates set out
- No materials set out

Altogether, auditing included rubbish or recycling, or both, from a total 875 individual households.

In each audit area, the rubbish and recycling was transported to a waste audit site (usually a local transfer station or landfill) for auditing on the same day as the collection.

## 2.7. Sorting methodology

Sorting was undertaken by a team of six auditors and two data recorders. SYCL supervised and recorded the data (along with a second recorder) at each of the locations, and three teams of two auditors sorted the rubbish and recycling.

Sorting was undertaken at the individual household level. A household sample of rubbish or recycling was weighed by the recorders and the weight was recorded in a spreadsheet, alongside the unique ID number. The bag was then placed onto a sorting table, and the unique IDs were removed and set aside. The contents of the bag were then sorted by an initial team of two auditors (Team A). These auditors sorted all materials in each sample into one of five categories:

- All fibre
- Plastic containers and lids
- Metal containers, lids and aluminium foil
- Glass bottles and jars
- All other materials (for rubbish), Contamination (for recycling)

Each category was in a separately labelled bin.

The bins of plastic and metal were then passed on to one of the other two teams (Team B), along with one of the unique ID tags. The bins of fibre and glass and the other unique ID tag were passed on to the other team of auditors (Team C). Teams B and C further sorted the materials in these bins.

For rubbish bags, Team A weighed out the All other materials bin, and the weight was recorded alongside the Unique ID. The contents of the bins were then disposed of. Team A then selected another bag of rubbish or recycling and repeated the process.

For recycling, the Contamination category was further sorted into six separate categories by Team A: Soft plastic, Food, Nappies, Fabric, Mixed materials (potentially recyclable), All other materials. See Appendix A for full definitions of these categories.

Before weighing out the contamination All other material category, an auditor from Team A recorded all of the items that were in that category. These were not weighed or counted, but their presence was recorded.

Meanwhile, Teams B and C were sorting the subsamples. These subsamples were sorted into the categories outline in Appendix A.

Once Team B or C had finished sorting a sample into labelled bins, they carried those bins to the recorder table, where one of the two recorders began weighing each bin and recording the material type and weight. For many of the categories, a selection of specific details were also recorded, such as how many items were in the bin, whether the containers in the bin were empty, dirty or contained contents, whether lids were on bottles, whether the container was a food or drink container or whether it was a janitorial or personal care product. All of this information was recorded into a spreadsheet by the two recorders, along with that sample's unique ID number.



**Recorder table in foreground, and audit teams in background**

As the audits progressed, it was possible to include some small analyses of particular materials, such as fabrics, plastic shrink sleeves, and pizza boxes. Each of these analyses were minor, and only undertaken at one audit site, often by a volunteer provided by the territorial authority or WasteMINZ. These analyses are identified as such in the report.

## 2.8. Analysis and reporting

The Project Brief requested that the project provide statistically robust national data, that could be scaled “to national level ensuring that the results reflect the variety of collection infrastructure in New Zealand”.

Scaling data collected from a relatively small sample of households with differing collection systems is problematic. As discussed in Section 2.4, the project attempted to gather data from households with a range of kerbside rubbish and recycling collection systems.

One of the issues with regards to extrapolating audit data to represent the waste output of a geographic area, is that not all households set out rubbish or recycling every week (or every collection cycle). However, when collecting waste for an audit, samples are always taken from households that have set out their rubbish or recycling (i.e. a 100% set out rate). Data on the overall set out rate (the proportion of households in any given week that set out rubbish) is not known for many territorial areas.

Therefore, a decision was made that the most accurate method to extrapolate the household data to national data would be by applying the composition of the rubbish and recycling data to the annual tonnage of rubbish and recycling collected in each territorial area. This data was requested from each territorial authority and provided to SYCL. In areas in which the territorial authority did not have access to data on private rubbish collections, assumptions were made to account for the tonnage of privately-collected rubbish in the area. Most of the data was from Waste Management Plans or Waste Assessments. All data was approved by the territorial authority in question before being used for the data analysis.

Territorial authorities also provided the number of households to receive territorial authority recycling collection services in their territorial area, and these figures were used to calculate an average quantity of rubbish and recycling set out per household per annum in each territorial authority area.

The analyses presented in this report are based on the composition of rubbish and recycling of all eight territorial areas, combined with a population-based weighting.

These calculations are outlined in the following Table 2.3. All extrapolated weight calculations that follow in this report are based on these figures.

**Table 2.3 – Calculating rubbish and recycling tonnages per household per annum**

|   |                |
|---|----------------|
| Number of households serviced by territorial authority kerbside recycling collection in sampled territorial areas                           | 696,031        |
| Estimated annual tonnes of kerbside rubbish collected in sampled territorial areas by territorial authority and private collection services | 310,146 tonnes |
| Annual tonnes of recycling collected in sampled territorial areas by territorial authority kerbside recycling services                      | 163,586 tonnes |
| Kg/rubbish/hh/annum   | 446 kg         |
| Kg/recycling/hh/annum   | 235 kg         |

Rubbish and recycling data for each individual territorial area is not provided in this report as certain areas include commercially-sensitive privately-collected rubbish tonnages.

At the time of publishing, StatsNZ had not yet released an average number of household occupants for New Zealand from the 2018 census. The average number of occupants in a household in the 2013 census was 2.7.

All extrapolated weight calculations that follow in this report have been based on the above figures. It is recognised that the figures used in this report may vary from those calculated using different datasets and different methods of extrapolation.

A statistical analysis of the compositions of kerbside rubbish and kerbside recycling presented in this report have not been provided as the compositions are the weighted average of the results of five separate audits.

Note that the sum of individual numbers in tables do not always add up to totals due to rounding.

## 2.9. Defining recyclability

While there are certain items that are accepted in domestic kerbside recycling collections across New Zealand, such as plastic containers #1 and #2, and steel and aluminium cans, there are other items that are accepted for recycling by some territorial authorities but not others.

In fact, differences in what is accepted for recycling vary widely across the country, and across the eight territorial areas included in this research programme. Table 2.4 provides an overview of the materials collected by each territorial authority included in the audit.

It should also be noted that while a local authority may accept a certain material for recycling, this does not necessarily mean that that material is being recycled. Changes, over time, in commodity markets that buy recyclable materials can result in local authorities collecting materials that they can no longer on-sell.

Plastics #3, 4, 6, 7 provide an example of this, with most local authorities still accepting them in domestic kerbside collections, while the international markets for these products collapsed in 2018, largely due to China's National Sword policy.

**Table 2.4 – Materials accepted for recycling by each territorial authority included in the audit**

| Materials accepted for recycling       | Auckland Council      | Clutha District Council               | Dunedin City Council  | Gore District Council | Hutt City Council | Invercargill City Council | Southland District Council | Whangarei District Council                     |
|--|-----------------------|---------------------------------------|-----------------------|-----------------------|-------------------|---------------------------|----------------------------|--|
| Plastic #1 & 2                         | Yes                   | Yes                                   | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Plastic #5                             | Yes                   | Yes                                   | Yes                   | Yes                   | No                | Yes                       | Yes                        | No   |
| Plastic #3,4,6,7                       | Yes                   | Yes                                   | Yes                   | Yes                   | No                | Yes                       | Yes                        | No   |
| Soft plastic                           | No                    | No                                    | No                    | Yes                   | No                | Yes                       | Yes                        | No   |
| Polystyrene                            | No                    | No                                    | No                    | Yes                   | No                | Yes                       | Yes                        | No   |
| Steel cans                             | Yes                   | Yes                                   | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Aerosol cans                           | Yes                   | Yes                                   | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Aluminium cans                         | Yes                   | Yes                                   | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Aluminium foil                         | Yes                   | Yes                                   | Yes                   | Yes                   | No                | Yes                       | Yes                        | Yes  |
| Glass bottles & jars                   | Yes                   | No                                    | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Fibre                                  | Yes                   | Yes                                   | Yes                   | Yes                   | Yes               | Yes                       | Yes                        | Yes  |
| Tetra Pak®/gable top containers        | Yes                   | No                                    | No                    | Yes                   | No                | Yes                       | Yes                        | No   |
| Plastic and metal bottle tops and lids | Leave lids on bottles | Recycled – not specified if on or off | Leave lids on bottles | Leave lids on bottles | Not specified     | Leave lids on bottles     | Leave lids on bottles      | Small lids in rubbish, large lids in recycling |

Invercargill City, Gore District and Southland District councils have a joint service agreement with Environment Southland, called WasteNet Southland, to provide co-ordinated delivery of solid waste services. In line with this agreement, the same materials are accepted for recycling through domestic kerbside recycling collection within the three territorial authorities. WasteNet Southland accepts soft plastics and polystyrene, materials that are not accepted through other domestic kerbside recycling collections in New Zealand.

This report does not present the waste audit data from individual territorial authorities, instead combining the data from each audit to generate 'national' data. While it is not possible to select eight local authorities that are representative of the range of rubbish and recycling systems provided across New Zealand, and whose



population each represents the proportion of the New Zealand population that uses each particular rubbish and recycling system, effort has been made to include a cross-section of systems.

The eight local authorities in this project also provide a range of different types of rubbish collections, including weekly wheelie bin collections, fortnightly wheelie bin collections, weekly rubbish bags collections, user-pays and rates funded collections, and private and territorial authority rubbish collections.

In this report, the definitions of recyclability do not specifically align with those of any of the local authorities included in the project. A list of what is defined as recyclable for the purposes of this report is provided in Table 2.5. This list has been designed to capture most materials accepted in domestic kerbside recycling collections in New Zealand.

During the audit, non-recyclable materials in domestic kerbside recycling were sorted into ten categories. Nine of these categories were specific types of items (e.g. Soft plastic, Food etc.), and one category was a catch-all for all other non-recyclable materials, called for the purposes of this report, 'All other materials'.

**Table 2.5 – Materials defined as recyclable in this report**

| <b>Materials defined as recyclable</b> |   |
|--|---|
| <b>Fibre</b>                           |   |
| Corrugated cardboard                   | All cardboard with a corrugated insert between two outer layers of card   |
| Newsprint, magazines, flyers           | All newspapers, magazines, flyers and other printed materials, excluding books  |
| Paper - all other                      | All other recyclable paper that does not fit into other listed categories, including office paper, books, wrapping paper etc  |
| Paper board                            | All paper board, e.g. cereal boxes, tea boxes etc   |
| Pizza boxes                            | All pizza boxes   |
| <b>Plastic containers</b>              |   |
| Plastic drink bottles #1               | All drink bottles displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic                            |
| Plastic other containers #1            | All other containers displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic                         |
| Plastic dairy bottles #2               | All dairy bottles displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)                                    |
| Plastic other containers #2            | All other containers displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)                                 |
| Plastic containers #3                  | All containers displaying a #3 recycling symbol – signalling that they are manufactured from PVC (Polyvinyl Chloride)   |
| Plastic containers #4                  | All rigid containers displaying a #4 recycling symbol – signalling that they are manufactured from LDPE (Low-Density Polyethylene)                                  |
| Plastic containers #5                  | All containers displaying a #5 recycling symbol – signalling that they are manufactured from PP (Polypropylene)   |
| Plastic containers #6                  | All containers displaying a #6 recycling symbol – signalling that they are manufactured from PS (Polystyrene)   |
| Plastic containers #7                  | All containers displaying a #7 recycling symbol – signalling that they are manufactured from a type of plastic other than those listed in #1 to 6 or mixed plastics |
| Unidentifiable plastic containers      | All containers with no recycling symbol, or on which a recycling symbol could not be located  |

|                                      |  |
|--------------------------------------|--|
| Plastic bottle tops and lids (loose) | All plastic bottle tops and lids that were not attached to their original container  |
| <b>Metal packaging</b>               |  |
| Steel cans                           | All steel cans (e.g. baked beans, canned fruit etc).   |
| Aluminium cans                       | All aluminium drink cans   |
| Other aluminium containers           | All aluminium containers used for food packaging (e.g. small cat food packaging)   |
| Aluminium foil                       | Aluminium foil   |
| Aerosol cans                         | All aerosol cans   |
| Metal bottle tops and lids           | All metal bottle tops and lids that were not attached to their original container (e.g. glass bottle caps, metal can and jar lids)                               |
| <b>Glass bottles and jars</b>        |  |
| Small glass drink bottles (<750ml)   | All glass drink bottles, alcoholic or non-alcoholic, under 750 ml. Includes small glass beer bottles, juice bottles and soft drink bottles                       |
| Large glass drink bottles (750ml +)  | All large alcoholic drink bottles, 750 ml and larger. Includes wine bottles, liqueurs and spirits  |
| All other glass bottles and jars     | All glass bottles larger than 750 ml used for non-alcoholic drinks, all glass bottles used for non-beverages (e.g. olive oil, soy sauce etc), and all glass jars |

As soft plastics and polystyrene are accepted in the domestic kerbside recycling of three of the local authorities included in this research, and Tetra Pak® and gable top containers are accepted by four of the local authorities, where applicable a separate analysis has been provided excluding data from these territorial authorities.

## 2.10. Adjustments for content of containers

A proportion of discarded plastic, metal and glass containers still have liquid or food in them. At the time of auditing, containers that still contained some product were recorded as such, and the items were weighed with their contents.

During data analysis, the weight of each container that contained food or liquid was replaced by the average weight of that type of container when empty.

This provides a more accurate representation of the proportion of each type of packaging material in the rubbish and recycling.

### 3. COMPOSITION OF DOMESTIC KERBSIDE COLLECTIONS

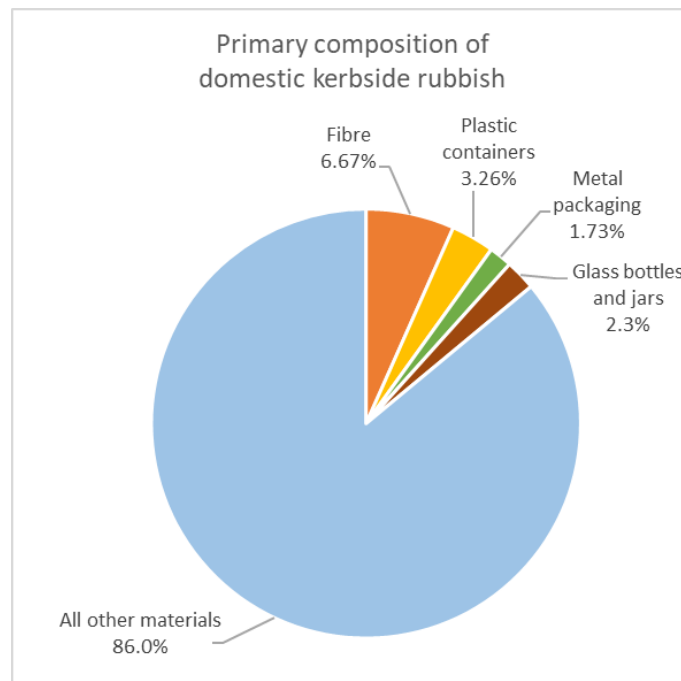
#### 3.1. Composition of rubbish

Domestic kerbside rubbish was sorted into five primary categories, and 30 secondary categories. Definitions of these categories are provided in Appendix A.

The composition of domestic kerbside rubbish, as found during this audit, based on the primary categories, is outlined below in Table 3.1 and Figure 3.1. The composition of the rubbish, based on all 30 secondary categories, is provided in Appendix B.

**Table 3.1 – Composition of domestic kerbside rubbish, by primary categories**

| Primary categories of domestic kerbside rubbish | Proportion of rubbish | Kg per household per annum |
|---|-----------------------|----------------------------|
| Fibre   | 6.67%                 | 29.7 kg                    |
| Plastic containers                              | 3.26%                 | 14.5 kg                    |
| Metal packaging                                 | 1.73%                 | 7.7 kg                     |
| Glass bottles and jars                          | 2.31%                 | 10.3 kg                    |
| All other materials <sup>2</sup>                | 86.03%                | 383.3 kg                   |
| <b>Total</b>                                    | <b>100.00%</b>        | <b>445.6 kg</b>            |



**Figure 3.1 - Composition of domestic kerbside rubbish, by primary categories**

<sup>2</sup> All other materials in the rubbish that do not fit into the above categories

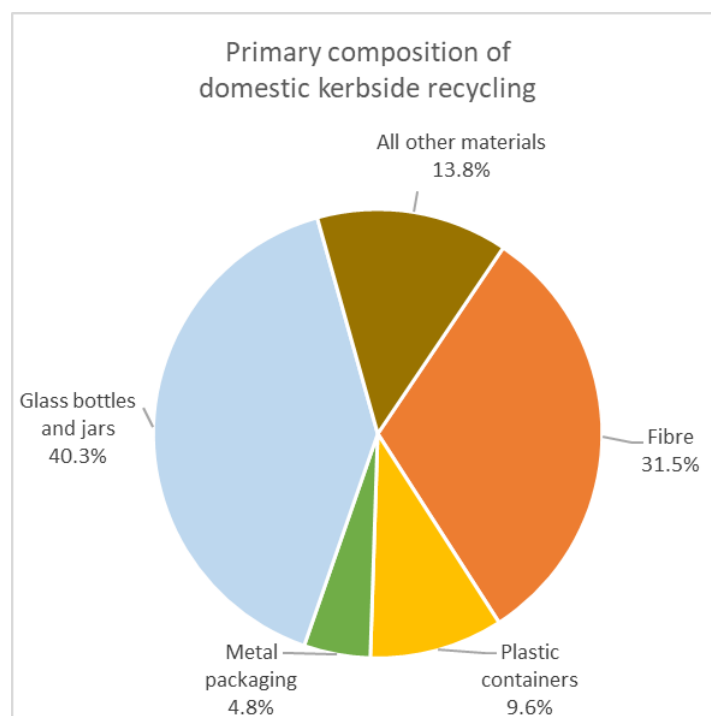
### 3.2. Composition of recycling

Materials set out for recycling were sorted into five primary categories, and 35 secondary categories. Definitions of these categories are provided in Appendix A.

The composition of kerbside recycling, as found during this audit, by primary categories, is outlined in Table 3.2 and Figure 3.2. The composition of the recycling, based on the secondary categories, is provided in Appendix B.

**Table 3.2 – Composition of domestic kerbside recycling, by primary categories**

| Primary categories of domestic kerbside recycling | Proportion of recycling | Kg per household per annum |
|---|-------------------------|----------------------------|
| Fibre   | 31.47%                  | 74.0 kg                    |
| Plastic containers                                | 9.62%                   | 22.6 kg                    |
| Metal packaging                                   | 4.80%                   | 11.3 kg                    |
| Glass bottles and jars                            | 40.33%                  | 94.8 kg                    |
| All other materials <sup>3</sup>                  | 13.79%                  | 32.4 kg                    |
| <b>Total</b>                                      | <b>100.0%</b>           | <b>235.0 kg</b>            |



**Figure 3.2 - Composition of domestic kerbside recycling, by primary categories**

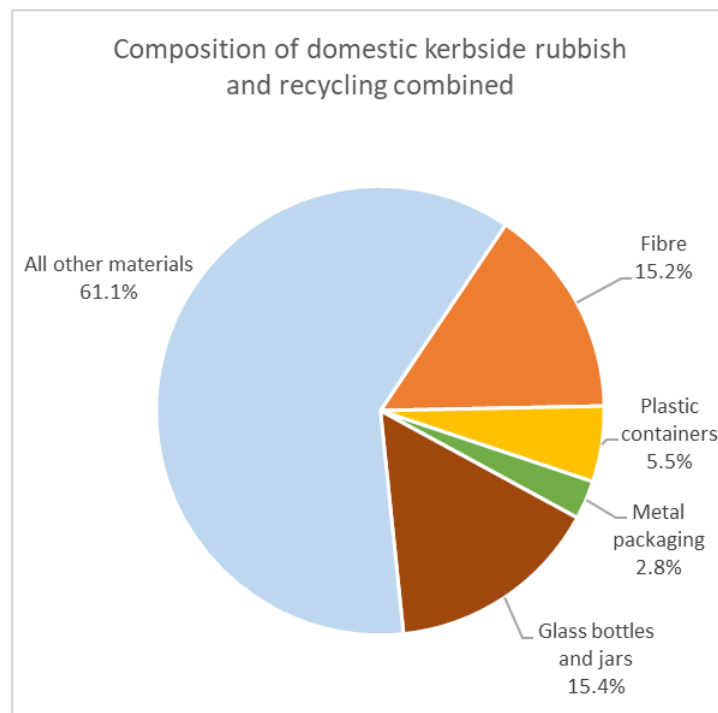
<sup>3</sup> All other materials in the recycling that do not fit into the above categories

### 3.3. Composition of rubbish and recycling

Table 3.3 and Figure 3.3, provide an overview of the composition of the primary categories of the rubbish and recycling, combined.

**Table 3.3 – Composition of domestic kerbside rubbish and recycling combined, by primary categories**

| Primary categories of domestic kerbside rubbish and recycling | Proportion of rubbish and recycling | Kg per household per annum |
|---|-------------------------------------|----------------------------|
| Fibre   | 15.23%                              | 103.7 kg                   |
| Plastic containers  | 5.45%                               | 37.1 kg                    |
| Metal packaging   | 2.79%                               | 19.0 kg                    |
| Glass bottles and jars  | 15.44%                              | 105.1 kg                   |
| All other materials <sup>4</sup>                              | 61.1%                               | 415.8 kg                   |
| <b>Total</b>  | <b>100.00%</b>                      | <b>680.6 kg</b>            |



**Figure 3.3 - Composition of domestic kerbside rubbish and recycling combined, by primary categories**

<sup>4</sup> All other materials in the rubbish or recycling that do not fit into the above categories

## 4. PLASTIC

### 4.1. Plastic containers - overview

There are hundreds of different types of plastics, with a wide range of different uses. This report focuses on plastic used in primary packaging. A plastic packaging container has been defined in this report as rigid or semi-rigid packaging used to package food, drink, or other household products such as janitorial or personal care products. It does not include soft plastic packaging, as soft plastic packaging is generally not accepted through territorial authority kerbside recycling collections.

Plastic packaging is generally classified as belonging to one of seven categories of plastic, based on the type of resin used during manufacture. These seven categories of plastic are identified on a product using a Plastic Identification Symbol.

Plastic Identification Symbols should not be confused with recycling symbols, which simply indicate that the item is potentially recyclable (though, ultimately, recyclability is confined to items that are accepted for recycling by local domestic kerbside recycling collections (or local drop-off points)).



**Plastic Identification Symbol**



**Recycling Symbol**

Table 4.1, on the following page, provides an overview of the seven types of plastic identified by Plastic Identification Symbols, their resin type, and common uses. Each of the first six categories represent a different plastic resin, while the seventh category is a catch all category for all other types of plastic or mixed plastic.

The composition of plastic, by Plastic Identification Symbol, in domestic kerbside collections is provided in Appendix C.

Table 4.1 – Types of plastic (from Plastics New Zealand<sup>5</sup>)

| SYMBOL   | TYPE OF PLASTIC  | PROPERTIES  | COMMON USES  |
|--|--|---|--|
| <br>PET     | <b>PET</b><br>Polyethylene Terephthalate   | Clear, tough, solvent resistant, barrier to gas and moisture, softens at 70°C   | <b>Soft drink and water bottles</b> , salad domes, biscuit trays, salad dressing and peanut butter containers, <b>fleece clothing</b> and geo-textiles   |
| <br>HDPE    | <b>HDPE</b><br>High Density Polyethylene   | Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, opaque, softens at 135°C, easily coloured, processed and formed       | Crinkly shopping bags, freezer bags, <b>milk bottles</b> , ice cream containers, juice bottles, shampoo, chemical and detergent bottles, buckets, rigid agricultural pipe, <b>milk crates</b>  |
| <br>PVC     | <b>PVC</b><br>Unplasticised Polyvinyl Chloride PVC-U<br><br>Plasticised Polyvinyl Chloride PVC-P   | Strong, tough, can be clear, can be solvent welded, softens at 75°C<br><br>Flexible, clear, elastic, can be solvent welded                      | <b>Cosmetic containers</b> , electrical conduit, <b>plumbing pipes</b> and fittings, blister packs, wall cladding, roof sheeting, bottles<br><br>Garden hose, shoe soles, cable sheathing, blood bags and tubing, watch straps, <b>commercial cling wrap</b> |
| <br>LDPE    | <b>LDPE</b><br>Low density Polyethylene<br><br><b>LLDPE</b><br>Linear low density Polyethylene   | Soft, flexible, waxy surface, translucent, softens at 80°C, scratches easily  | <b>Cling wrap</b> , rubbish bags, squeeze bottles, black irrigation tube, black mulch film, rubbish bins, <b>shrink wrap</b>   |
| <br>PP      | <b>PP</b><br>Polypropylene   | Hard but still flexible, waxy surface, softens at 145°C, translucent, withstands solvents, versatile  | <b>Dip potties</b> and ice cream tubs, potato chip bags, straws, microwave dishes, kettles, garden furniture, lunch boxes, blue packing tape, <b>automotive parts</b>  |
| <br>PS    | <b>PS</b><br>Polystyrene   | Clear, glassy, rigid, brittle, opaque, semi-tough, softens at 95°C. Affected by fats and solvents   | CD cases, plastic cutlery, imitation 'crystal glassware', low cost brittle toys, video cases, <b>water station cup</b> , <b>safety helmets</b>   |
| <br>EPS   | <b>EPS</b><br>Expanded Polystyrene   | Foamed, light weight, energy absorbing, heat insulating   | Foamed polystyrene hot drink cups, hamburger take-away clamshells, <b>foamed meat trays</b> , protective packaging for fragile items, insulation, <b>insulation panels</b>   |
| <br>OTHER | <b>OTHER</b><br>Letters below indicate ISO code for plastic type including SAN (styrene, acrylonitrile), ABS (Acrylonitrile butadiene styrene), PC (polycarbonate), Nylon, degradable plastic e.g. PLA | Includes all other resins, multi materials (e.g. laminates) and degradable plastics. Properties dependent on plastic or combination of plastics | <b>Packaging</b> , car parts, appliance parts, <b>computers</b> , electronics, water cooler bottles, medical devices,  |

<sup>5</sup> Downloaded from <https://www.plastics.org.nz/images/documents/PDFs/pnz-id-code-web-2009-1.pdf>

### 4.1.1. Plastic containers - by weight

Plastic containers comprised 3.26% of materials set out in domestic kerbside rubbish, and 9.62% of materials set out in domestic kerbside recycling, by weight.

The following Table 4.2 provides the composition of plastic containers in the domestic kerbside rubbish, as a proportion of all plastic containers in the rubbish and as a proportion of all material in the rubbish, per kg per household per annum.

Table 4.3 on the following page provides the same information for plastic containers set out in domestic kerbside recycling collections. Table 4.4 combines the two data sets to provide overall quantity and composition data for plastic containers across both domestic kerbside rubbish and recycling collections.

Soft plastics in the rubbish were not measured as part of this project. All soft plastics were included in the ‘All other materials’ classification. Soft plastics in recycling were recorded as ‘Soft plastic contamination’.

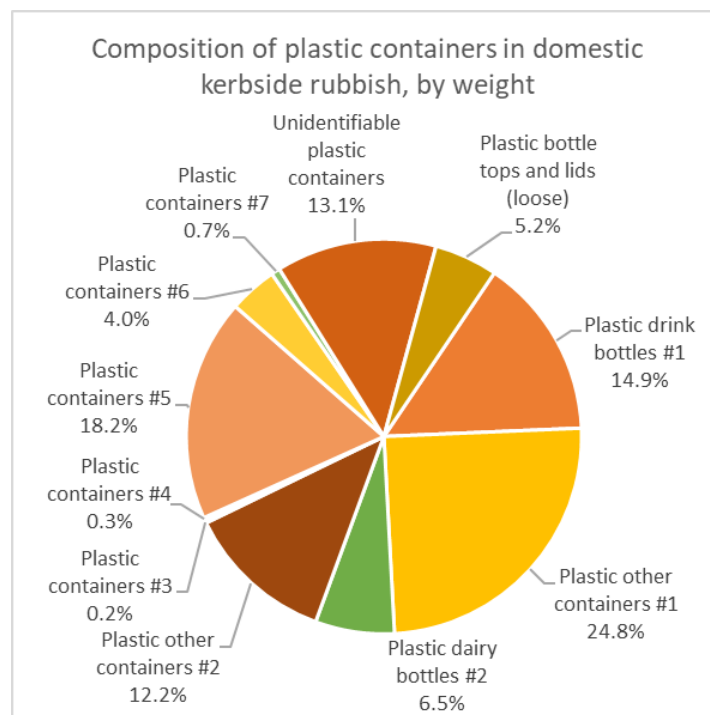
Plastic items that are not containers or soft plastic (such as plastic toys) were also excluded from this analysis, and were classified as ‘All other materials’, as these items can generally not be recycled.

Table 4.2 and Figure 4.1 show the composition of plastic containers in domestic kerbside rubbish collections.

**Table 4.2 – Composition of plastic containers in domestic kerbside rubbish, by weight**

| Plastic containers in domestic kerbside rubbish | Proportion of each type of plastic container in rubbish | Proportion of all rubbish | Kg per household per annum |
|---|---|---------------------------|----------------------------|
| Plastic drink bottles #1                        | 14.88%  | 0.48%                     | 2.2 kg                     |
| Plastic other containers #1                     | 24.82%  | 0.81%                     | 3.6 kg                     |
| Plastic dairy bottles #2                        | 6.47%   | 0.21%                     | 0.9 kg                     |
| Plastic other containers #2                     | 12.17%  | 0.40%                     | 1.8 kg                     |
| Plastic containers #3                           | 0.18%   | 0.01%                     | 0.0 kg                     |
| Plastic containers #4                           | 0.29%   | 0.01%                     | 0.0 kg                     |
| Plastic containers #5                           | 18.21%  | 0.59%                     | 2.6 kg                     |
| Plastic containers #6                           | 3.95%   | 0.13%                     | 0.6 kg                     |
| Plastic containers #7                           | 0.72%   | 0.02%                     | 0.1 kg                     |
| Unidentifiable plastic containers               | 13.12%  | 0.43%                     | 1.9 kg                     |
| Plastic bottle tops and lids (loose)            | 5.19%   | 0.17%                     | 0.8 kg                     |
| <b>Total plastic containers</b>                 | <b>100.00%</b>  | <b>3.26%</b>              | <b>14.5 kg</b>             |





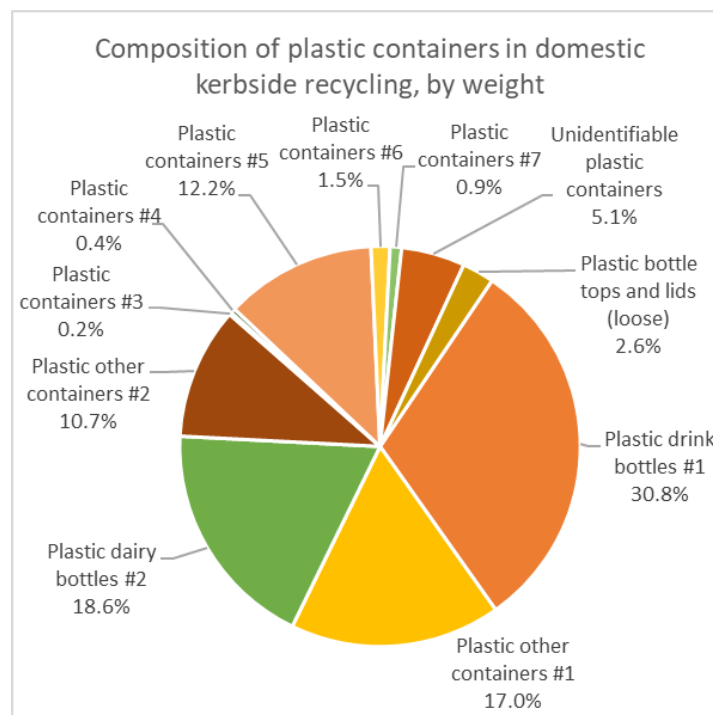
**Figure 4.1 - Composition of plastic containers in domestic kerbside rubbish, by weight**

The most readily recyclable plastic containers (plastic containers #1, #2 and #5), comprised 2.50% of material in domestic kerbside rubbish collections.

Table 4.3 and Figure 4.2 provide the composition of plastic containers in domestic kerbside recycling collections. Plastic containers comprised 9.62% of the domestic kerbside recycling collection.

**Table 4.3 – Composition of plastic containers in domestic kerbside recycling, by weight**

| Plastic containers in domestic kerbside recycling | Proportion of each type of plastic container in recycling | Proportion of all recycling | Kg per household per annum |
|---|---|-----------------------------|----------------------------|
| Plastic drink bottles #1                          | 30.76%  | 2.96%                       | 7.0 kg                     |
| Plastic other containers #1                       | 17.02%  | 1.64%                       | 3.8 kg                     |
| Plastic dairy bottles #2                          | 18.60%  | 1.79%                       | 4.2 kg                     |
| Plastic other containers #2                       | 10.66%  | 1.03%                       | 2.4 kg                     |
| Plastic containers #3                             | 0.20%   | 0.02%                       | 0.0 kg                     |
| Plastic containers #4                             | 0.38%   | 0.04%                       | 0.1 kg                     |
| Plastic containers #5                             | 12.23%  | 1.18%                       | 2.8 kg                     |
| Plastic containers #6                             | 1.52%   | 0.15%                       | 0.3 kg                     |
| Plastic containers #7                             | 0.93%   | 0.09%                       | 0.2 kg                     |
| Unidentifiable plastic containers                 | 5.14%   | 0.49%                       | 1.2 kg                     |
| Plastic bottle tops and lids (loose)              | 2.57%   | 0.25%                       | 0.6 kg                     |
| <b>Total plastic containers</b>                   | <b>100.00%</b>  | <b>9.62%</b>                | <b>22.6 kg</b>             |



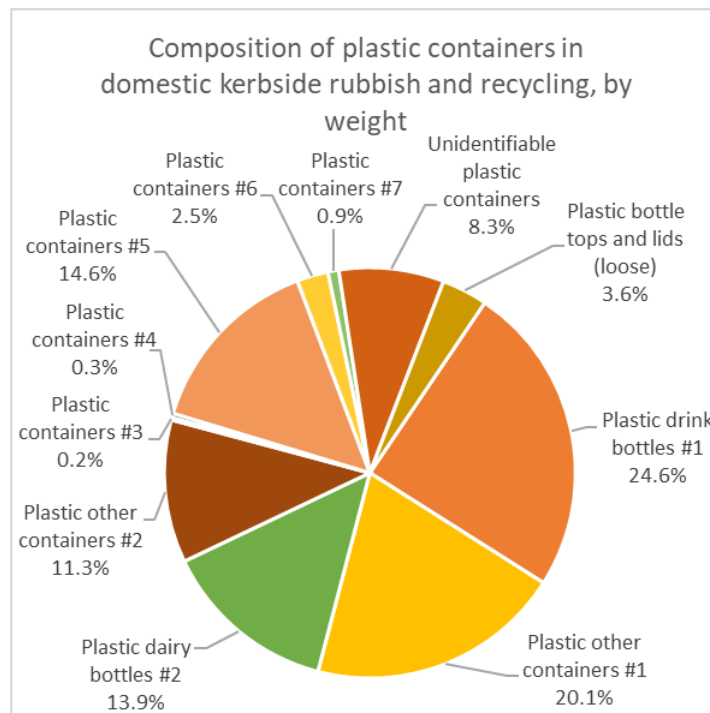
**Figure 4.2 – Composition of plastic containers in domestic kerbside recycling, by weight**

The most readily recyclable plastic containers (plastic containers #1, #2 and #5), comprised 8.58% of material in domestic kerbside recycling collection, and 89.26% of plastic containers in the recycling.

Table 4.4 and Figure 4.3 show the composition of plastic containers in the domestic kerbside rubbish and recycling combined, per kg per household per annum.

**Table 4.4 - Composition of plastic containers in domestic kerbside rubbish and recycling, by weight**

| Plastic containers in domestic kerbside rubbish and recycling | Proportion of each type of plastic container in rubbish and recycling | Proportion of plastic containers in domestic kerbside collections | Kg per household per annum |
|---|---|---|----------------------------|
| Plastic drink bottles #1                                      | 24.55%  | 1.34%   | 9.1 kg                     |
| Plastic other containers #1                                   | 20.07%  | 1.09%   | 7.5 kg                     |
| Plastic dairy bottles #2                                      | 13.85%  | 0.76%   | 5.1 kg                     |
| Plastic other containers #2                                   | 11.25%  | 0.61%   | 4.2 kg                     |
| Plastic containers #3   | 0.19%   | 0.01%   | 0.1 kg                     |
| Plastic containers #4   | 0.34%   | 0.02%   | 0.1 kg                     |
| Plastic containers #5   | 14.57%  | 0.79%   | 5.4 kg                     |
| Plastic containers #6   | 2.47%   | 0.13%   | 0.9 kg                     |
| Plastic containers #7   | 0.85%   | 0.05%   | 0.3 kg                     |
| Unidentifiable plastic containers                             | 8.26%   | 0.45%   | 3.1 kg                     |
| Plastic bottle tops and lids (loose)                          | 3.60%   | 0.20%   | 1.3 kg                     |
| <b>TOTAL plastic containers</b>                               | <b>100.00%</b>  | <b>5.45%</b>  | <b>37.1 kg</b>             |



**Figure 4.3 - Composition of plastic containers in domestic kerbside rubbish and recycling, by weight**

The average New Zealand household disposes of 37.1 kg of plastic containers per annum through kerbside rubbish and recycling collections.

#### 4.1.2. Plastic containers - by count

The number of each type of plastic container in the rubbish and recycling was counted as part of this project. These numbers have been extrapolated to provide data on the number of each container type in an average household’s rubbish and recycling per annum.

These extrapolations have been undertaken by calculating the average number of containers per tonne of rubbish and recycling, based on the total number of each type of container present across the eight territorial areas included in the audit. The results of the audit were not weighted based on the size of the territorial areas, as the number of items in each area was too low. It was deemed more reliable to extrapolate the total number of items across all areas. The average number of each type of item in a tonne of rubbish and recycling is provided in Appendix D.

The average number per tonne was then used to calculate the number per annual household set out, of rubbish and recycling.

**Table 4.5 – Number of plastic containers in domestic kerbside collections**

| <b>Plastic containers in domestic kerbside collections</b> | <b># in rubbish per household per annum</b> | <b># in recycling per household per annum</b> | <b># in rubbish and recycling per household per annum</b> |
|--|---|---|---|
| Plastic drink bottles #1                                   | 36.2  | 151.8   | 188.0   |
| Plastic other containers #1                                | 111.1                                       | 115.8   | 227.0   |
| Plastic dairy bottles #2                                   | 15.6  | 97.4  | 113.0   |
| Plastic other containers #2                                | 22.7  | 32.5  | 55.2  |
| Plastic containers #3                                      | 3.9   | 3.6   | 7.5   |
| Plastic containers #4                                      | 1.5   | 0.9   | 2.4   |
| Plastic containers #5                                      | 85.9  | 86.1  | 172.0   |
| Plastic containers #6                                      | 45.7  | 26.3  | 72.0  |
| Plastic containers #7                                      | 4.1   | 2.9   | 7.1   |
| Unidentifiable plastic containers                          | 63.6  | 33.5  | 97.0  |
| Plastic bottle tops and lids (loose)                       | 80.9  | 84.3  | 165.2   |

### 4.1.3. Plastic, glass and metal containers

The audit weighed and counted containers in the rubbish and recycling made from plastic, glass and metal, as well as some containers made of fibre.

Table 4.6 provides an overview of the proportion of the rubbish and recycling that was comprised of containers made from plastic, glass and metal, as well as the average number of each of these types of containers disposed of to domestic kerbside rubbish and recycling collections, per household per annum.

In this table, containers included in the plastic containers category include plastic containers #1-#7 and unidentifiable containers, but excludes bottle tops and lids (loose). Metal containers include aluminium and steel cans, other aluminium containers, and aerosol cans, but excludes aluminium foil and metal lids. Glass containers include glass bottles and jars.

**Table 4.6 – Number of containers in domestic kerbside collections  
(excluding lids and aluminium foil)**

| <b>Containers in domestic kerbside collections</b>      | <b>Plastic containers</b> | <b>Metal containers</b> | <b>Glass containers</b> |
|---|---------------------------|-------------------------|-------------------------|
| <b>Rubbish</b>  |                           |                         |                         |
| Proportion of rubbish, by weight                        | 3.09%                     | 1.44%                   | 2.31%                   |
| # in rubbish per HH per annum                           | 390.4                     | 119.1                   | 66.9                    |
| <b>Recycling</b>  |                           |                         |                         |
| Proportion of recycling, by weight                      | 9.37%                     | 4.45%                   | 40.33%                  |
| # in recycling per HH per annum                         | 550.8                     | 291.3                   | 389.6                   |
| <b>Rubbish and recycling combined</b>                   |                           |                         |                         |
| Proportion of rubbish and recycling combined, by weight | 5.26%                     | 2.48%                   | 15.44%                  |
| # per HH per annum                                      | 941.2                     | 410.4                   | 456.5                   |

The average household disposes of 941 plastic containers through their domestic kerbside rubbish or recycling collection, per year, as well as 410 metal containers and 456 glass containers.

## 4.2. Plastic containers by plastic type

This section provides further detail on plastic containers disposed of through domestic kerbside rubbish and recycling collections. Soft plastics are not defined as containers within this report and are therefore not included in this section.

### 4.2.1. Plastic containers #1

Plastic containers #1 are manufactured from PET (Polyethylene Terephthalate) plastic and are classified as being either Drink containers or Other containers. Table 4.7 provides an overview of the quantity of plastic Drink bottles #1 and Other containers #1 in the rubbish and recycling, by weight and item count, as well as the overall quantity of Plastic containers #1.

**Table 4.7 – Overview of Plastic containers #1 in domestic kerbside rubbish and recycling**

| <b>Overview of Plastic containers #1 in domestic kerbside rubbish and recycling</b> | <b>Plastic drink bottles #1</b> | <b>Plastic other containers #1</b> | <b>Total all Plastic containers #1</b> |
|---|---------------------------------|------------------------------------|--|
| <b>Domestic kerbside rubbish</b>  |                                 |                                    |  |
| Proportion of plastic containers in rubbish, by weight                              | 14.88%                          | 24.82%                             | 39.70%                                 |
| Proportion of rubbish, by weight  | 0.48%                           | 0.81%                              | 1.29%                                  |
| Kg per HH in rubbish per annum  | 2.2 kg                          | 3.6 kg                             | 5.8 kg                                 |
| # in rubbish per HH per annum   | 36.2                            | 111.1                              | 147.3                                  |
| <b>Domestic kerbside recycling</b>  |                                 |                                    |  |
| Proportion of plastic containers in recycling, by weight                            | 30.76%                          | 17.02%                             | 47.78%                                 |
| Proportion of recycling, by weight  | 2.96%                           | 1.64%                              | 4.59%                                  |
| Kg per HH in recycling per annum  | 7.0 kg                          | 3.8 kg                             | 10.8 kg                                |
| # in recycling per HH per annum   | 151.8                           | 115.8                              | 267.7                                  |
| <b>Domestic kerbside rubbish and recycling combined</b>                             |                                 |                                    |  |
| Kg per HH per annum   | 9.1 kg                          | 7.5 kg                             | 16.6 kg                                |
| # per HH per annum  | 188.0                           | 227.0                              | 415.0                                  |

The following sections 4.2.1.1 and 4.2.1.2 provide more detail on Plastic drink bottles #1 and Plastic other containers #1.

### 4.2.1.1. Plastic drink bottles #1

Plastic drink bottles #1 are manufactured from PET (Polyethylene Terephthalate) plastic and include a wide range of clear and coloured drink bottles, in a range of sizes.



**Example of Plastic drink bottles #1**

A range of variables relating to Plastic drink bottles #1 were measured during the audit. The variables are listed below and were recorded for all Plastic drink bottles #1 in each household's waste and recycling.

1. Number of bottles
2. Number of clear versus coloured bottles
3. Number of empty bottles versus bottles containing liquid
4. Number of bottles with lids on versus lids off
5. Number of small bottles versus large bottles
6. Number of bottles with shrink sleeves

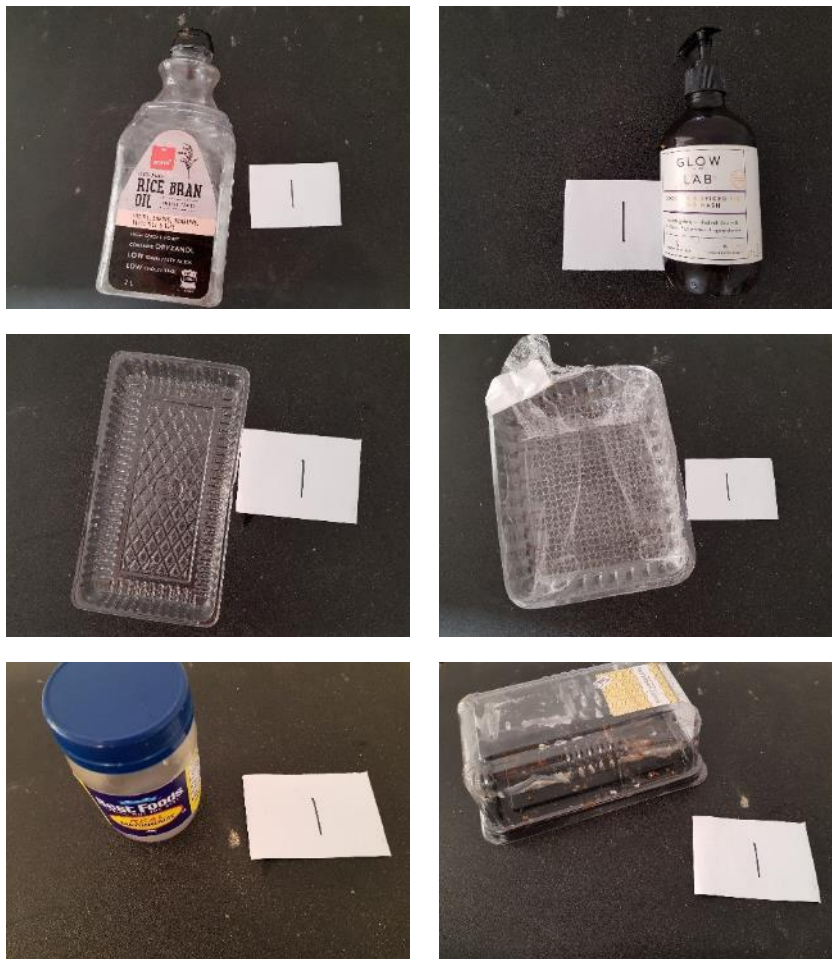
The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.8 – Plastic drink bottles #1**

| <b>Plastic drink bottles #1 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|--|----------------|------------------|---------------------------------------|
| # per HH per annum   | 36.2           | 151.8            | 188.0                                 |
| Clear bottles  | 85.9%          | 86.2%            | 86.1%                                 |
| Coloured bottles   | 14.1%          | 13.8%            | 13.9%                                 |
| Empty bottles  | 88.8%          | 97.1%            | 95.8%                                 |
| Bottles containing liquid  | 11.2%          | 2.9%             | 4.2%                                  |
| Bottles with lids on   | 74.6%          | 83.2%            | 81.8%                                 |
| Bottles with lids off  | 25.4%          | 16.8%            | 18.2%                                 |
| Small bottles (under 1-litre)  | 53.3%          | 37.7%            | 40.1%                                 |
| Large bottles (1-litre and over)   | 46.7%          | 62.3%            | 59.9%                                 |
| With shrink sleeve   | 10.9%          | 6.3%             | 7.0%                                  |
| Without shrink sleeve  | 89.1%          | 93.7%            | 93.0%                                 |

### 4.2.1.2. Plastic other containers #1

Plastic other containers #1 are other containers manufactured from PET (Polyethylene Terephthalate), and included a wide range of different types of containers, from plastic jars, to cleaning containers, personal care bottles, meat trays, biscuit trays, plastic clam shells for fruit, muffins etc. A selection of such items is provided in the following photos.



**Examples of Plastic other containers #1**

A range of variables relating to Plastic other containers #1 were measured during the audit. The variables are listed below and were recorded for all Plastic other containers #1 in each household's waste and recycling.

1. Number of containers
2. Number of food containers versus janitorial/personal care containers
3. Number of clear versus coloured containers
4. Number of meat trays
5. Number of empty containers, dirty containers, and containers containing product
6. Number of meat trays with plastic wrap
7. Number of bottles with shrink sleeves
8. Number of containers with trigger or pump on janitorial and personal care containers

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.



**Table 4.9 – Plastic other containers #1**

| <b>Plastic other containers #1 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| # per HH per annum  | 111.1          | 115.8            | 227.0                                 |
| Food containers   | 93.3%          | 87.1%            | 89.8%                                 |
| Janitorial/personal care containers   | 6.7%           | 12.9%            | 10.2%                                 |
| Clear containers  | 83.8%          | 86.0%            | 85.0%                                 |
| Coloured containers   | 16.2%          | 14.0%            | 15.0%                                 |
| Empty containers  | 36.1%          | 84.5%            | 63.3%                                 |
| Dirty containers  | 59.3%          | 14.2%            | 33.9%                                 |
| Containers containing product   | 4.6%           | 1.4%             | 2.8%                                  |
| Meat trays as % of all  | 42.3%          | 33.0%            | 36.7%                                 |
| Meat trays as % of food containers  | 45.3%          | 37.8%            | 63.3%                                 |
| Meat trays with plastic wrap  | 72.6%          | 25.3%            | 48.8%                                 |
| Meat trays without plastic wrap   | 27.4%          | 74.7%            | 51.2%                                 |
| Bottles with shrink sleeve  | 2.1%           | 0.6%             | 1.2%                                  |
| Bottles without shrink sleeve   | 97.9%          | 99.4%            | 98.8%                                 |
| Janitorial/personal care containers with trigger or pump                      | 21.2%          | 23.0%            | 22.4%                                 |
| Janitorial/personal care containers without trigger or pump                   | 78.8%          | 77.0%            | 77.6%                                 |

A quarter of meat trays made from Plastic other containers #1 still have plastic wrap around them when disposed of to recycling. In this report plastic wrap refers to cling wrap, wrapped around the tray.

## 4.2.2. Plastic containers #2

Plastic containers #2 are manufactured from HDPE (High-Density Polyethylene) plastic and were classified as being either dairy containers or other containers. The Plastic dairy bottles #2 category was comprised of dairy products such as milk and cream bottles. The Plastic other containers #2 category included a range of food and drink containers and janitorial bottles.

Table 4.10 provides an overview of the quantity of Plastic dairy bottles #2 and Plastic other containers #2 in the rubbish and recycling, by weight and item count, as well as the overall quantity of plastic containers #2.

**Table 4.10 – Overview of Plastic containers #2 in domestic kerbside rubbish and recycling**

| <b>Overview of plastic containers #2 in domestic kerbside rubbish and recycling</b> | <b>Dairy bottles #2</b> | <b>Other containers #2</b> | <b>Total all containers #2</b> |
|---|-------------------------|----------------------------|--------------------------------|
| <b>Domestic kerbside rubbish</b>  |                         |                            |                                |
| Proportion of plastic containers in rubbish, by weight                              | 6.47%                   | 12.17%                     | 18.63%                         |
| Proportion of rubbish, by weight  | 0.21%                   | 0.40%                      | 0.61%                          |
| Kg per HH in rubbish per annum  | 0.9 kg                  | 1.8 kg                     | 2.5 kg                         |
| # in rubbish per HH per annum   | 15.6                    | 22.7                       | 38.3                           |
| <b>Domestic kerbside recycling</b>  |                         |                            |                                |
| Proportion of plastic containers in recycling, by weight                            | 18.60%                  | 10.66%                     | 29.26%                         |
| Proportion of recycling, by weight  | 1.79%                   | 1.03%                      | 2.81%                          |
| Kg per HH in recycling per annum  | 4.2 kg                  | 2.4 kg                     | 6.6 kg                         |
| # in recycling per HH per annum   | 97.4                    | 32.5                       | 129.9                          |
| <b>Domestic kerbside rubbish and recycling combined</b>                             |                         |                            |                                |
| Kg per HH per annum   | 5.1 kg                  | 4.2 kg                     | 9.3 kg                         |
| # per HH per annum  | 113.0                   | 55.2                       | 168.2                          |

The following sections 4.2.2.1 and 4.2.2.2 provide more detail on Plastic dairy bottles #2 and Plastic other containers #2.

### 4.2.2.1. Plastic dairy bottles #2

Almost all Plastic dairy bottles #2 were milk or cream bottles.



**Example of Plastic dairy bottles #2**

A range of variables were measured during the audit relating to Plastic dairy bottles #2. The variables are listed below and were recorded for all Plastic dairy bottles #2 in each household’s waste and recycling.

1. Number of bottles
2. Number of natural versus coloured bottles (white milk bottles were classified as ‘coloured’)
3. Number of empty bottles versus bottles containing liquid
4. Number of bottles with lids on
5. Number of small bottles (under 1-litre)
6. Number of large bottles (1-litre and over)

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

In most cases bottles classified as small (under 1-litre), were cream bottles, and large bottles (1-litre and over were milk bottles).

**Table 4.11 – Plastic dairy bottles #2 in domestic kerbside rubbish and recycling**

| Plastic dairy bottles #2 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|---|---------|-----------|--------------------------------|
| # per HH per annum  | 15.6    | 97.4      | 113.0                          |
| ‘Natural’ bottles   | 65.9%   | 73.8%     | 72.9%                          |
| Coloured bottles  | 34.1%   | 26.2%     | 27.1%                          |
| Empty bottles   | 87.8%   | 99.0%     | 97.7%                          |
| Bottles containing liquid   | 12.2%   | 1.0%      | 2.3%                           |
| Bottles with lids on  | 77.8%   | 77.4%     | 77.4%                          |
| Bottles without lids on   | 22.2%   | 22.6%     | 22.6%                          |
| Small bottles (under 1-litre)                                       | 36.2%   | 13.5%     | 16.1%                          |
| Large bottles (1-litre and over)                                    | 63.8%   | 86.5%     | 83.9%                          |

The word ‘Natural’, when referring to plastic #2, is a term used to describe semi-opaque HDPE, as used in many milk bottles. Natural HDPE (or plastic #2) milk bottles are different to light-proof or coloured HDPE milk bottles, as used by certain dairy brands. The difference can be seen in the photo at the top of the page. The second and fourth bottles (from the left), are Natural HDPE. The others are light-proof or coloured. For this analysis light-proof bottles were categorised as coloured.

### 4.2.2.2. Plastic other containers #2

Other plastic containers #2 are other HDPE (High-Density Polyethylene) containers and include a range of different types of janitorial and food and drink containers, as shown in the following photos.

When the project was designed, the project team was unaware that there were any drinks sold in plastic containers #2, other than dairy products. Therefore, a separate category for drink containers (other than dairy) was not created. A very small number of drinks were subsequently found to be sold in plastic containers #2.



**Sample of Plastic other containers #2**

A range of variables were measured during the audit relating to Plastic other containers #2. The variables are listed below and were recorded for all Plastic other containers #2 in each household’s waste and recycling.

1. Number of containers
2. Number of food/drink containers versus janitorial/personal care containers
3. Number of clear versus coloured containers
4. Number of empty containers versus containers containing liquid
5. Number of containers with trigger or pump on janitorial and personal care containers

The results of these variables are presented in Table 4.12, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.12 – Plastic other containers #2 in domestic kerbside rubbish and recycling**

| <b>Plastic other containers #2 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| # per HH per annum  | 22.7           | 32.5             | 55.2                                  |
| Food/drink containers   | 39.4%          | 19.7%            | 26.9%                                 |
| Janitorial/personal care containers   | 60.6%          | 80.3%            | 73.1%                                 |
| 'Natural' containers  | 14.5%          | 16.6%            | 15.8%                                 |
| Coloured containers   | 85.5%          | 83.4%            | 84.2%                                 |
| Empty containers  | 87.8%          | 96.1%            | 92.9%                                 |
| Containers containing liquid  | 12.2%          | 3.9%             | 7.1%                                  |
| Containers with shrink sleeve   | 10.1%          | 6.9%             | 8.1%                                  |
| Containers without shrink sleeves   | 89.9%          | 93.1%            | 91.9%                                 |
| Janitorial/personal care containers with trigger or pump                      | 15.4%          | 11.5%            | 12.7%                                 |
| Janitorial/personal care containers without trigger or pump                   | 84.6%          | 88.5%            | 87.3%                                 |

The word 'Natural', when referring to plastic #2, is a term used to describe semi-opaque HDPE, as used in the bottle in the bottom left hand corner of the previous page. The other bottles are coloured.

In future research it may be worth categorising plastic #2 into natural, white and coloured, as white HDPE is easier to recycle than HDPE in other colours.

### 4.2.3. Plastic containers #3

Plastic containers #3 are containers made from PVC (Polyvinyl Chloride) plastic and are predominately biscuit and cracker trays. There are also a small range of other types of packaging. Examples of these found in the audit included some takeaway food packaging, a shampoo bottle, and a multi-muffin case.

Table 4.13 provides an overview of the quantity of Plastic containers #3 set out in domestic kerbside rubbish and recycling, by weight and item count.

**Table 4.13 – Overview of Plastic containers #3 in domestic kerbside rubbish and recycling**

| Overview of Plastic containers #3 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight                                  | 0.18%   | 0.20%     | 0.19%                          |
| Proportion of all rubbish or recycling, by weight                            | 0.01%   | 0.02%     | 0.01%                          |
| Kg per HH per annum  | 0.03 kg | 0.04 kg   | 0.07 kg                        |
| # per HH per annum   | 3.9     | 3.6       | 7.5                            |



**Example of Plastic containers #3**

Two variables were measured during the audits relating to Plastic containers #3. The variables are listed below and were recorded for all Plastic containers #3 in each household's waste and recycling.

1. Number of containers
2. Number of empty containers, dirty containers, and containers containing product

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.14 – Plastic containers #3 in domestic kerbside rubbish and recycling**

| Plastic containers #3 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| # per HH per annum   | 3.9     | 3.6       | 7.5                            |
| Empty container  | 88.1%   | 92.0%     | 90.3%                          |
| Dirty container  | 10.2%   | 6.7%      | 8.2%                           |
| Container containing product                                     | 1.7%    | 1.3%      | 1.5%                           |

#### 4.2.4. Plastic containers #4

Plastic containers #4 are containers made from LDPE (Low-Density Polyethylene) plastic, and are predominately used as packaging for tomato ketchup, mustard, and BBQ sauce, from a number of brands. There was also a small number of other Plastic containers #4, including hair dye.

Much soft plastic is also made from plastic #4, LDPE. Only rigid plastic is included in this section.

**Table 4.15 – Overview of Plastic containers #4 in domestic kerbside rubbish and recycling**

| Overview of Plastic containers #4 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight                                  | 0.29%   | 0.38%     | 0.34%                          |
| Proportion of all rubbish or recycling, by weight                            | 0.01%   | 0.04%     | 0.02%                          |
| Kg per HH per annum  | 0.0 kg  | 0.1 kg    | 0.1 kg                         |
| # per HH per annum   | 1.5     | 0.9       | 2.4                            |



**Example of Plastic containers #4**

Two variables were measured during the audits relating to Plastic containers #4. The variables are listed below and were recorded for all Plastic containers #4 in each household’s waste and recycling.

1. Number of containers
2. Number of empty containers, dirty containers, and containers containing product

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.16 – Plastic containers #4 in domestic kerbside rubbish and recycling**

| Plastic containers #4 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| # per HH per annum   | 1.5     | 0.9       | 2.4                            |
| Empty container  | 30.0%   | 57.9%     | 40.8%                          |
| Dirty container  | 33.3%   | 42.1%     | 36.7%                          |
| Container containing product                                     | 36.7%   | 0.0%      | 22.4%                          |

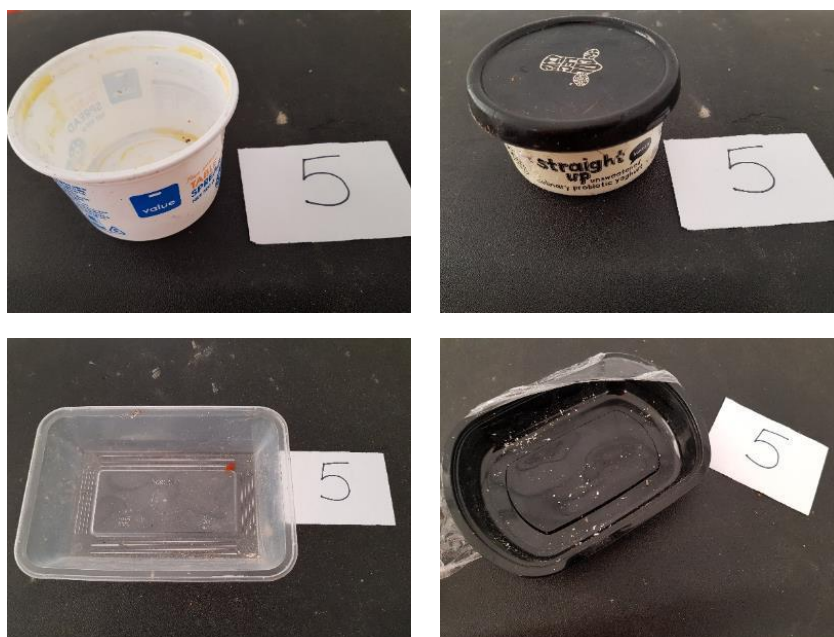
### 4.2.5. Plastic containers #5

Plastic containers #5 are containers made from PP (Polypropylene) plastic, and are used for a wide range of, predominantly, food packaging. The most common product sold in a Plastic containers #5, based on the audit, was margarine, followed by yoghurt, take away containers, ice cream and dips. A range of other products are also sold in Plastic containers #5. This packaging comes in many colours, including clear, black, white, and a variety of other colours.

**Table 4.17 – Overview of Plastic containers #5 in domestic kerbside rubbish and recycling**

| Overview of Plastic containers #5 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight                                  | 18.21%  | 12.23%    | 14.57%                         |
| Proportion of all rubbish or recycling, by weight                            | 0.59%   | 1.18%     | 0.79%                          |
| Kg per HH per annum  | 2.6 kg  | 2.8 kg    | 5.4 kg                         |
| # per HH per annum   | 85.9    | 86.1      | 172.0                          |

Examples of a few of these packaging types are shown below.



**Examples of Plastic containers #5**

A range of variables were measured during the audit relating to Plastic containers #5. The variables are listed below and were recorded for all Plastic containers #5 in each household’s waste and recycling.



1. Number of containers
2. Number of food containers versus janitorial/personal care containers
3. Number of empty containers, dirty containers, and containers containing product
4. Number of black containers

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.18 – Plastic containers #5 in domestic kerbside rubbish and recycling**

| <b>Plastic containers #5 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| # per HH per annum  | 85.9           | 86.1             | 172.0                                 |
| Food containers   | 90.9%          | 92.5%            | 91.8%                                 |
| Janitorial/personal care containers                                     | 9.1%           | 7.5%             | 8.2%                                  |
| Empty container   | 38.4%          | 80.6%            | 61.4%                                 |
| Dirty container   | 49.8%          | 17.7%            | 32.3%                                 |
| Container containing product  | 11.8%          | 1.7%             | 6.3%                                  |
| Black container   | 4.8%           | 4.2%             | 4.5%                                  |

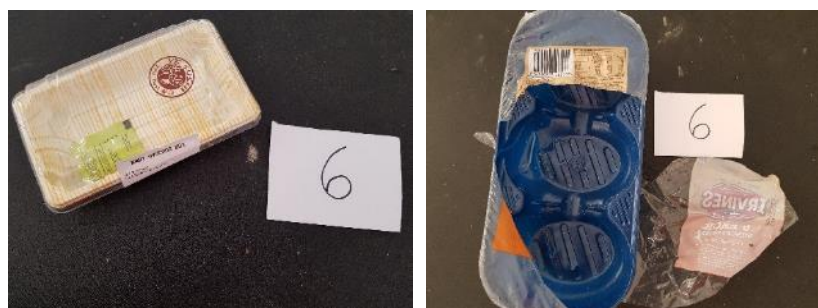
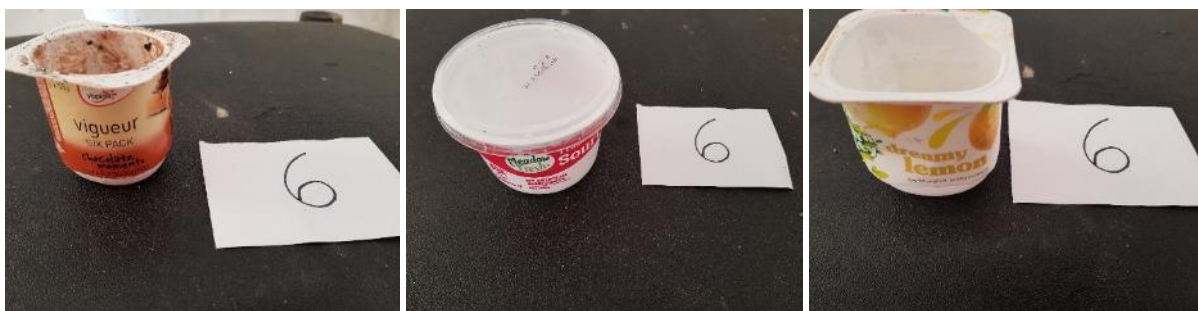
## 4.2.6. Plastic containers #6

Plastic containers #6 are containers made from PS (Polystyrene) plastic and are used in a range of packaging. The most common product sold in a Container #6, based on the audit, was yoghurt. The next most common product was soft cheeses, such as cottage cheese and sour cream. Following, in order of quantity in the audit, were sushi trays, pie trays, take away containers, and other trays including meat and biscuit trays.

**Table 4.19 – Overview of Plastic containers #6 in domestic kerbside rubbish and recycling**

| Overview of Plastic containers #6 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight                                  | 3.95%   | 1.52%     | 2.47%                          |
| Proportion of all rubbish or recycling, by weight                            | 0.13%   | 0.15%     | 0.13%                          |
| Kg per HH per annum  | 0.6 kg  | 0.3 kg    | 0.9 kg                         |
| # per HH per annum   | 45.7    | 26.3      | 72.0                           |

Examples of Plastic containers #6 are provided in the following photos.



**Examples of Plastic containers #6**

Two variables were measured during the audit relating to Plastic containers #6. The variables are listed below and were recorded for all Plastic containers #6 in each household's waste and recycling.

1. Number of containers
2. Number of empty containers, dirty containers, and containers containing product

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.20 – Plastic containers #6 in domestic kerbside rubbish and recycling**

| <b>Plastic containers #6 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| # per HH per annum  | 45.7           | 26.3             | 72.0                                  |
| Empty container   | 23.6%          | 71.3%            | 43.6%                                 |
| Dirty container   | 66.7%          | 27.0%            | 50.1%                                 |
| Container containing product  | 9.7%           | 1.6%             | 6.3%                                  |

### 4.2.7. Plastic containers #7

Plastic containers #7, or containers made from all other plastics not included in categories 1 to 6, or from mixed or multilayer plastics, are used for a range of packaging, including fresh pasta packaging, PLA products, such as bio cups, sliced meat packaging, and others.

**Table 4.21 – Overview of Plastic containers #7 in domestic kerbside rubbish and recycling**

| Overview of Plastic containers #7 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight                                  | 0.72%   | 0.93%     | 0.85%                          |
| Proportion of all rubbish or recycling, by weight                            | 0.02%   | 0.09%     | 0.05%                          |
| Kg per HH per annum  | 0.1 kg  | 0.2 kg    | 0.3 kg                         |
| # per HH per annum   | 4.1     | 2.9       | 7.1                            |



**Examples of Plastic containers #7**

Two variables were measured during the audits relating to Plastic containers #7. The variables are listed below and were recorded for all Plastic containers #7 in each household's waste and recycling.

1. Number of containers
2. Number of empty containers, dirty containers, and containers containing product

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.22 – Plastic containers #7 in domestic kerbside rubbish and recycling**

| Plastic containers #7 in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| # per HH per annum   | 4.1     | 2.9       | 7.1                            |
| Empty container  | 51.9%   | 93.4%     | 70.3%                          |
| Dirty container  | 45.5%   | 4.9%      | 27.5%                          |
| Container containing product                                     | 2.6%    | 1.6%      | 2.2%                           |

### 4.2.8. Unidentifiable plastic containers

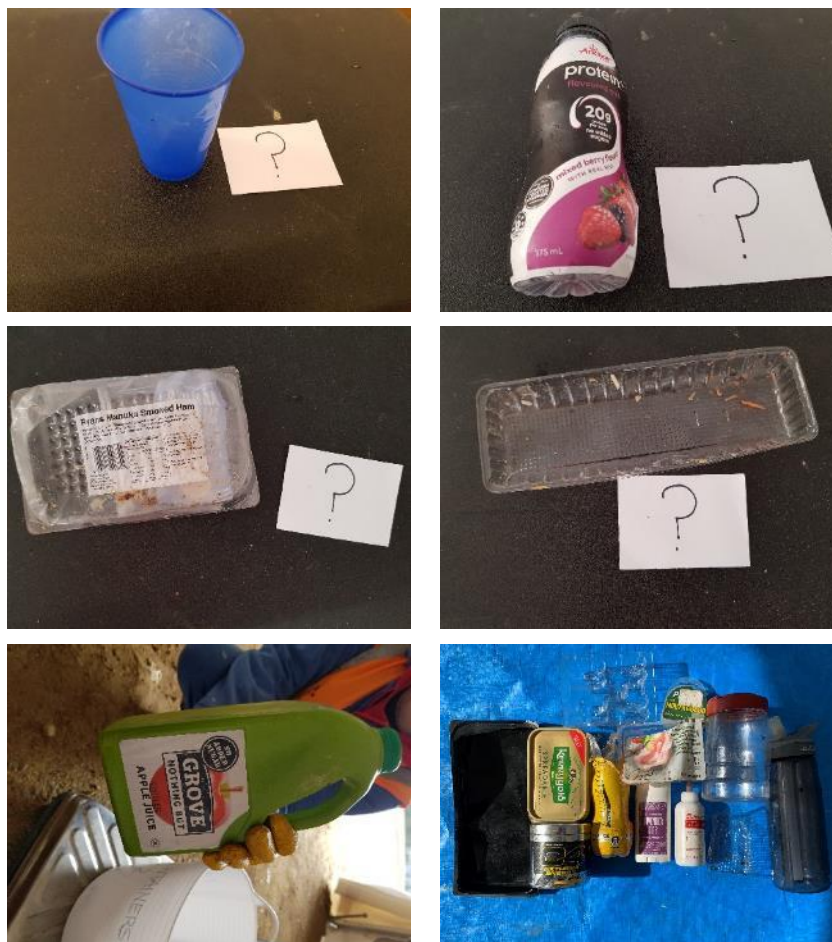
The Unidentifiable plastic containers category included all plastic containers that did not display a plastic identification symbol with a number, or on which the auditor was not able to locate a symbol.

Unidentifiable plastics in the audit included a wide range of packaging types, including cold meat packaging, such as sliced ham, meat trays (including black meat trays), clear biscuit and cracker trays, plant pots, and many other items.

**Table 4.23 – Overview of Unidentifiable plastic containers in domestic kerbside rubbish and recycling**

| Overview of Unidentifiable plastic containers in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| Proportion of plastic containers, by weight  | 13.12%  | 5.14%     | 8.26%                          |
| Proportion of all rubbish or recycling, by weight  | 0.43%   | 0.49%     | 0.45%                          |
| Kg per HH per annum  | 1.9 kg  | 1.2 kg    | 3.1 kg                         |
| # per HH per annum   | 63.6    | 33.5      | 97.0                           |

Examples of Unidentifiable plastic containers are provided in the following photos.



**Examples of Unidentifiable plastic containers**



**Examples of Unidentifiable plastic containers**

Three variables were measured during the audit relating to Unidentifiable plastic containers. The variables are listed below and were recorded for all Unidentifiable plastic containers in each household’s waste and recycling.

1. Number of containers
2. Number of empty containers, dirty containers, and containers containing product
3. Number of containers with shrink sleeves

The results of these variables are presented below, for rubbish and recycling. The results are presented based on the data collected across all eight territorial areas, without weighting.

**Table 4.24 – Unidentifiable plastic containers in domestic kerbside rubbish and recycling**

| Unidentifiable plastic containers in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|--|---------|-----------|--------------------------------|
| # per HH per annum   | 63.6    | 33.5      | 97.0                           |
| Empty container  | 44.1%   | 82.3%     | 56.9%                          |
| Dirty container  | 50.7%   | 14.4%     | 38.5%                          |
| Container containing product   | 5.2%    | 3.3%      | 4.6%                           |
| Bottles with shrink sleeve   | 5.9%    | 5.9%      | 5.9%                           |
| Bottles without shrink sleeve  | 94.1%   | 94.1%     | 94.1%                          |

At one of the audit locations a closer examination of Unidentifiable plastic containers was undertaken by a volunteer associated with WasteMINZ. This examination was carried out on a sample of 24 containers and should be considered indicative only.

Unidentifiable plastic containers were classified into one of four categories, as shown in the following table.

**Table 4.25 – Breakdown of sample of Unidentifiable plastic containers in domestic kerbside rubbish and recycling**

| Container use                         | Proportion |
|---------------------------------------|------------|
| Trays (meat, biscuit etc)             | 32%        |
| Personal care e.g. shampoo, deodorant | 24%        |
| Sliced meat containers                | 18%        |
| All other                             | 26%        |

While none of these 24 containers had a plastic identification symbol, 43% of them displayed an international recycling symbol. Personal hygiene containers were more likely to use the international recycling symbol. None of the trays or sliced meat containers displayed an international recycling symbol.

### 4.3. Plastic bottle tops and lids

Plastic bottles tops and lids that were loose, i.e. not attached to their original container, were weighed and counted as a separate category. Plastic bottle tops and lids that were attached to a bottle or another container were left on the container and classified as part of that container.

Plastic bottle tops and lids were from a variety of containers, including bottles, coffee cups, hummus containers and ice cream containers.



**Examples of Plastic bottle tops and lids**

The type of plastic from which the bottle top or lid was manufactured was not able to be recorded, as it is rarely indicated on the bottle top or lid. Plastic bottle tops and lids are manufactured from a range of plastics.

**Table 4.26 – Plastic bottle tops and lids (loose) in domestic kerbside rubbish and recycling**

| <b>Overview of Plastic bottle tops and lids (loose) in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|--|----------------|------------------|---------------------------------------|
| Kg per HH per annum  | 0.8 kg         | 0.6 kg           | 1.3 kg                                |
| # per HH per annum   | 80.9           | 84.3             | 165.2                                 |

## 4.4. Plastic trays

The audit found a variety of different types of plastic trays in the rubbish and recycling, including trays used for packaging meat, biscuits and crackers, pies, fresh herb etc. These trays are also made from a variety of plastic types, including plastic #1 (PET), #3 (PVC), #5 (PP), #6 (PS), #7 (Other). Many trays do not include a recycling symbol with a number and were therefore classified as Unidentifiable containers.

The following photos provide examples of some of the different types of trays identified in the audit.



**Examples of different types of plastic trays**

Trays were not specifically recorded as trays (as opposed to any other kind of container) in the audit, apart from meat trays made from Plastic #1. All meat trays made from Plastic #1 were recorded, and these comprised 37% of all Other plastic #1 containers.

A small number of meat trays made from Plastic #5 and Plastic #6 were also observed, as well as meat trays that did not include an identification code (Unidentifiable plastic containers).

A quarter of all Other plastic #1 meat trays placed into recycling bins still have plastic wrap attached.



## 4.5. Shrink sleeves

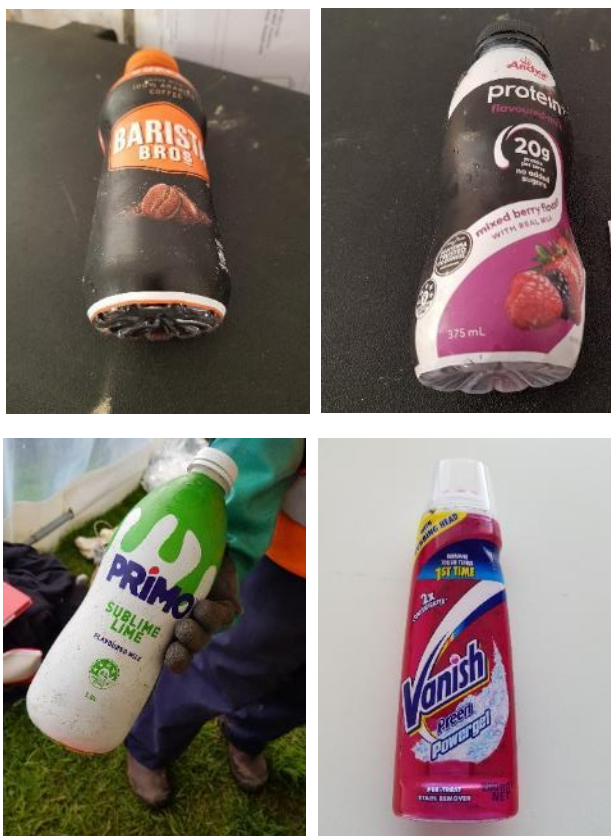
Many plastic drink bottles have plastic labels on them, as shown in the following image.



**Examples of drink bottles with plastic labels**

Increasingly, drink bottles and other containers such as cleaning products, are being wrapped in a printed plastic shrink sleeve that covers most of the bottle and can make it difficult for infra-red scanners on plastic sorting machines to identify the plastic from which the container was manufactured.

Some of these bottles include a 'zip' down the side of the plastic shrink sleeve, and printed instructions to remove the sleeve before recycling. However, this 'zip' was not on all shrink sleeved bottles. Photos of a selection of shrink sleeved bottles are provided below.



**Examples of bottles with plastic shrink sleeves**

Some bottles have a partial shrink sleeve, that covers a large proportion of the bottle, but not the whole bottle, as in the following images.



Examples of bottles with partial shrink sleeves

**Table 4.27 – Proportion, by count, of each type of plastic container that has a shrink sleeve in domestic kerbside rubbish and recycling**

| Types of plastic containers with shrink sleeve in domestic kerbside rubbish and recycling | Rubbish | Recycling | Rubbish and recycling combined |
|---|---------|-----------|--------------------------------|
| Plastic drink bottles #1  | 10.88%  | 6.30%     | 7.04%                          |
| Plastic other containers #1   | 2.10%   | 0.56%     | 1.17%                          |
| Plastic other containers #2   | 10.13%  | 6.89%     | 8.14%                          |
| Unidentifiable containers   | 5.86%   | 5.87%     | 5.86%                          |
| Number of bottles with shrink sleeve per household per annum                              | 11.0    | 13.7      | 24.7                           |

According to these findings, each household placed almost 14 plastic containers into the recycling each year that were probably not recycled by the processor due to the container’s shrink sleeve. It was not possible to quantify the number of bottles disposed of to recycling where the sleeve had been removed.

At one of the audit locations, a small analysis of 28 plastic bottles found in the recycling with shrink sleeves intact was undertaken by a volunteer associated with WasteMINZ. Of the bottles examined, 32% had no Plastic Identification Symbol or Recycling Symbol. Sixty-one per cent of the sample didn’t include any obvious perforations on the sleeve to assist with its removal.

Of the bottles in the sample, only 32% included written instructions suggesting that the sleeve be removed before recycling. Those that did include instructions used a range of wording, including:

- To recycle remove sleeve
- To recycle tear here & remove sleeve
- Removing the label will help make sure your bottle is recyclable
- Please remove label before recycling
- Remove label before recycling the bottle

It appeared that cleaning product bottles were less likely to include recycling information.

Photos of bottles with and without ‘zips’ are provided on the following page.



Examples of bottles with 'zips'



Examples of bottles without 'zips'

## 4.6. Triggers and pumps

Some Plastic other containers #1 and Plastic other containers #2 have a trigger or a pump. These containers are janitorial or personal care products, such as hand soap, or cleaning sprays, as shown in the following photos.



**Plastic other container #1 with pump**



**Plastic other container #2 with trigger**

Triggers and pumps are generally manufactured from a different plastic to the bottles they are fitted to and often contain a metal spring, and therefore, cannot be recycled.

During auditing, the presence of a trigger or pump on a janitorial or personal care bottle was recorded. Table 4.28 provides an overview of the proportion of janitorial and personal care these containers with triggers or pumps.

**Table 4.28 – Triggers and pumps on Plastic other containers #1 and #2 in domestic kerbside rubbish and recycling**

| <b>Trigger and pumps on Plastic other containers #1 and #2 in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| All Plastic other containers #1   | 1.29%          | 2.73%            | 2.05%                                 |
| Janitorial and personal care Plastic other containers #1  | 21.24%         | 22.98%           | 22.44%                                |
| All Plastic other containers #2   | 10.67%         | 11.60%           | 11.24%                                |
| Janitorial and personal care Plastic other containers #2  | 15.38%         | 11.54%           | 12.70%                                |

Based on the results of this audit, 2.05% of all Plastic containers #1 and 11.24% of all Plastic containers #2 have pumps or triggers.

## 4.7. Coloured plastic containers

Plastic containers #1 and #2 manufactured from coloured plastic can be more difficult to recycle, and therefore more difficult for recycling companies to on-sell. Likewise, black Plastic #5 is less easily recyclable.

The audits outlined in this report collected data on whether Plastic containers #1 and #2 were coloured, as well as whether Plastic #5 was black. The audit did not record whether Plastic containers #5 were clear or coloured (any colour other than black). The colour of Plastic containers #3, 4, 6, 7 and Unidentifiable plastic containers was not recorded.

Table 4.29 provides an overview of the proportion of Plastic container #1 and #2 that were coloured, and the proportion of Plastic containers #5 that were black.

**Table 4.29 – Proportion, and number, of plastic containers that are coloured in domestic kerbside rubbish and recycling**

| Proportion of each type of plastic container that is coloured in domestic kerbside rubbish and recycling | % of coloured bottles in rubbish | # of coloured containers in rubbish per HH per annum | % of coloured bottles in recycling | # of coloured containers in recycling per HH per annum | % of coloured bottles in rubbish and recycling | # of coloured containers in rubbish and recycling per HH per annum |
|--|----------------------------------|--|------------------------------------|--|--|--|
| Plastic drink bottles #1   | 14.09%                           | 5.1  | 13.83%                             | 21.0   | 13.87%   | 26.1   |
| Plastic other containers #1  | 16.59%                           | 18.4   | 14.02%                             | 16.2   | 15.13%   | 34.3   |
| <b>Total coloured plastic containers #1</b>  | <b>15.97%</b>                    | <b>23.5</b>  | <b>13.91%</b>                      | <b>37.2</b>  | <b>14.53%</b>                                  | <b>60.4</b>  |
| Plastic dairy bottles #2   | 34.13%                           | 5.3  | 26.23%                             | 25.6   | 27.13%   | 30.7   |
| Plastic other containers #2  | 86.65%                           | 19.7   | 84.62%                             | 27.5   | 85.33%   | 47.1   |
| <b>Total coloured plastic containers #2</b>  | <b>64.84%</b>                    | <b>25.0</b>  | <b>40.74%</b>                      | <b>53.0</b>  | <b>45.28%</b>                                  | <b>77.8</b>  |
| Black Plastic containers #5  | 4.77%                            | 4.1  | 4.22%                              | 3.6  | 4.46%  | 7.7  |

Based on the results of the audit, 14.53% of plastics #1 and 45.28% of plastic #2 were coloured.

## 5. FIBRE

### 5.1 Fibre in domestic kerbside collection

In this report, fibre is the term used to describe cardboard or paper-based materials and packaging. Definitions for the fibre categories are provided in Table 5.1, below.

**Table 5.1 – Audit categories for Fibre**

| <b>Fibre</b>                              |   |
|---|---|
| Corrugated cardboard                      | All cardboard with a corrugated insert between two outer layers of card   |
| Newsprint, magazines, flyers              | All newspapers, magazines, flyers and other printed materials, excluding books  |
| Paper - all other                         | All other recyclable paper that does not fit into other listed categories, including office paper, books, wrapping paper etc.                                   |
| Paper board                               | All paper board, e.g. cereal boxes, tea boxes etc.  |
| Paper cups                                | All cups made from fibre products, regardless of lining, including single use soft drink cups, water cups, coffee cups, takeaway noodle bowls etc.              |
| Pizza boxes                               | All pizza boxes (including contents)  |
| Tetra Pak® and gable top drink containers | All fibre-based Tetra Pak® and gable top drink containers, including soymilk, rice milk, cow's milk and fruit juice.  |
| Tetra Pak® and gable top other containers | All fibre-based Tetra Pak® and gable top non-drink containers, such as stock and yoghurt containers.  |
| All other non-recyclable fibre            | All other non-recyclable paper, including food contaminated paper, foil lined fibre packaging, laminated paper, photographs, paper ream wrappers, receipts etc. |

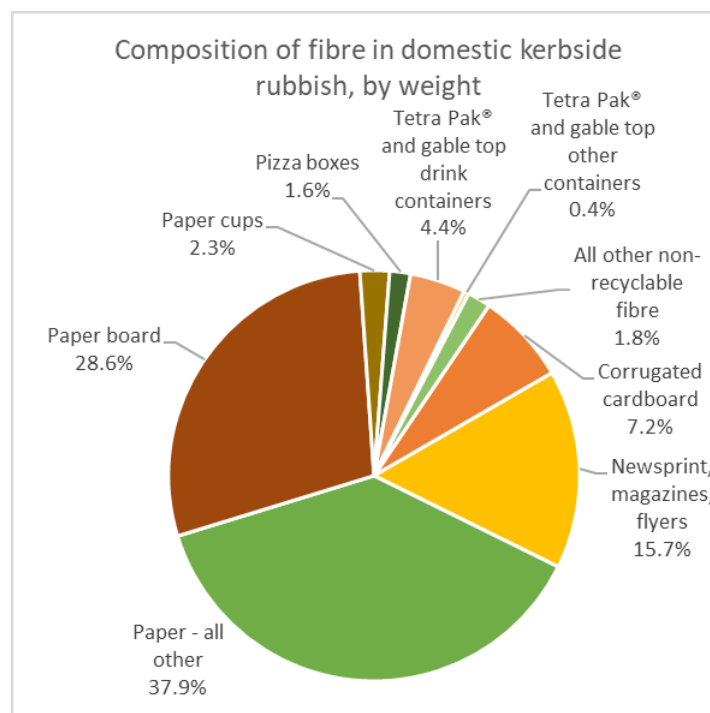
Fibre was found in domestic kerbside rubbish and recycling, and comprised 6.67%, by weight, of domestic kerbside rubbish, and 31.47%, by weight, of the domestic kerbside recycling.

Table 5.2 and Figure 5.1, on the following page, provide the composition of fibre in the domestic kerbside rubbish, as a proportion of all fibre in the rubbish, as a proportion of all material in the rubbish, and per kg per household per annum.

Table 5.3 and Figure 5.2 provide the same information for fibre in domestic kerbside recycling collections. Table 5.4 combines the two data sets to provide overall disposal of fibre across both domestic kerbside rubbish and recycling collections.

**Table 5.2 - Composition of fibre in domestic kerbside rubbish, by weight**

| Fibre in domestic kerbside rubbish        | Proportion of fibre in rubbish | Proportion of all rubbish | Kg per household per annum |
|---|--------------------------------|---------------------------|----------------------------|
| Corrugated cardboard                      | 7.21%                          | 0.48%                     | 2.1 kg                     |
| Newsprint, magazines, flyers              | 15.67%                         | 1.05%                     | 4.7 kg                     |
| Paper - all other                         | 37.93%                         | 2.53%                     | 11.3 kg                    |
| Paper board                               | 28.64%                         | 1.91%                     | 8.5 kg                     |
| Paper cups (coffee, water, soft drinks)   | 2.32%                          | 0.15%                     | 0.7 kg                     |
| Pizza boxes                               | 1.64%                          | 0.11%                     | 0.5 kg                     |
| Tetra Pak® and gable top drink containers | 4.37%                          | 0.29%                     | 1.3 kg                     |
| Tetra Pak® and gable top other containers | 0.40%                          | 0.03%                     | 0.1 kg                     |
| All other non-recyclable fibre            | 1.82%                          | 0.12%                     | 0.5 kg                     |
| <b>TOTAL fibre</b>                        | <b>100.00%</b>                 | <b>6.67%</b>              | <b>29.7 kg</b>             |

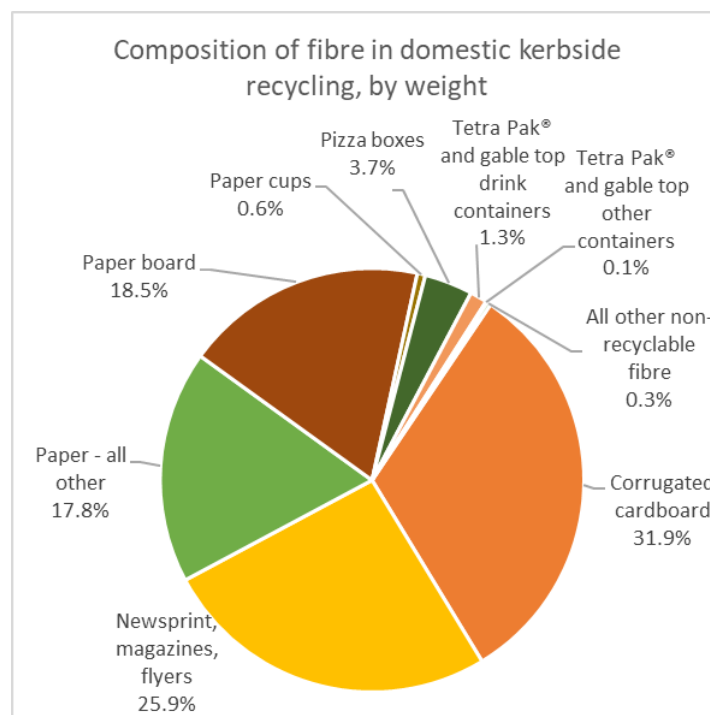


**Figure 5.1 - Composition of fibre in domestic kerbside rubbish, by weight**

Table 5.3 shows the composition of fibre in the domestic kerbside recycling, as a proportion of all fibre in the recycling, as a proportion of all material in the recycling, and per kg per household per annum.

**Table 5.3 - Composition of fibre in domestic kerbside recycling, by weight**

| Fibre in domestic kerbside recycling      | Proportion of fibre in recycling | Proportion of all recycling | Kg per household per annum |
|---|----------------------------------|-----------------------------|----------------------------|
| Corrugated cardboard                      | 31.87%                           | 10.03%                      | 23.6 kg                    |
| Newsprint, magazines, flyers              | 25.87%                           | 8.14%                       | 19.1 kg                    |
| Paper - all other                         | 17.78%                           | 5.60%                       | 13.2 kg                    |
| Paper board                               | 18.47%                           | 5.81%                       | 13.7 kg                    |
| Paper cups (coffee, water, soft drinks)   | 0.62%                            | 0.19%                       | 0.5 kg                     |
| Pizza boxes                               | 3.68%                            | 1.16%                       | 2.7 kg                     |
| Tetra Pak® and gable top drink containers | 1.30%                            | 0.41%                       | 1.0 kg                     |
| Tetra Pak® and gable top other containers | 0.11%                            | 0.03%                       | 0.1 kg                     |
| All other non-recyclable fibre            | 0.30%                            | 0.10%                       | 0.2 kg                     |
| <b>TOTAL fibre</b>                        | <b>100.00%</b>                   | <b>31.47%</b>               | <b>74.0 kg</b>             |



**Figure 5.2 - Composition of fibre in domestic kerbside recycling, by weight**

Table 5.4, on the following page, shows the composition of fibre in the domestic kerbside rubbish and recycling combined, and per kg per household per annum.



**Table 5.4 - Composition of fibre in domestic kerbside rubbish and recycling, by weight**

| <b>Fibre in domestic kerbside rubbish and recycling</b> | <b>Kg per household per annum</b> |
|---|-----------------------------------|
| Corrugated cardboard                                    | 25.7 kg                           |
| Newsprint, magazines, flyers                            | 23.8 kg                           |
| Paper - all other                                       | 24.4 kg                           |
| Paper board   | 22.2 kg                           |
| Paper cups (coffee, water, soft drinks)                 | 1.1 kg                            |
| Pizza boxes   | 3.2 kg                            |
| Tetra Pak® and gable top drink containers               | 2.3 kg                            |
| Tetra Pak® and gable top other containers               | 0.2 kg                            |
| All other non-recyclable fibre                          | 0.8 kg                            |
| <b>TOTAL fibre</b>                                      | <b>103.7 kg</b>                   |

Approximately 103.7 kg of fibre is disposed of per household every year, of which 71% is disposed of through the domestic kerbside recycling collection.

The following images provide examples of the different types of fibre found in the audit.



**Corrugated cardboard**



**Newsprint, magazines, flyers**



**Paper – all other**





**Paper board**



**Paper cups**



**Tetra Pak® and gable top containers**



**Pizza boxes**



**All other non-recyclable fibre**

## 5.2 Pizza boxes

Pizza boxes were weighed and counted during the audit. They were also assessed as being empty, dirty, or still containing pizza. The difference between empty and dirty was somewhat subjective, but generally a box with grease stains was considered empty, a box with cheese or crust stuck to it was considered dirty, and a box with a piece of pizza in it, or a loose piece of crust, was considered to still contain pizza.



**Examples of empty and dirty pizza boxes, and pizza boxes containing pizza**

Table 5.5 provides the results of this analysis.

**Table 5.5 – Weight and number of pizza boxes in domestic kerbside rubbish and recycling collections**

| <b>Overview of pizza boxes in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|---|----------------|------------------|---------------------------------------|
| Kg per HH per annum   | 0.5 kg         | 2.7 kg           | 3.2 kg                                |
| # per HH per annum  | 4.1            | 13.6             | 17.7                                  |
| Empty   | 67.11%         | 86.16%           | 82.49%                                |
| Dirty   | 27.63%         | 8.81%            | 12.44%                                |
| Containing pizza  | 5.26%          | 5.03%            | 5.08%                                 |

### 5.3 Tetra Pak® and gable top containers

Tetra Pak® and gable top containers were separated into two categories during the audit – containers that were used for drinks (including milk products, such as rice milk, almond milk, soy milk etc), and other containers (predominately used for products such as vegetable or meat stock, or yoghurt).



Examples of Tetra Pak® and gable top containers

The containers were weighed and counted. Table 5.6 provides the results of this analysis.

**Table 5.6 – Weight and number of Tetra Pak® and gable top containers in domestic kerbside rubbish and recycling collections**

| Overview of Tetra Pak® and gable top containers in domestic kerbside rubbish and recycling | Tetra Pak® and gable top drink containers | Tetra Pak® and gable top other containers | All Tetra Pak® and gable top containers |
|--|---|---|---|
| <b>Domestic kerbside rubbish</b>   |   |   |   |
| Kg per HH per annum  | 1.3 kg                                    | 0.1 kg                                    | 1.4 kg                                  |
| # per HH per annum   | 24.4                                      | 3.4                                       | 27.8                                    |
| <b>Domestic kerbside recycling</b>   |   |   |   |
| Kg per HH per annum  | 1.0 kg                                    | 0.1 kg                                    | 1.0 kg                                  |
| # per HH per annum   | 16.9                                      | 1.5                                       | 18.4                                    |
| <b>Domestic kerbside rubbish and recycling combined</b>                                    |   |   |   |
| Kg per HH per annum  | 2.3 kg                                    | 0.2 kg                                    | 2.5 kg                                  |
| # per HH per annum   | 41.3                                      | 4.9                                       | 46.2                                    |

Of the eight location included in the audit, only four accept Tetra Pak® and gable top containers in their recycling collections. Tetra Pak® and gable top containers are discussed further in the report on contamination and missed capture.

## 6. METAL PACKAGING

### 6.1. Metal packaging - by weight

Metal packaging comprised 1.73% of domestic kerbside rubbish, and 4.80% of domestic kerbside recycling.

In this report, metal packaging includes steel and aluminium cans, other aluminium packaging, aluminium foil, aerosol cans and metal lids and bottle top.

The following Table 6.1 provides the composition of metal packaging in the domestic kerbside rubbish, as a proportion of all metal packaging in the rubbish, as a proportion of all material in the rubbish, and per kg per household per annum.

Table 6.2 on the following page provides the same information for metal packaging in domestic kerbside recycling collections. Table 6.3 combines the two data sets to provide overall quantity and composition data for metal packaging across both domestic kerbside rubbish and recycling collections.

**Table 6.1 – Composition of metal packaging in domestic kerbside rubbish, by weight**

| Metal packaging in domestic kerbside rubbish | Proportion of each type of metal packaging in rubbish | Proportion of all rubbish | Kg per household per annum |
|--|---|---------------------------|----------------------------|
| Steel cans                                   | 47.54%  | 0.82%                     | 3.7 kg                     |
| Aluminium cans                               | 11.34%  | 0.20%                     | 0.9 kg                     |
| Other aluminium containers                   | 2.21%   | 0.04%                     | 0.2 kg                     |
| Aerosol cans                                 | 22.19%  | 0.38%                     | 1.7 kg                     |
| Aluminium foil                               | 11.22%  | 0.19%                     | 0.9 kg                     |
| Metal bottle tops and lids                   | 5.49%   | 0.10%                     | 0.4 kg                     |
| <b>Total metal packaging</b>                 | <b>100.00%</b>  | <b>1.73%</b>              | <b>7.7 kg</b>              |

Steel cans are the most common type of metal packaging in the rubbish, by weight, with steel cans comprising 0.82% of domestic kerbside rubbish.

Table 6.2 provides the composition of metal packaging in domestic kerbside recycling collections. Metal packaging comprised 4.80% of the domestic kerbside recycling collections.

**Table 6.2 – Composition of metal packaging in domestic kerbside recycling, by weight**

| Metal packaging in domestic kerbside recycling | Proportion of each type of metal packaging in recycling | Proportion of all recycling | Kg per household per annum |
|--|---|-----------------------------|----------------------------|
| Steel cans                                     | 62.86%  | 3.01%                       | 7.1 kg                     |
| Aluminium cans                                 | 24.76%  | 1.19%                       | 2.8 kg                     |
| Other aluminium containers                     | 0.47%   | 0.02%                       | 0.1 kg                     |
| Aerosol cans                                   | 4.67%   | 0.22%                       | 0.5 kg                     |
| Aluminium foil                                 | 1.94%   | 0.09%                       | 0.2 kg                     |
| Metal bottle tops and lids                     | 5.29%   | 0.25%                       | 0.6 kg                     |
| <b>Total metal packaging</b>                   | <b>100.00%</b>  | <b>4.80%</b>                | <b>11.3 kg</b>             |

Steel cans were also the most common type of metal packaging in the recycling, by weight, with steel cans comprising 3.01% of domestic kerbside recycling.

Table 6.3 shows the composition of metal packaging in the domestic kerbside rubbish and recycling combined, and per kg per household per annum.

Note: all territorial authorities in the audit accepted aerosol cans in domestic kerbside recycling and all but one territorial authority accepted aluminium foil<sup>6</sup>.

**Table 6.3 - Composition of metal packaging in domestic kerbside rubbish and recycling, by weight**

| <b>Metal packaging in domestic kerbside rubbish and recycling</b> | <b>Proportion of each type of metal packaging in rubbish and recycling</b> | <b>Proportion of all rubbish and recycling</b> | <b>Kg per household per annum</b> |
|---|--|--|-----------------------------------|
| Steel cans  | 56.63%   | 1.58%  | 10.8 kg                           |
| Aluminium cans  | 19.30%   | 0.54%  | 3.7 kg                            |
| Other aluminium containers  | 1.18%  | 0.03%  | 0.2 kg                            |
| Aerosol cans  | 11.80%   | 0.33%  | 2.2 kg                            |
| Aluminium foil  | 5.72%  | 0.16%  | 1.1 kg                            |
| Metal bottle tops and lids  | 5.37%  | 0.15%  | 1.0 kg                            |
| <b>Total metal packaging</b>                                      | <b>100.00%</b>   | <b>2.79%</b>                                   | <b>19.0 kg</b>                    |

The average New Zealand household disposed of 19.0 kg of metal packaging per annum through kerbside rubbish and recycling collections.

During the audit, all pieces of aluminium foil were recorded as clean, dirty or as containing something (generally food). This was a subjective analysis, and often based on weight rather than on trying to untangle every piece of scrunched up foil to determine its cleanliness. There was also a subjective differentiation between dirty foil and foil containing material. Does residual grilled cheese stuck to foil mean that it's dirty or contains product? It is likely that the auditors had different thresholds for these categories.

The results of this analysis are presented below in Table 6.4

**Table 6.4 – Cleanliness of aluminium foil in domestic kerbside rubbish and recycling**

| <b>Aluminium foil in domestic kerbside rubbish and recycling</b> | <b>Rubbish</b> | <b>Recycling</b> | <b>Rubbish and recycling combined</b> |
|--|----------------|------------------|---------------------------------------|
| Clean  | 46.3%          | 82.5%            | 52.9%                                 |
| Dirty  | 46.2%          | 8.8%             | 39.4%                                 |
| Containing product   | 7.5%           | 8.8%             | 7.7%                                  |

These results indicate that there is a higher proportion of clean aluminium foil in recycling than in rubbish.

<sup>6</sup> At the time the research was conducted only 47 councils accepted aerosol cans for recycling and only 20 accepted aluminium foil

## 6.2. Metal packaging - by count

Some types of metal packaging items in the rubbish and recycling were counted as part of this project. These numbers have been extrapolated to provide data on the number of each type of metal packaging in an average household’s rubbish and recycling per annum, and the number disposed of to domestic kerbside recycling and rubbish nationally, per annum.

Aluminium foil is included in this count, however, it is present in the rubbish and recycling in a range of sizes, from tiny scraps to large bundles. Unlike the other metal packaging items, aluminium foil is not a solid container – it can be torn into many little pieces.

These extrapolations have been undertaken by calculating the average number of containers per tonne of rubbish and recycling, based on the total number of each type of container present across the eight territorial areas included in the audit. The results of the audit were not weighted based on the size of the territorial areas, as the number of items in each area was too low. It was deemed more reliable to extrapolate the total number of items across all areas.

The average number per tonne was then used to calculate the number per annual household set out.

**Table 6.5 – Number of items of metal packaging in domestic kerbside collections**

| Metal packaging in domestic kerbside collections | # in rubbish per household per annum | # in recycling per household per annum | # in rubbish and recycling per household per annum |
|--|--------------------------------------|--|--|
| Steel cans                                       | 47.1                                 | 107.8                                  | 155.0  |
| Aluminium cans                                   | 50.1                                 | 168.2                                  | 218.3  |
| Other aluminium containers                       | 12.7                                 | 10.4                                   | 23.1   |
| Aerosol cans                                     | 9.2                                  | 4.8                                    | 14.0   |
| Aluminium foil                                   | 41.6                                 | 6.8                                    | 48.4   |
| Metal bottle tops and lids                       | 79.2                                 | 90.9                                   | 170.1  |
| <b>Total metal packaging</b>                     | <b>239.9</b>                         | <b>388.9</b>                           | <b>628.8</b>                                       |

At two audit locations, a volunteer associated with WasteMINZ undertook a small additional analysis of aerosol cans. Aerosol cans can be manufactured from steel or aluminium. Of the 78 aerosol cans studied by the volunteers, collected from both rubbish and recycling, 58% were steel.



**Aerosol cans found in the recycling bins**

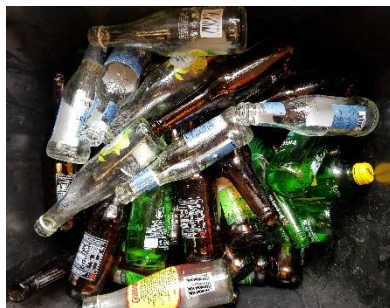
## 7. GLASS BOTTLES AND JARS

### 7.1. Glass bottles and jars - by weight

For this project, glass bottles and jars were sorted into three categories:

- Small glass drink bottles under 750 ml - this included alcoholic and non-alcoholic drink bottles (e.g. beer bottles, juice bottles, soft drink bottles)
- Large glass drink bottles 750 ml and above - this only included alcoholic drink bottles, such as wine, liqueur and spirit bottles.
- All other glass bottles and jars - all glass bottles larger than 750 ml used for non-alcoholic drinks, all glass bottles used for non-beverages (e.g. olive oil, soy sauce etc), and all glass jars

Glass items that were not glass bottles or jars (such as light bulbs, mirrors, windowpanes etc.) were excluded from this analysis, and were classified as 'All other materials', as these items cannot be recycled.



**Small glass drink bottles**



**Large glass drink bottles**



**All other glass containers**

Glass bottles and jars comprised 2.31% of domestic kerbside rubbish, and 40.33% of domestic kerbside recycling.

Table 7.1 provides the composition of glass bottles and jars in the domestic kerbside rubbish, as a proportion of all glass bottles and jars in the rubbish, as a proportion of all material in the rubbish, and per kg per household per annum.

Table 7.2 provides the same information for glass bottles and jars in domestic kerbside recycling collections. Table 7.3 combines the two data sets to provide overall quantity and composition data for glass bottles and jars across both domestic kerbside rubbish and recycling collections.

**Table 7.1 – Composition of glass bottles and jars in domestic kerbside rubbish, by weight**

| Glass bottles and jars in domestic kerbside rubbish | Proportion of each type of glass bottles and jars in rubbish | Proportion of all rubbish | Kg per household per annum |
|---|--|---------------------------|----------------------------|
| Small glass drink bottles                           | 50.53%   | 1.17%                     | 5.2 kg                     |
| Large glass drink bottles                           | 12.18%   | 0.28%                     | 1.3 kg                     |
| All other glass containers                          | 37.29%   | 0.86%                     | 3.8 kg                     |
| <b>Total glass bottles and jars</b>                 | <b>100.00%</b>   | <b>2.31%</b>              | <b>10.3 kg</b>             |

Small glass drink bottles represented the highest proportion of glass containers in the rubbish, with 1.17% of domestic kerbside rubbish comprised of these bottles.



Table 7.2 provides the composition of glass bottles and jars in domestic kerbside recycling collections. Glass bottles and jars comprised 40.33% of the domestic kerbside recycling collection.

**Table 7.2 – Composition of glass bottles and jars in domestic kerbside recycling, by weight**

| Glass bottles and jars in domestic kerbside recycling | Proportion of each type of glass bottles and jars in recycling | Proportion of all recycling | Kg per household per annum |
|---|--|-----------------------------|----------------------------|
| Small glass drink bottles                             | 46.87%   | 18.90%                      | 44.4 kg                    |
| Large glass drink bottles                             | 37.34%   | 15.06%                      | 35.4 kg                    |
| All other glass containers                            | 15.79%   | 6.37%                       | 15.0 kg                    |
| <b>Total glass bottles and jars</b>                   | <b>100.00%</b>   | <b>40.33%</b>               | <b>94.8 kg</b>             |

Small glass drink bottles were also the largest component of glass containers, by weight, in the recycling, with 18.90% of domestic kerbside recycling comprised of these bottles.

Table 7.3 shows the composition of glass bottles and jars in the domestic kerbside rubbish and recycling combined, and per kg per household per annum.

**Table 7.3 - Composition of glass bottles and jars in domestic kerbside rubbish and recycling, by weight**

| Glass bottles and jars in domestic kerbside rubbish and recycling | Proportion of each type of glass bottles and jars in rubbish and recycling | Proportion of all rubbish and recycling | Kg per household per annum |
|---|--|---|----------------------------|
| Small glass drink bottles   | 47.22%   | 7.29%                                   | 49.6 kg                    |
| Large glass drink bottles   | 34.88%   | 5.38%                                   | 36.6 kg                    |
| All other glass containers  | 17.90%   | 2.76%                                   | 18.8 kg                    |
| <b>Total glass bottles and jars</b>                               | <b>100.00%</b>   | <b>15.44%</b>                           | <b>105.1 kg</b>            |

The average New Zealand household disposed of 105.1 kg of glass bottles and jars per annum through kerbside rubbish and recycling collections.

## 7.2. Glass bottles and jars - by count

The number of each type of glass bottles and jars in the rubbish and recycling was counted as part of this project. These numbers have been extrapolated to provide data on the number of each type of glass container in an average household's rubbish and recycling per annum, and the number disposed of to domestic kerbside recycling and rubbish nationally, per annum.

These extrapolations have been undertaken by calculating the average number of containers per tonne of rubbish and recycling, based on the total number of each type of container present across the eight territorial areas included in the audit. The results of the audit were not weighted based on the size of the territorial areas, as the number of items in each area was too low. It was deemed more accurate to extrapolate the total number of items across all areas.

The average number per tonne was then used to calculate the number per annual household set out.

**Table 7.4 – Number of glass bottles and jars in domestic kerbside collections**

| Glass bottles and jars in domestic kerbside collections | # in rubbish per household per annum | # in recycling per household per annum | # in rubbish and recycling per household per annum |
|---|--------------------------------------|--|--|
| Small glass drink bottles                               | 41.2                                 | 280.3                                  | 321.6  |
| Large glass drink bottles                               | 5.0                                  | 58.6                                   | 63.6   |
| All other glass containers                              | 20.7                                 | 50.7                                   | 71.4   |
| <b>Total glass bottles and jars</b>                     | <b>66.9</b>                          | <b>389.6</b>                           | <b>456.5</b>                                       |

Altogether, approximately 385 glass drink bottles are disposed of per household through domestic kerbside collections annually, and 88% of these bottles are disposed of to recycling.

## 7.1. Contents in glass bottles and jars

During auditing, if a small or large glass drink bottle still contained some contents, this was recorded. It was not recorded for All other glass containers. Table 7.5 presents the proportion of glass bottles and jars in the rubbish and recycling that still had some contents remaining.

**Table 7.5 – Glass drink bottles with contents remaining**

| Glass drink bottles with contents in domestic kerbside rubbish and recycling | % of glass drink bottles in rubbish with contents | % of glass drink bottles in recycling with contents | % of glass drink bottles in rubbish and recycling with contents |
|--|---|---|---|
| Small glass drink bottles (<750ml)   | 0.58%   | 0.45%   | 0.47%   |
| Large glass drink bottles (750ml +)  | 0.00%   | 1.06%   | 0.97%   |

## 8. FABRIC

For this project, the term ‘Fabric’ has been used to define the same materials referred to in the MfE’s Solid Waste Analysis Protocols as ‘Textiles’. The Fabric category includes items made primarily of cloth or textiles, as well as items containing some textiles and other materials, such as carpets, shoes, backpacks, suitcases etc.

During auditing, Fabric in recycling bins was separated and weighed. Fabric disposed of to rubbish bins was categorised as All other materials and was not weighed out separately. Table 8.1 provides an overview of the quantity of Fabric disposed of through domestic kerbside recycling. Eight per cent of households disposed of Fabric to domestic kerbside recycling.

**Table 8.1 – Fabric in domestic kerbside recycling**

| Fabric in domestic kerbside recycling | Proportion of contamination in recycling | Proportion of all recycling | Kg per household per annum |
|---------------------------------------|--|-----------------------------|----------------------------|
| Fabric                                | 7.13%                                    | 1.06%                       | 2.5 kg                     |

In all five audit locations, WasteMINZ requested that all Fabric from rubbish and recycling be set aside and sorted and weighed at the end of the audit week.

To gain a better understanding of the composition of Fabric, at the end of each week, Fabric set aside from rubbish and recycling was sorted into three categories:

1. Clothing
2. Bedding, towels, curtains etc
3. Other (shoes, bags, soft toys etc)

Table 8.2 provides an overview of the types of Fabric disposed of by households through domestic kerbside rubbish and recycling collections.

**Table 8.2 – Types of Fabric in domestic kerbside rubbish and recycling**

| Fabric types                        | Proportion |
|-------------------------------------|------------|
| Clothing                            | 47.5%      |
| Bedding, towels, curtains etc.      | 19.5%      |
| Others (shoes, bags, soft toys etc) | 33.1%      |

Almost half of the Fabric category was clothing. A third was shoes, bags and soft toys etc, and a further 19.5% was bedding, towels, curtains etc.

Photos of examples of these categories are provided on the following page.



**Examples of clothing in domestic rubbish and recycling**



**Examples of bedding, towels, curtains in rubbish and recycling**



**Examples of shoes, bags and soft toys in rubbish and recycling**

## 9. PLASTIC AND METAL BOTTLES TOPS AND LIDS

During the audit of rubbish and recycling, plastic and metal lids that were not attached to their original container (i.e. loose lids), were counted and weighed.

Similarly, the presence of a lid on each Plastic drink bottles #1, Plastic dairy bottles #2, and small and large glass bottle was recorded.

In this report, Plastic bottle tops and lids are defined as “All bottle tops and lids that were not attached to their original container”. This included plastic bottles tops from soft drinks and dairy products, as well as lids off ice cream, margarine and other containers.

Metal bottle tops lids are defined as “All metal bottle tops lids that were not attached to their original container, and includes lids off jars, wine bottles and caps off beer bottles”.

Territorial authorities in New Zealand provide a range of differing instructions to their residents regarding lids in recycling. Of the eight territorial authorities included in this research: five requested that bottle tops and lids be left on containers; one requested that small lids be placed in the rubbish, and large lids in the recycling; one suggested that plastic lids could be placed in the recycling bin, but didn’t specify whether they should be left on the container or not; and one territorial authority did not mention lids in their online recycling information.

### 9.1. Plastic bottle tops and lids

This section provides an overview of the information gathered on Plastic bottle tops and lids. Table 9.1 provides information on the number and weight of Plastic bottle tops and lids placed loose in the rubbish and recycling, based on the results of the audit.

**Table 9.1 – Number and weight of plastic bottle tops and lids (loose) in domestic kerbside rubbish and recycling**

| <b>Loose plastic bottle tops and lids in domestic kerbside rubbish and recycling</b> | <b>Kg per household per annum</b> | <b># in per household per annum</b> |
|--|-----------------------------------|-------------------------------------|
| <b>Rubbish</b>   | 0.8 kg                            | 80.9                                |
| <b>Recycling</b>   | 0.6 kg                            | 84.3                                |
| <b>Rubbish/recycling combined</b>  | 1.3 kg                            | 165.2                               |

Depending on the recycling operators’ processes, some Plastic bottle tops and lids placed loose into recycling are too small to be recycled and end up in fines (and are landfilled). Lids can also end up contaminating fibre bales, as they can be caught up in fibre during processing.

The following Tables 9.2 and 9.3 provide an overview of the number of plastic drink bottles that were disposed of to the rubbish or recycling with their lids on. Also included in the tables, is the proportion of that type of bottle that contained some of their contents (i.e. the lid prevented the contents from emptying out in the bin). This can be an issue for recyclers, as plastic bottles with liquid in them are not always able to be mechanically sorted and can become contamination.

**Table 9.2 – Number of Plastic drink bottles #1 with lids on and proportion containing liquid in domestic kerbside rubbish and recycling**

| Plastic drink bottles #1 with lids on in domestic kerbside rubbish and recycling | % with lids on | # per household per annum with lids on | % of all Plastic drink bottles #1 containing liquid |
|--|----------------|--|---|
| Rubbish  | 74.56%         | 27.0                                   | 11.21%  |
| Recycling  | 83.23%         | 126.4                                  | 2.91%   |
| Rubbish/recycling combined   | 81.84%         | 153.9                                  | 4.23%   |

**Table 9.3 – Number of Plastic dairy bottles #2 with lids on and proportion containing liquid in domestic kerbside rubbish and recycling**

| Plastic dairy bottles #2 with lids on in domestic kerbside rubbish and recycling | % with lids on | # per household per annum with lids on | % of Plastic dairy bottles #2 containing liquid |
|--|----------------|--|---|
| Rubbish  | 77.82%         | 12.1                                   | 12.24%  |
| Recycling  | 77.37%         | 75.4                                   | 0.98%   |
| Rubbish/recycling combined   | 77.42%         | 87.5                                   | 2.27%   |

## 9.2. Metal bottle tops and lids

This section provides an overview of the information gathered on Metal bottle tops and lids. Table 9.4 provides information on the number and weight of Metal bottle tops and lids placed loose in the rubbish and recycling, based on the results of the audit.

**Table 9.4 – Number and weight of Metal bottle tops and lids (loose) in domestic kerbside rubbish and recycling**

| Loose Metal bottle tops and lids in domestic kerbside rubbish and recycling | Kg per household per annum | # in per household per annum |
|---|----------------------------|------------------------------|
| Rubbish   | 0.4 kg                     | 79.2                         |
| Recycling   | 0.6 kg                     | 90.9                         |
| Rubbish/recycling combined  | 1.0 kg                     | 170.1                        |

The following Tables 9.5 and 9.6 provide an overview of the number of glass drink bottles that were disposed of to domestic kerbside rubbish and recycling rubbish or recycling with their metal lids on. Also included in these tables, is the proportion of that type of bottle that contained some of their contents (i.e. the lid prevented the contents from emptying out in the bin).

**Table 9.5 – Number of Small glass drink bottles with lids on in domestic kerbside rubbish and recycling**

| Small glass drink bottles with lids on in domestic kerbside rubbish and recycling | % with lids on | # per household per annum with lids on | % of all bottles containing liquid |
|---|----------------|--|------------------------------------|
| Rubbish   | 8.52%          | 3.5                                    | 0.58%                              |
| Recycling   | 8.55%          | 24.0                                   | 0.45%                              |
| Rubbish/recycling combined  | 8.55%          | 27.5                                   | 0.47%                              |

**Table 9.6 – Number of Large glass drink bottles with lids on in domestic kerbside rubbish and recycling**

| Large glass drink bottles with lids on in domestic kerbside rubbish and recycling | % with lids on | # in per household per annum with lids on | % of all bottles containing liquid |
|---|----------------|---|------------------------------------|
| Rubbish   | 68.09%         | 3.4                                       | 0.00%                              |
| Recycling   | 57.50%         | 33.7                                      | 1.06%                              |
| Rubbish/recycling combined  | 58.39%         | 37.1                                      | 0.97%                              |

## 10. CONTAINER RETURN SCHEME

In 2008, the New Zealand government passed the Waste Minimisation Act 2008 (WMA), which aims to reduce the environmental harm of waste and provide economic, social and cultural benefits for New Zealand. In order to achieve this aim, the Act provided a range of new tools. These include:

- imposing a levy on all waste disposed of in landfills to generate funding to help local government, communities and businesses minimise waste.
- establishing a process for government accreditation of product stewardship schemes which recognises those businesses and organisations that take responsibility for managing the environmental impacts of their products
- requiring product stewardship schemes to be developed for certain 'priority products' where there is a high risk of environmental harm from the waste or significant benefits from recovering the product
- allowing for regulations to be made to control the disposal of products, materials or waste, require take-back services, deposit fees or labelling of products
- allowing for regulations to be made that make it mandatory for certain groups (eg, landfill facility operators) to report on waste to improve information on waste minimisation
- clarifying the roles and responsibilities of territorial authorities with respect to waste minimisation
- establishing the Waste Advisory Board to give independent advice to the Minister for the Environment on waste minimisation issues.<sup>7</sup>

In August 2019, the Ministry for the Environment (MfE) released a consultation document on proposed regulated product stewardship schemes for six priority products. These priority products include tyres, electrical and electronic products (e-waste), agrichemicals and their containers, refrigerants and other synthetic greenhouse gases, farm plastics, and packaging (specifically single use beverage containers).

In September 2019, the Associate Minister for the Environment, Eugenie Sage, announced that funding had been provided to Auckland Council and Marlborough District Council through the Ministry for the Environment's Waste Minimisation Fund, to set up a project team and working group to co-design a product stewardship scheme for packaging. This scheme is referred to as a Container Return Scheme (CRS).

One of the aims of this Rethinking Rubbish and Recycling project was to gather data on beverage containers disposed of through domestic kerbside rubbish and recycling collections. This report specifically focuses on presenting this data and making it available to interested parties involved in developing a Container Return Scheme.

### 10.1. Number and weight of beverage containers

The parameters of a New Zealand Container Return Scheme (CRS) have not yet been defined, and the type of containers to be included in a CRS have yet to be confirmed.

This report provides information on all plastic, glass, and fibre beverage containers. Liquid dairy products (and non-dairy milk products such as soymilk and almond milk) have been classified as beverages (milk and cream).

A small number of plastic drink bottles #2 are excluded from this analysis, as when the project was designed, the project team was unaware that there were any drinks sold in plastic containers #2, other than dairy products. Therefore, a separate category for drink containers (other than dairy) was not created. A very small number of drinks were subsequently discovered to be sold in plastic containers #2 which were primarily cold pressed juices.

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<sup>7</sup> <https://www.mfe.govt.nz/waste/waste-strategy-and-legislation/waste-minimisation-act>



Plastic and glass beverage containers are classified by size. Plastic bottles are divided into bottles under 1-litre, and bottles 1-litre and over. This size classification places most milk bottles into the large plastic dairy bottles #2 category, and most cream bottles into the small plastic dairy bottles #2 category.

Glass bottles are divided into bottles under 750 ml, which mainly consist of beer bottles and juice and soft drink bottles, and bottles 750 ml and over, which includes most wine bottles and spirit bottles.

All other glass bottles and jars are omitted from the analysis, as they are not beverage containers. It should be noted that if CRS is introduced to New Zealand, approximately 19 kg (or 71 items) of All other glass bottles and jars would still be disposed of to kerbside rubbish and recycling collections annually.

Table 10.1 provides information on the number and weight of beverage containers in domestic kerbside rubbish collections. The number and weight of beverage containers in recycling and in rubbish and recycling combined are provided in Tables 10.2 and 10.3 on the following page.

This table provides an overview of all beverage containers (except for drink bottles #2) and does not necessarily align with the eventual parameters of a Container Return Scheme (e.g. small plastic dairy bottles #2 (< 1-litre) are mostly cream containers. These may or may not be included in a CRS).

**Table 10.1 – Composition of beverage containers in domestic kerbside rubbish, by weight and count**

| Beverage containers in domestic kerbside rubbish     | Kg in rubbish per household per annum | # in rubbish per household per annum |
|--|---------------------------------------|--------------------------------------|
| <i>Small plastic drink bottles #1 (&lt; 1-litre)</i> | 1.2 kg                                | 19.3                                 |
| <i>Large plastic drink bottles #1 (1-litre +)</i>    | 1.0 kg                                | 16.9                                 |
| <b>All plastic drink bottles #1</b>                  | <b>2.2 kg</b>                         | <b>36.2</b>                          |
| <i>Small plastic dairy bottles #2 (&lt; 1-litre)</i> | 0.3 kg                                | 5.6                                  |
| <i>Large plastic dairy bottles #2 (1-litre +)</i>    | 0.6 kg                                | 9.9                                  |
| <b>All plastic dairy bottles #2</b>                  | <b>0.9 kg</b>                         | <b>15.6</b>                          |
| <b>All aluminium cans</b>                            | <b>0.9 kg</b>                         | <b>50.1</b>                          |
| <i>Small glass drink bottles (&lt;750ml)</i>         | 5.2 kg                                | 41.2                                 |
| <i>Large glass drink bottles (750ml +)</i>           | 1.3 kg                                | 5.0                                  |
| <b>All glass bottles</b>                             | <b>6.4 kg</b>                         | <b>46.2</b>                          |
| <b>Tetra Pak®/gable top drink containers</b>         | <b>1.3 kg</b>                         | <b>24.4</b>                          |
| <b>Total beverage containers</b>                     | <b>11.7 kg</b>                        | <b>172.5</b>                         |

Table 10.2, on the following page, provides information on the number and weight of beverage containers in domestic kerbside recycling collections.

**Table 10.2 – Composition of beverage containers in domestic kerbside recycling, by weight and count**

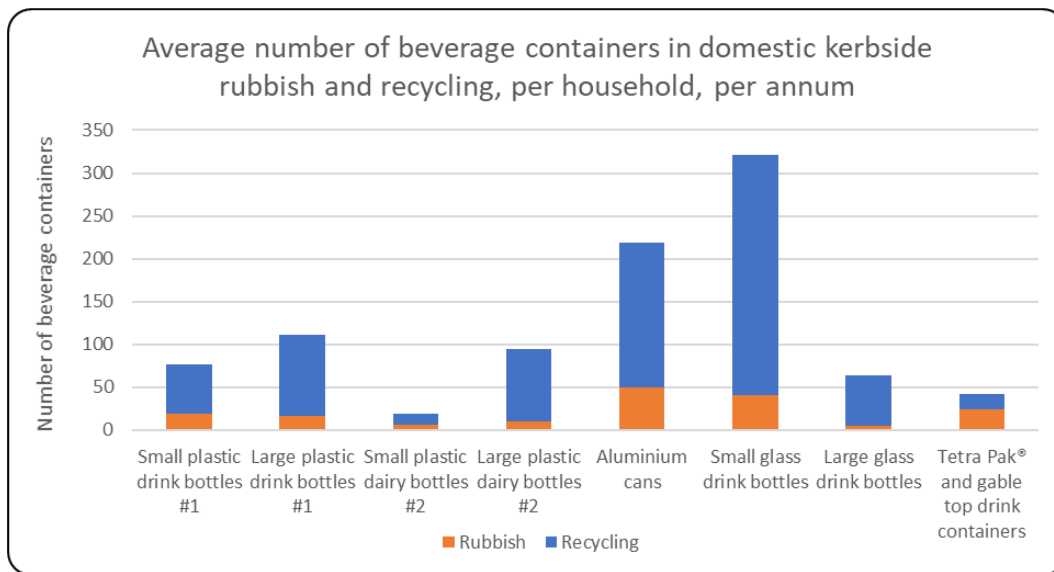
| Beverage containers in domestic kerbside recycling   | Kg in recycling per household per annum | # in recycling per household per annum |
|--|---|--|
| <i>Small plastic drink bottles #1 (&lt; 1-litre)</i> | 2.6 kg                                  | 57.3                                   |
| <i>Large plastic drink bottles #1 (1-litre +)</i>    | 4.3 kg                                  | 94.6                                   |
| <b>All plastic drink bottles #1</b>                  | <b>7.0 kg</b>                           | <b>151.8</b>                           |
| <i>Small plastic dairy bottles #2 (&lt; 1-litre)</i> | 0.6 kg                                  | 13.2                                   |
| <i>Large plastic dairy bottles #2 (1-litre +)</i>    | 3.6 kg                                  | 84.3                                   |
| <b>All plastic dairy bottles #2</b>                  | <b>4.2 kg</b>                           | <b>97.4</b>                            |
| <b>All aluminium cans</b>                            | <b>2.8 kg</b>                           | <b>168.2</b>                           |
| <i>Small glass drink bottles (&lt;750ml)</i>         | 44.4 kg                                 | 280.3                                  |
| <i>Large glass drink bottles (750ml +)</i>           | 35.4 kg                                 | 58.6                                   |
| <b>All glass bottles</b>                             | <b>79.8 kg</b>                          | <b>338.9</b>                           |
| <b>Tetra Pak®/gable top drink containers</b>         | <b>1.0 kg</b>                           | <b>16.9</b>                            |
| <b>Total beverage containers</b>                     | <b>94.7 kg</b>                          | <b>773.3</b>                           |

Table 10.3 provides information on the number and weight of beverage containers in domestic kerbside rubbish and recycling collections combined.

**Table 10.3 – Composition of beverage containers in domestic kerbside rubbish and recycling, by weight and count**

| Beverage containers in domestic kerbside rubbish and recycling combined | Kg in rubbish and recycling per household per annum | # in rubbish and recycling per household per annum |
|---|---|--|
| <i>Small plastic drink bottles #1 (&lt; 1-litre)</i>                    | 3.8 kg  | 76.5   |
| <i>Large plastic drink bottles #1 (1-litre +)</i>                       | 5.3 kg  | 111.5  |
| <b>All plastic drink bottles #1</b>                                     | <b>9.1 kg</b>                                       | <b>188.0</b>                                       |
| <i>Small plastic dairy bottles #2 (&lt; 1-litre)</i>                    | 0.9 kg  | 18.8   |
| <i>Large plastic dairy bottles #2 (1-litre +)</i>                       | 4.2 kg  | 94.2   |
| <b>All plastic dairy bottles #2</b>                                     | <b>5.1 kg</b>                                       | <b>113.0</b>                                       |
| <b>All aluminium cans</b>   | <b>3.7 kg</b>                                       | <b>218.3</b>                                       |
| <i>Small glass drink bottles (&lt;750ml)</i>                            | 49.6 kg   | 321.6  |
| <i>Large glass drink bottles (750ml +)</i>                              | 36.6 kg   | 63.6   |
| <b>All glass bottles</b>  | <b>86.3 kg</b>                                      | <b>385.2</b>                                       |
| <b>Tetra Pak®/gable top drink containers</b>                            | <b>2.3 kg</b>                                       | <b>41.3</b>  |
| <b>Total beverage containers</b>  | <b>106.4 kg</b>                                     | <b>945.8</b>                                       |

Figure 10.1 provides an overview of the average number of beverage containers in rubbish and recycling collections, per household, per annum.



**Figure 10.1 – Average number of beverage containers in domestic kerbside rubbish and recycling collections, per household, per annum**

Table 10.4 provides an overview of the proportion of each type of beverage container, by count, that is currently disposed of to rubbish and to recycling.

**Table 10.4 – Proportion of beverage containers disposed of to domestic kerbside rubbish and domestic kerbside recycling, by count**

| Beverage containers in domestic kerbside collections | Proportion in rubbish | Proportion in recycling |
|--|-----------------------|-------------------------|
| <i>Small plastic drink bottles #1 (&lt; 1-litre)</i> | 25.18%                | 74.82%                  |
| <i>Large plastic drink bottles #1 (1-litre +)</i>    | 15.16%                | 84.84%                  |
| <b>All plastic drink bottles #1</b>                  | <b>19.24%</b>         | <b>80.76%</b>           |
| <i>Small plastic dairy bottles #2 (&lt; 1-litre)</i> | 30.01%                | 69.99%                  |
| <i>Large plastic dairy bottles #2 (1-litre +)</i>    | 10.56%                | 89.44%                  |
| <b>All plastic dairy bottles #2</b>                  | <b>13.79%</b>         | <b>86.21%</b>           |
| <b>All aluminium cans</b>                            | <b>22.96%</b>         | <b>77.04%</b>           |
| <i>Small glass drink bottles (&lt; 750ml)</i>        | 12.82%                | 87.18%                  |
| <i>Large glass drink bottles (750ml +)</i>           | 7.86%                 | 92.14%                  |
| <b>All glass bottles</b>                             | <b>12.00%</b>         | <b>88.00%</b>           |
| <b>Tetra Pak®/gable top drink containers</b>         | <b>59.13%</b>         | <b>40.87%</b>           |
| <b>Total beverage containers</b>                     | <b>18.24%</b>         | <b>81.76%</b>           |

Based on the results of these audits, 81.76% of beverage containers currently disposed of to domestic kerbside collections are being recycled.

However, it should be noted that these results are based on the disposal habits of residents in eight territorial authority areas with varying instructions for recycling. Only half of these territorial authorities accept Tetra Pak® and gable top drink containers for recycling, and one of the territorial authorities does not accept glass for recycling.

A further discussion of Tetra Pak®/gable top drink containers and glass bottles is provided in Section 8.

## 10.2. Volume of beverage containers

During the course of the auditing undertaken for this project, WasteMINZ asked SYCL whether it was possible to gather information on the volume of containers. This was requested to enable territorial authorities to model the impact on collections and collection frequency if a CRS was implemented (i.e. the impact on the fullness of bins, determining how often they require collecting).

While this was not one of the key deliverables of the research, SYCL attempted to gather some relevant data. This was undertaken by setting aside all beverage containers over a week of auditing, and at the end of the week filling 70-litre recycling crates with each type of container while counting them. This was done several times over for each container type, and an average number of containers per 70-litre crate was calculated. This was used to calculate the volume of each container (i.e. the amount of space taken up by each type of container in a rubbish or recycling bin).

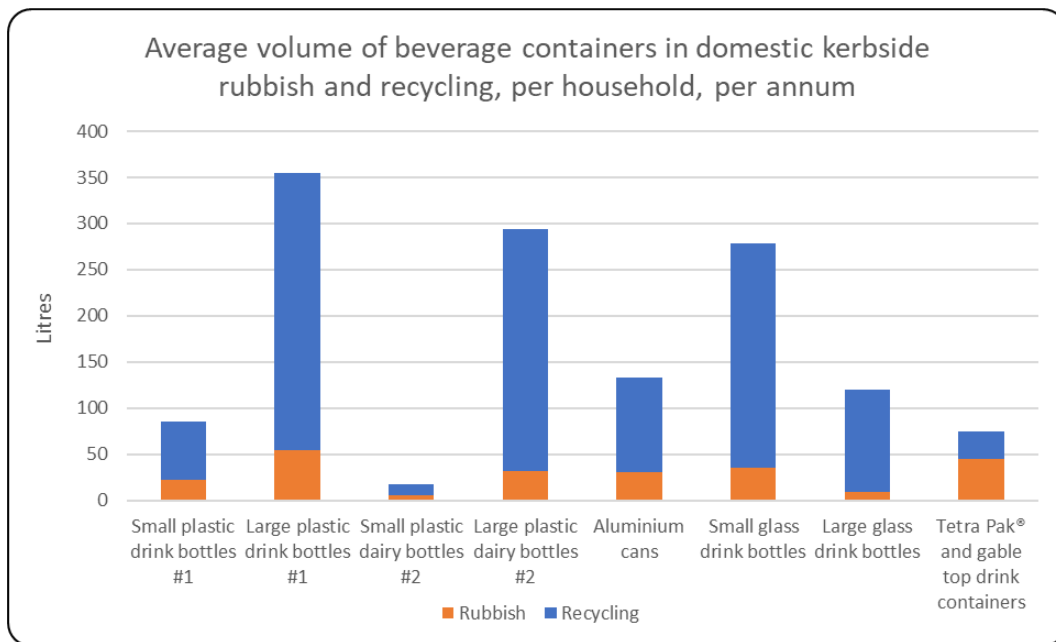
This is a rough calculation and is meant as an estimate only. It is based on a crate being filled with a single type of container, rather than a mixture of container types and materials as is the case in rubbish and recycling bins and bags. The volume calculated for each beverage container is provided in Appendix E.

Table 10.5 provides the approximate volume of beverage containers (in litres) in the average household's rubbish and recycling per annum.

**Table 10.5 – Average volume of beverage containers in domestic kerbside rubbish and recycling, per household, per annum**

| Volume of beverage containers in domestic kerbside collections | Litres in rubbish per household per annum | Litres in recycling per household per annum | Litres in rubbish and recycling per household per annum |
|--|---|---|---|
| <i>Small plastic drink bottles #1 (&lt; 1-litre)</i>           | 22  | 64  | 85  |
| <i>Large plastic drink bottles #1 (1-litre +)</i>              | 54  | 301   | 355   |
| <b>All plastic drink bottles #1</b>                            | <b>75</b>                                 | <b>365</b>                                  | <b>440</b>  |
| <i>Small plastic dairy bottles #2 (&lt; 1-litre)</i>           | 5   | 12  | 17  |
| <i>Large plastic dairy bottles #2 (1-litre +)</i>              | 31  | 263   | 294   |
| <b>All plastic dairy bottles #2</b>                            | <b>36</b>                                 | <b>275</b>                                  | <b>311</b>  |
| <b>All aluminium cans</b>                                      | <b>31</b>                                 | <b>103</b>                                  | <b>133</b>  |
| <i>Small glass drink bottles (&lt;750ml)</i>                   | 36  | 243   | 278   |
| <i>Large glass drink bottles (750ml +)</i>                     | 9   | 110   | 119   |
| <b>All glass bottles</b>                                       | <b>45</b>                                 | <b>353</b>                                  | <b>398</b>  |
| <b>Tetra Pak®/gable top drink containers</b>                   | <b>44</b>                                 | <b>31</b>                                   | <b>75</b>   |
| <b>Total beverage containers</b>                               | <b>232</b>                                | <b>1,126</b>                                | <b>1,357</b>  |

Figure 10.6, on the following page, provides an overview of the average volume of beverage containers in rubbish and recycling collections, per household, per annum.



**Figure 10.2 – Average volume of beverage containers in domestic kerbside rubbish and recycling collections, per household, per annum**

### 10.3. Coloured plastic beverage containers

Plastic containers #1 and #2 that are manufactured from coloured plastic are more difficult for recycling companies to on-sell as the range of products they can be turned into is restricted by the colouring.

The audits outlined in this report collected data on the proportion of beverage containers that are coloured. The results from this analysis are provided in Table 10.6. Note that coloured Plastic dairy bottles included primarily white plastic bottles.

**Table 10.6 – Proportion, and number, of coloured beverage containers in domestic kerbside rubbish and recycling**

| Proportion of coloured beverage containers in domestic kerbside rubbish and recycling | % of coloured bottles in rubbish | # of coloured bottles in rubbish per HH per annum | % of coloured bottles in recycling | # of coloured bottles in recycling per HH per annum | % of coloured bottles in rubbish and recycling | # of coloured bottles in rubbish and recycling per HH per annum |
|---|----------------------------------|---|------------------------------------|---|--|---|
| Plastic drink bottles #1  | 14.09%                           | 5.1   | 13.83%                             | 21.0  | 13.87%   | 26.1  |
| Plastic dairy bottles #2  | 34.13%                           | 5.3   | 26.23%                             | 25.6  | 27.13%   | 30.7  |
| <b>Total all plastic beverage containers</b>  | <b>20.25%</b>                    | <b>10.4</b>                                       | <b>18.68%</b>                      | <b>46.6</b>   | <b>18.90%</b>                                  | <b>56.8</b>   |

Based on the results of the audit, 13.87% of plastics #1 and 27.13% of Plastic #2 beverage containers are coloured.

## 10.4. Beverage containers with lids

During the audit, auditors recorded the number of plastic and glass beverage containers that had lids on.

Table 10.7 provides an overview of the proportion of plastic and glass beverage containers that are disposed of with their lids on.

**Table 10.7 – Lids on beverage containers in domestic kerbside rubbish and recycling**

| Proportion of beverage containers with lids on in domestic kerbside rubbish and recycling | Proportion of bottles in rubbish with lids on | # in rubbish per household per annum | Proportion of bottles in recycling with lids on | # in recycling per household per annum | Proportion of bottles in rubbish and recycling with lids on | # in rubbish and recycling per household per annum |
|---|---|--------------------------------------|---|--|---|--|
| Plastic drink bottles #1  | 74.56%  | 27.0                                 | 83.23%  | 126.4                                  | 81.84%  | 153.9  |
| Plastic dairy bottles #2  | 77.82%  | 12.1                                 | 77.37%  | 75.4                                   | 78.89%  | 89.1   |
| Small glass drink bottles (<750ml)  | 8.52%   | 3.5                                  | 8.55%   | 24.0                                   | 8.55%   | 27.5   |
| Large glass drink bottles (750ml +)   | 68.09%  | 3.4                                  | 57.50%  | 33.7                                   | 58.39%  | 37.1   |

Approximately 80% of plastic beverage containers are disposed of with lids attached. Just over 8% of small glass bottles have lids attached. This lower number is due to the majority of these bottles being beer bottles with caps rather than screw on lids.

Almost 60% of wine and spirit bottles are disposed of with a lid on.

The proportions of beverage containers with the lids on were very similar in rubbish and recycling.

## 10.5. Contents in beverage containers

Some beverage containers are disposed of to rubbish or recycling with a portion of their contents remaining. The proportion of beverage containers that contained some contents at the time of disposal is shown in Table 10.8. Information on contents was only gathered for bottles, not aluminium cans or Tetra Pak® and gable top drink containers.

**Table 10.8 – Beverage containers with contents remaining in domestic kerbside rubbish and recycling**

| Beverage containers with contents in domestic kerbside rubbish and recycling | % of beverage containers in rubbish with contents | % of beverage containers in recycling with contents | % of beverage containers in rubbish and recycling with contents |
|--|---|---|---|
| All plastic drink bottles #1   | 11.21%  | 2.91%   | 4.23%   |
| All plastic dairy bottles #2   | 12.24%  | 0.98%   | 2.27%   |
| Small glass drink bottles (<750ml)   | 0.58%   | 0.45%   | 0.47%   |
| Large glass drink bottles (750ml +)  | 0.00%   | 1.06%   | 0.97%   |

Based on these results, it appears that householders are more likely to place a plastic bottle still containing liquid into rubbish than into recycling.

## 10.6. Variations in recycling

What is communicated to residents as being accepted for recycling varies across the country. Each territorial authority creates its own educational materials for its recycling collections, and, each territorial authority (or group of territorial authorities, such as WasteNet Southland) has its own recycling collection and processing systems (owned or contracted). Therefore, different materials are accepted for recycling in different areas of the country. Additionally, as recycling markets change over time, territorial authorities can be left collecting materials that no longer have markets (i.e. plastic #3, 4, 6, and 7).

Tetra Pak® and gable top containers are an example of this issue. Tetra Pak® and gable top containers are accepted for recycling by four of the eight territorial authorities included in this research.

However, three of the territorial authorities included in this research that accept Tetra Pak® and gable top containers for recycling, do not have access to recycling markets, and must instead landfill them. Only one of the territorial authorities included in this research (and in fact in the country) does have a recycling market for Tetra Pak® and gable top containers.

Glass is another item that is not accepted by all territorial authorities. At time of publishing, it is believed that there are three territorial authorities in New Zealand that do not accept glass in domestic kerbside recycling, though they all offer glass drop-off facilities. One of the eight territorial authorities included in this audit does not collect glass through domestic kerbside recycling.

## 11. CONTAMINATION IN RECYCLING

### 11.1. Definition of contamination

There are certain common items that are accepted in domestic kerbside recycling collections across New Zealand, such as plastic containers #1 and #2, and steel and aluminium cans. There are other items that are accepted for recycling by some territorial authorities but not others.

Differences in what is accepted for recycling vary widely across the country, and across the eight territorial areas included in this project. Table 11.1 provides an overview of the materials collected by each territorial authority included in the audit.

It should also be noted that while a territorial authority may accept a certain material for recycling, this does not necessarily mean that that material is being recycled. Changes, over time, in commodity markets that buy recyclable materials can result in territorial authorities collecting materials that they can no longer on-sell. These materials may be stockpiled until they are able to be sold or they may be landfilled.

Plastics #3, 4, 6, 7 provide an example of this situation, with most territorial authorities continuing to accept them in domestic kerbside recycling collections, even though the international markets for these products collapsed in 2018 as a result of the China Sword policy.

**Table 11.1 – Materials accepted in domestic kerbside recycling by each territorial authority included in the audit**

| Materials accepted for recycling | Auckland Council | Clutha District Council | Dunedin City Council | Gore District Council | Hutt City Council | Invercargill City Council | Southland District Council | Whangarei District Council |
|----------------------------------|------------------|-------------------------|----------------------|-----------------------|-------------------|---------------------------|----------------------------|----------------------------|
| Plastic #1 & 2                   | Yes              | Yes                     | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Plastic #5                       | Yes              | Yes                     | Yes                  | Yes                   | No                | Yes                       | Yes                        | No                         |
| Plastic #3,4,6,7                 | Yes              | Yes                     | Yes                  | Yes                   | No                | Yes                       | Yes                        | No                         |
| Soft plastic                     | No               | No                      | No                   | Yes                   | No                | Yes                       | Yes                        | No                         |
| Polystyrene                      | No               | No                      | No                   | Yes                   | No                | Yes                       | Yes                        | No                         |
| Steel cans                       | Yes              | Yes                     | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Aerosol cans                     | Yes              | Yes                     | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Aluminium cans                   | Yes              | Yes                     | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Aluminium foil                   | Yes              | Yes                     | Yes                  | Yes                   | No                | Yes                       | Yes                        | Yes                        |
| Glass bottles & jars             | Yes              | No                      | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Fibre                            | Yes              | Yes                     | Yes                  | Yes                   | Yes               | Yes                       | Yes                        | Yes                        |
| Tetra Pak®/gable top containers  | Yes              | No                      | No                   | Yes                   | No                | Yes                       | Yes                        | No                         |

Invercargill City, Gore District and Southland District councils have a joint service agreement with Environment Southland, called WasteNet Southland, to provide co-ordinated delivery of solid waste services. In line with this agreement, the same materials are accepted for recycling through domestic kerbside recycling collection within the three territorial authorities. WasteNet Southland accepts soft plastics and polystyrene, materials that are not accepted through other domestic kerbside recycling collections in New Zealand.

This report does not present the audit data from individual territorial authorities, instead combining the data from each audit to generate 'national' data. While it has not been possible to select eight territorial authorities



that are representative of the range of rubbish and recycling systems provided across New Zealand, and whose population represents the proportion of the New Zealand population that uses each particular rubbish and recycling system, effort has been made to include a cross-section of systems.

The eight territorial authorities in this project provide a range of different types of rubbish collection, including weekly wheelie bin collections, fortnightly wheelie bin collections, weekly rubbish bags collections, user-pays and rates funded collections, and private and territorial authority rubbish collections.

In this report, the definitions of recyclable materials and non-recyclable materials do not specifically align with those of any of the territorial authorities included in the project. A list of what was defined as recyclable for the purposes of this report is provided in Table 11.2. This list has been designed to include most materials accepted in domestic kerbside recycling collections in New Zealand.

During the audit, non-recyclable materials in domestic kerbside recycling were sorted into ten categories. Nine of these categories are specific types of items (e.g. soft plastic, food etc.), and one category is a catch-all for all other non-recyclable materials, called for the purposes of this report, 'All other materials'.

**Table 11.2 – Materials defined as recyclable in this report**

| <b>Materials defined as recyclable</b> |   |
|--|---|
| <b>Fibre</b>                           |   |
| Corrugated cardboard                   | All cardboard with a corrugated insert between two outer layers of card   |
| Newsprint, magazines, flyers           | All newspapers, magazines, flyers and other printed materials, excluding books  |
| Paper - all other                      | All other recyclable paper that does not fit into other listed categories, including office paper, books, wrapping paper etc                      |
| Paper board                            | All paper board, e.g. cereal boxes, tea boxes etc   |
| Pizza boxes                            | All pizza boxes   |
| <b>Plastic containers</b>              |   |
| Plastic drink bottles #1               | All drink bottles displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic          |
| Plastic other containers #1            | All other containers displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic       |
| Plastic dairy bottles #2               | All dairy bottles displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)                  |
| Plastic other containers #2            | All other containers displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)               |
| Plastic containers #3                  | All containers displaying a #3 recycling symbol – signalling that they are manufactured from PVC (Polyvinyl Chloride)                             |
| Plastic containers #4                  | All rigid containers displaying a #4 recycling symbol – signalling that they are manufactured from LDPE (Low-Density Polyethylene)                |
| Plastic containers #5                  | All containers displaying a #5 recycling symbol – signalling that they are manufactured from PP (Polypropylene)                                   |
| Plastic containers #6                  | All containers displaying a #6 recycling symbol – signalling that they are manufactured from PS (Polystyrene)                                     |
| Plastic containers #7                  | All containers displaying a #7 recycling symbol – signalling that they are manufactured from a type of plastic other than those listed in #1 to 6 |

|                                     |  |
|-------------------------------------|--|
| Unidentifiable plastic containers   | All containers with no recycling symbol, or on which a recycling symbol could not be located   |
| Bottle tops and lids (loose)        | All plastic bottle tops and lids that were not attached to their original container  |
| <b>Metal packaging</b>              |  |
| Steel cans                          | All steel cans (e.g. baked beans, canned fruit etc).   |
| Aluminium cans                      | All aluminium drink cans   |
| Other aluminium containers          | All aluminium containers used for food packaging (e.g. small cat food packaging)   |
| Aluminium foil                      | Aluminium foil   |
| Aerosol cans                        | All aerosol cans   |
| Metal bottle tops and lids          | All metal bottle tops and lids that were not attached to their original container (e.g. bottle tops, steel can and jar lids)                                     |
| <b>Glass bottles and jars</b>       |  |
| Small glass drink bottles (<750ml)  | All glass drink bottles, alcoholic or non-alcoholic, under 750 ml. Includes small glass beer bottles, juice bottles and soft drink bottles                       |
| Large glass drink bottles (750ml +) | All large alcoholic drink bottles, 750 ml and larger. Includes wine bottles, liqueurs and spirits  |
| All other glass bottles and jars    | All glass bottles larger than 750 ml used for non-alcoholic drinks, all glass bottles used for non-beverages (e.g. olive oil, soy sauce etc), and all glass jars |

Materials listed in Table 11.3 are considered to be non-recyclable in this report and are referred to as contamination when found in recycling bins.

**Table 11.3 – Materials defined as contamination in recycling in this report**

| <b>Materials defined as contamination in recycling</b> |   |
|--|---|
| Paper cups   | All cups made from fibre products, including single use soft drink cups, coffee cups, takeaway noodle bowls etc   |
| Tetra Pak® and gable top drink containers              | All fibre-based Tetra Pak® and gable top drink containers, including soymilk, rice milk, cow's milk, fruit juice, etc   |
| Tetra Pak® and gable top other containers              | All fibre-based Tetra Pak® and gable top non-drink containers, such as stock and yoghurt containers   |
| All other non-recyclable fibre                         | All other non-recyclable paper, including food contaminated paper, laminated paper, photographs, paper ream wrappers, receipts etc                                |
| Soft plastic   | All soft plastic, including plastic bags, bread bags, cling film, soft plastic packaging such as the outer wrapping on a packet of biscuits, plastic sachets etc. |
| Food   | All items of food (placed in recycling with or without packaging)   |
| Nappies  | Baby nappies only (adult sanitary products were classified as 'All other materials')  |
| Fabric   | All clothing, soft toys, bags, shoes and other fabrics  |
| Mixed materials (potentially recyclable)               | All mixed material packaging that could have been recycled (or part thereof could have been recycled) if the different types of material had                      |

|                     |  |
|---------------------|--|
|                     | been separated e.g. magazine wrapped in plastic, toy packaging with paperboard attached to hard plastic.   |
| All other materials | All other materials in the recycling that are not recyclable and do not fit into the above categories (e.g. green waste, polystyrene, timber, non-packaging items made from plastic, metal or glass) |

All results presented in this section are based on the above definitions of recyclable and contamination.

As soft plastics and polystyrene are accepted in the domestic kerbside recycling of three of the territorial authorities included in this research, and Tetra Pak® and gable top containers are accepted by four of the territorial authorities, where applicable a separate analysis has been provided excluding data from these territorial authorities.

## 11.2. Proportion of contamination in recycling

Based on the results of the audit, the average household recycles 235 kg of material per year, of which 14.90% (or 35.0 kg) was contamination.

Figure 3.1 provides an overview of the weight of contamination in recycling bins. The analysis in this figure was based on the raw data from the audit, without extrapolation. Note that the recycling bins in the audit included a range of containers, from commingled 240-litre wheelie bins to 60-litre recycling crates.

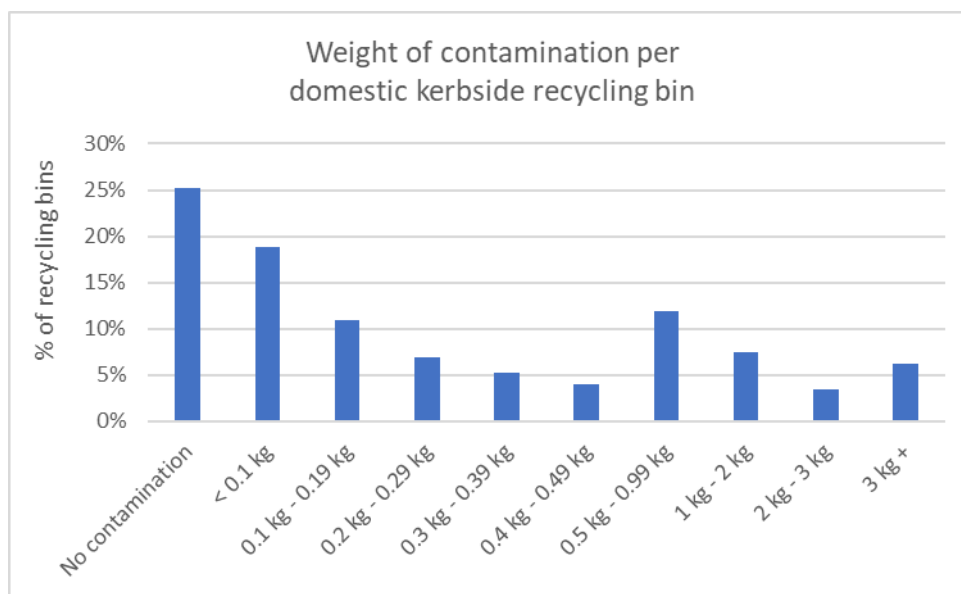


Figure 11.1 – Weight of contamination in each domestic kerbside recycling bin

Twenty-five per cent of recycling bins in the audit contained no contamination.

A total of 708 domestic kerbside recycling bins were audited as part of this project, and 14.9 % of the material in recycling bins, by weight, was material that was considered contamination based on the definitions in Table 11.3.

Table 11.4, on the following page, provides the proportion, by weight, of domestic kerbside recycling that was contamination, and the proportion of contamination represented by each type of item. The average quantity of contamination per household per annum is also presented.

Note that some of the material types defined as ‘contamination’ are acceptable in kerbside recycling collections in some of the territorial authority areas included in the audit.

These results are presented from the largest proportion to the smallest.

**Table 11.4 – Composition of contamination in domestic kerbside recycling, by weight**

| Contamination in domestic kerbside recycling | % of recycling | % of contamination | Kg per household per annum |
|--|----------------|--------------------|----------------------------|
| All other materials                          | 8.57%          | 57.50%             | 20.1 kg                    |
| Food   | 2.61%          | 17.54%             | 6.1 kg                     |
| Fabric                                       | 1.06%          | 7.13%              | 2.5 kg                     |
| Soft plastic                                 | 0.85%          | 5.73%              | 2.0 kg                     |
| Mixed materials (potentially recyclable)     | 0.50%          | 3.37%              | 1.2 kg                     |
| All other non-recyclable fibre               | 0.49%          | 3.31%              | 1.2 kg                     |
| Tetra Pak® / gable top drink containers      | 0.41%          | 2.75%              | 1.0 kg                     |
| Paper cups                                   | 0.19%          | 1.30%              | 0.5 kg                     |
| Nappies                                      | 0.17%          | 1.15%              | 0.4 kg                     |
| Tetra Pak® / gable top other containers      | 0.03%          | 0.22%              | 0.1 kg                     |
| <b>TOTAL</b>                                 | <b>14.90%</b>  | <b>100.00%</b>     | <b>35.0 kg</b>             |

When all materials from domestic kerbside recycling bins were combined, 14.90%, by weight, was contamination. Of this contamination, 57.50% was All other materials, comprised of a variety of non-recyclable items not included in the other contamination categories. A further 17.54% of contamination was Food waste, 7.13% was Fabrics, and 5.73% was Soft plastics.

Some households place many different types of contamination in their recycling, while others dispose of very little. Table 11.5 provides an overview of the proportion of households in the audit that had placed each type of contamination into their recycling bin.

**Table 11.5 – Proportion of households that dispose of contamination to domestic kerbside recycling**

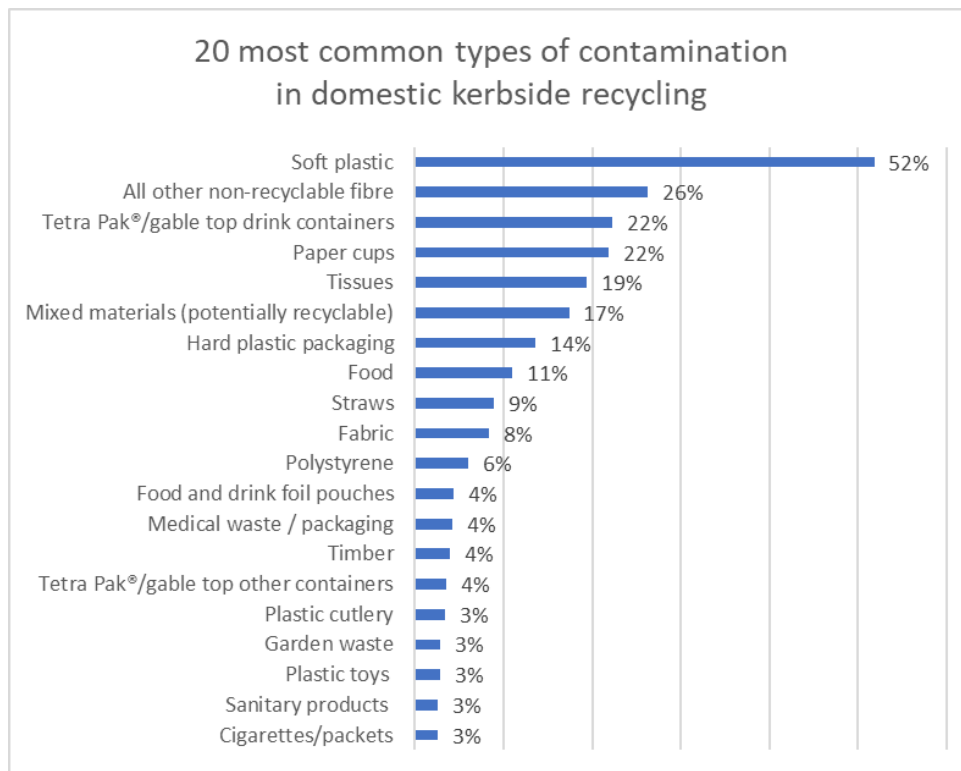
| Contamination in domestic kerbside recycling | Proportion of households that dispose of contamination to recycling |
|--|---|
| All other materials                          | 52%   |
| Soft plastic                                 | 52%   |
| All other non-recyclable fibre               | 26%   |
| Paper cups                                   | 22%   |
| Tetra Pak® / gable top drink containers      | 22%   |
| Mixed materials (potentially recyclable)     | 17%   |
| Food   | 11%   |
| Tetra Pak® / gable top other containers      | 4%  |
| Fabric                                       | 8%  |
| Nappies                                      | 0%  |

### 11.3. Top 20 contaminants in recycling

Contamination in recycling bins was sorted into ten categories, as outlined in Table 11.6. One of these categories was All other materials and included all materials that did not fit into any of the other nine categories. Before the All other materials category was weighed, an auditor recorded the types of items that were being disposed of in this category.

Figure 11.2 shows the 20 most common items disposed of as contamination, including the items categorised as All other materials and the other nine contamination categories outlined in Section 11.1.

These items are presented based on the proportion of the 708 recycling bins audited that contained each item.



**Figure 11.2 – Most common items of contamination in domestic kerbside recycling, by proportion of households**

Based on this analysis, Soft plastic was the most common item of contamination in domestic kerbside recycling bins, with 52% of recycling bins audited containing some Soft plastic. The second most common contamination was All other non-recyclable fibre, which includes receipts, photos, laminated paper etc.

Soft plastics and Polystyrene were accepted in domestic kerbside recycling collections provided by three of the eight territorial authorities included in the audit (Invercargill, Gore and Southland). When the recycling bins from these three territorial authorities are removed from the analysis, Soft plastic was still the most common type of contaminant, found in 44% of recycling bins. Polystyrene was present in 5% of recycling bins, excluding Southland, and drops from 11<sup>th</sup> place to 12<sup>th</sup> in the top 20 contaminants.

Tetra Pak® and gable top drink containers and Paper cups (coffee cups, paper water cups, paper soft drink cups etc.) were both present in 22% of the audited recycling bins. In four of the eight territorial authorities included in this audit, Tetra Pak® and gable top containers were accepted in domestic kerbside recycling collections (Invercargill, Gore, Southland, and Auckland). When the recycling bins from these four territorial authorities were removed from the analysis, Tetra Pak® and gable top drink containers were still third in the list of top contaminants and were present in 18% of recycling bins.

## 11.4. Dirty items in recycling

Most territorial authorities request that only clean items be placed into kerbside recycling bins.

During the audit, an assessment was made of most containers to determine whether they were empty, dirty or contained liquids or food. It was relatively easy to determine whether a container was empty or still contained some of its contents. Determining whether a container was dirty could be more subjective. Items can become dirty in the bin, and items can be dirty on the inside, but that was not always visible from the outside. Therefore, the results for dirtiness are somewhat subjective.

Drink bottles (plastic drink bottles #1, Plastic dairy bottles #2, small and large glass drink bottles) were not classified as being dirty, as they were either empty, or they had something in them. Plastic Other containers #2 were also not considered dirty, as they were predominantly bottles that were either empty or not.

Containers such as biscuit trays and fresh pasta trays looked clean regardless of whether they'd been washed or not.

Other items were more likely to appear dirty than others, based on the type of food they were used to package. Items such as Plastic containers #4, for example, have a relatively high level of dirtiness, as the category was almost entirely made up of tomato sauce and mustard bottles. There was also a very small sample of Plastic containers #4, which may explain the lack of containers with contents.

Plastic containers #5 and #6 were mostly used as packaging for foods such as yoghurt, margarine and hummus. Unless specifically washed, these containers were obviously dirty.

Other containers, such as biscuit trays and fresh pasta trays looked clean regardless of whether they had been washed or not.

Table 11.6, on the following page, presents the proportion of containers in recycling that were dirty or contained liquid or food.

**Table 11.6 – Proportion of containers in domestic kerbside recycling that were dirty or contain liquids or food**

| Containers in domestic kerbside recycling | Dirty  | Contain liquid or food |
|---|--------|------------------------|
| Plastic drink bottles #1                  | NA     | 2.91%                  |
| Plastic other containers #1               | 14.13% | 1.36%                  |
| Plastic dairy bottles #2                  | NA     | 0.98%                  |
| Plastic other containers #2               | NA     | 4.02%                  |
| Plastic containers #3                     | 6.67%  | 1.33%                  |
| Plastic containers #4                     | 42.11% | 0.00%                  |
| Plastic containers #5                     | 17.72% | 1.72%                  |
| Plastic containers #6                     | 27.02% | 1.65%                  |
| Plastic containers #7                     | 4.92%  | 1.64%                  |
| Unidentifiable plastic containers         | 14.40% | 3.26%                  |
| Pizza boxes                               | 8.81%  | 5.03%                  |
| Small glass drink bottles                 | NA     | 0.45%                  |
| Large glass drink bottles                 | NA     | 1.06%                  |

The container that was most likely to contain remaining contents was pizza boxes, with 5.03% of pizza boxes in recycling containing some pizza.

Plastic other containers #2 had the next highest level of remnants, at 4.02%, and 3.26% of Unidentifiable plastic containers retained some contents.

Many meat trays appeared clean, yet they still retained their plastic wrap, indicating that they were not likely to have been washed. Plastic wrap was considered contamination in recycling. Thirty-seven per cent of all Other plastic #1 containers were meat trays and a quarter of these trays in the recycling still had plastic wrap attached.

## 11.5. Reasons for contamination

There are likely to be a variety of reasons why people place non-recyclable items into their recycling bins and the reasons may vary from person to person, even within a single household. In consultation with WasteMINZ, four main reasons have been identified:

- Confusion – uncertainty as to whether an item is recyclable or not
- Assumption – an assumption that an item is recyclable because it is made of plastic or fibre
- Laziness - not caring to sort recyclables from non-recyclables
- Lack of room in their rubbish bin

It is also possible that some householders believe that items in recycling bins are salvaged for reuse and/or donated to charity, thus placing reusable clothing and toys etc into the recycling bin.

In Table 11.7, the 20 most common types of contamination in domestic kerbside recycling have been categorised based on the likelihood that a householder may be confused as to the items’ recyclability or potential for reuse. This list is subjective and would need to be substantiated by further research.

**Table 11.7 – Top 20 contaminants in domestic kerbside recycling and likelihood of confusion as to recyclability**

| Ranking in Top 20 | Possibly considered recyclable           | Ranking in Top 20 | Unlikely to be considered recyclable |
|-------------------|--|-------------------|--------------------------------------|
| 1                 | Soft plastic                             | 8                 | Food                                 |
| 2                 | Non-recyclable paper                     | 14                | Timber                               |
| 3                 | Tetra Pak®/gable top drink containers    | 17                | Garden waste                         |
| 4                 | Paper cups                               | 19                | Sanitary products                    |
| 5                 | Tissues                                  |                   |                                      |
| 6                 | Mixed materials (potentially recyclable) |                   |                                      |
| 7                 | Hard plastic packaging                   |                   |                                      |
| 9                 | Straws                                   |                   |                                      |
| 10                | Fabric (clothing)                        |                   |                                      |
| 11                | Polystyrene                              |                   |                                      |
| 12                | Food / drink foil pouches                |                   |                                      |
| 13                | Medical waste / packaging                |                   |                                      |
| 15                | Tetra Pak®/gable top other containers    |                   |                                      |
| 16                | Plastic cutlery                          |                   |                                      |
| 18                | Plastic toys                             |                   |                                      |
| 20                | Cigarettes/packets                       |                   |                                      |

Of the top 20 most common types of contamination in domestic kerbside recycling, listed in Figure 3.2, 16 are items that could 'possibly be considered recyclable'.

The top seven most common items of contamination are in the 'Possibly considered recyclable' list. The eighth item in the top 20 was food, and then the following five are also in the 'Possibly considered recyclable' list.

The top item in the top 20 most common contamination list was Soft plastic. However, the next four items were types of fibre. There may be confusion as to what types of fibre can be recycled.



## 12. MISSED CAPTURE IN RUBBISH

### 12.1. Definition of missed capture

Most domestic kerbside rubbish receptacles contain a proportion of recyclable materials. In this report, these materials are referred to as ‘missed capture’.

As discussed in Section 11.1, there are no national definitions for recyclable or non-recyclable materials in domestic kerbside collections, as these differ between territorial authorities. A list of what has been defined as recyclable for the purposes of this report, and therefore as missed capture when disposed of to rubbish, is provided in Table 12.1. This list has been designed to include most materials accepted in domestic kerbside recycling collections in New Zealand.

**Table 12.1 – Materials defined as missed capture in domestic kerbside rubbish in this report**

| <b>Materials defined as missed capture in domestic kerbside rubbish</b> |   |
|---|---|
| <b>Fibre</b>  |   |
| Corrugated cardboard  | All cardboard with a corrugated insert between two outer layers of card   |
| Newsprint, magazines, flyers  | All newspapers, magazines, flyers and other printed materials, excluding books  |
| Paper - all other   | All other recyclable paper that does not fit into other listed categories, including office paper, books, wrapping paper etc                      |
| Paper board   | All paper board, e.g. cereal boxes, tea boxes etc   |
| Pizza boxes   | All pizza boxes   |
| <b>Plastic containers</b>   |   |
| Plastic drink bottles #1  | All drink bottles displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic          |
| Plastic other containers #1   | All other containers displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic       |
| Plastic dairy bottles #2  | All dairy bottles displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)                  |
| Plastic other containers #2   | All other containers displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)               |
| Plastic containers #3   | All containers displaying a #3 recycling symbol – signalling that they are manufactured from PVC (Polyvinyl Chloride)                             |
| Plastic containers #4   | All rigid containers displaying a #4 recycling symbol – signalling that they are manufactured from LDPE (Low-Density Polyethylene)                |
| Plastic containers #5   | All containers displaying a #5 recycling symbol – signalling that they are manufactured from PP (Polypropylene)                                   |
| Plastic containers #6   | All containers displaying a #6 recycling symbol – signalling that they are manufactured from PS (Polystyrene)                                     |
| Plastic containers #7   | All containers displaying a #7 recycling symbol – signalling that they are manufactured from a type of plastic other than those listed in #1 to 6 |
| Unidentifiable plastic containers                                       | All plastic containers made solely of plastic with no recycling symbol, or on which a recycling symbol could not be located                       |

|                                      |  |
|--------------------------------------|--|
| Plastic bottle tops and lids (loose) | All plastic bottle tops and lids that were not attached to their original container  |
| <b>Metal packaging</b>               |  |
| Steel cans                           | All steel cans (e.g. baked beans, canned fruit etc).   |
| Aluminium cans                       | All aluminium drink cans   |
| Other aluminium containers           | All aluminium containers used for food packaging (e.g. small cat food packaging)   |
| Aluminium foil                       | Aluminium foil   |
| Aerosol cans                         | All aerosol cans   |
| Metal bottle tops and lids           | All metal bottle tops and lids that were not attached to their original container (e.g. glass bottle caps, metal can and jar lids)                               |
| <b>Glass bottles and jars</b>        |  |
| Small glass drink bottles (<750ml)   | All glass drink bottles, alcoholic or non-alcoholic, under 750 ml. Includes small glass beer bottles, juice bottles and soft drink bottles                       |
| Large glass drink bottles (750ml +)  | All large alcoholic drink bottles, 750 ml and larger. Includes wine bottles, liqueurs and spirits  |
| All other glass bottles and jars     | All glass bottles larger than 750 ml used for non-alcoholic drinks, all glass bottles used for non-beverages (e.g. olive oil, soy sauce etc), and all glass jars |

## 12.2. Proportion of rubbish that was missed capture

This section examines the proportion of materials in domestic kerbside rubbish that was comprised of recyclable materials (missed capture) and the proportion of households that placed recyclable materials into rubbish bins.

An analysis of recyclable items that were most commonly disposed of to rubbish is also presented.

Table 12.2, on the following page, provides the proportion, by weight, of missed capture in domestic kerbside rubbish, and the proportion of all missed capture comprised of each type of recyclable material. The average quantity of missed capture per household per annum is also presented.

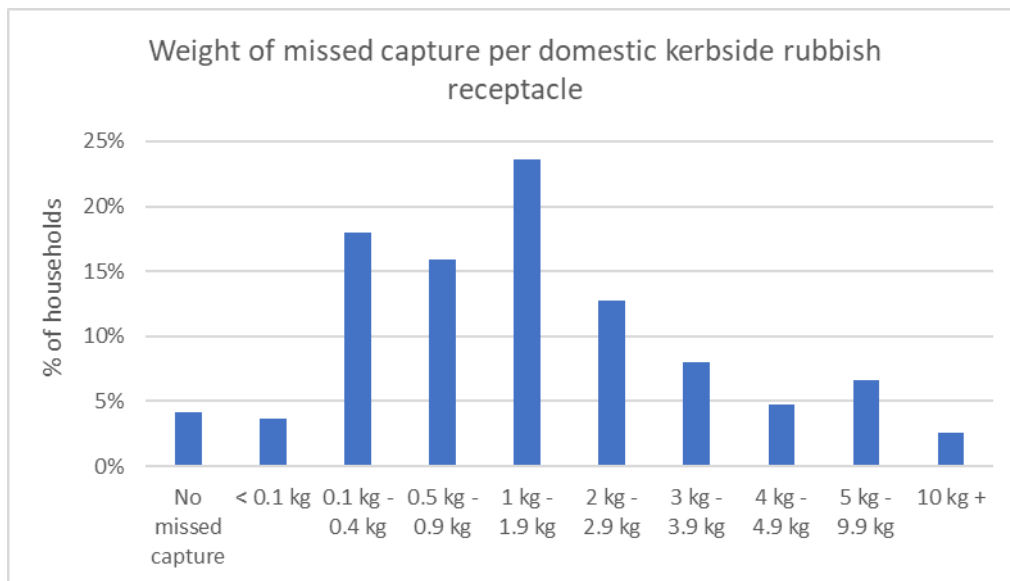
On average, 13.38% of domestic kerbside rubbish was missed capture.

**Table 12.2 – Composition of missed capture in domestic kerbside rubbish, by weight**

| Missed capture in domestic kerbside rubbish | % of rubbish  | % of missed capture | Kg per household per annum |
|---|---------------|---------------------|----------------------------|
| Corrugated cardboard                        | 0.48%         | 3.59%               | 2.1 kg                     |
| Newsprint etc                               | 1.05%         | 7.81%               | 4.7 kg                     |
| Paper - all other                           | 2.53%         | 18.91%              | 11.3 kg                    |
| Paper board                                 | 1.91%         | 14.28%              | 8.5 kg                     |
| Pizza boxes                                 | 0.11%         | 0.82%               | 0.5 kg                     |
| <b>Subtotal - Fibre</b>                     | <b>6.07%</b>  | <b>45.41%</b>       | <b>27.1 kg</b>             |
| Plastic drink bottles #1                    | 0.48%         | 3.63%               | 2.2 kg                     |
| Plastic other containers #1                 | 0.81%         | 6.05%               | 3.6 kg                     |
| Plastic dairy bottles #2                    | 0.21%         | 1.58%               | 0.9 kg                     |
| Plastic other containers #2                 | 0.40%         | 2.96%               | 1.8 kg                     |
| Plastic containers #3                       | 0.01%         | 0.04%               | 0.0 kg                     |
| Plastic containers #4                       | 0.01%         | 0.07%               | 0.0 kg                     |
| Plastic containers #5                       | 0.59%         | 4.44%               | 2.6 kg                     |
| Plastic containers #6                       | 0.13%         | 0.96%               | 0.6 kg                     |
| Plastic containers #7                       | 0.02%         | 0.18%               | 0.1 kg                     |
| Unidentifiable plastic containers           | 0.43%         | 3.20%               | 1.9 kg                     |
| Plastic bottle tops and lids                | 0.17%         | 1.27%               | 0.8 kg                     |
| <b>Subtotal - Plastic</b>                   | <b>3.26%</b>  | <b>24.37%</b>       | <b>14.5 kg</b>             |
| Steel cans                                  | 0.82%         | 6.17%               | 3.7 kg                     |
| Aluminium cans                              | 0.20%         | 1.47%               | 0.9 kg                     |
| Other aluminium containers                  | 0.04%         | 0.29%               | 0.2 kg                     |
| Aerosol cans                                | 0.38%         | 2.88%               | 1.7 kg                     |
| Aluminium foil                              | 0.19%         | 1.46%               | 0.9 kg                     |
| Metal bottle tops and lids                  | 0.10%         | 0.71%               | 0.4 kg                     |
| <b>Subtotal - Metal</b>                     | <b>1.73%</b>  | <b>12.97%</b>       | <b>7.7 kg</b>              |
| Small glass drink bottles                   | 1.17%         | 8.72%               | 5.2 kg                     |
| Large glass drink bottles                   | 0.28%         | 2.10%               | 1.3 kg                     |
| All other glass containers                  | 0.86%         | 6.43%               | 3.8 kg                     |
| <b>Subtotal - Glass</b>                     | <b>2.31%</b>  | <b>17.25%</b>       | <b>10.3 kg</b>             |
| <b>Grand Total</b>                          | <b>13.38%</b> | <b>100.00%</b>      | <b>59.6 kg</b>             |

Recyclable fibre was the material most commonly disposed of to rubbish, with 6.07% of the average domestic kerbside rubbish receptacle being comprised of fibre.

Figure 12.1 provides an overview of the weight of missed capture in each household’s rubbish receptacle. The analysis in this figure has been based on the raw data from the audit, without extrapolation.



**Figure 12.1 – Weight of missed capture in rubbish receptacles**

Some households place many different recyclable items into their rubbish, while others dispose of very little. Based on the results of the audit, only 4% of households disposed of no missed capture into their rubbish.

Table 12.3, on the following page, shows the proportion of households in the audit that had placed each type of recyclable item (missed capture) into their rubbish.

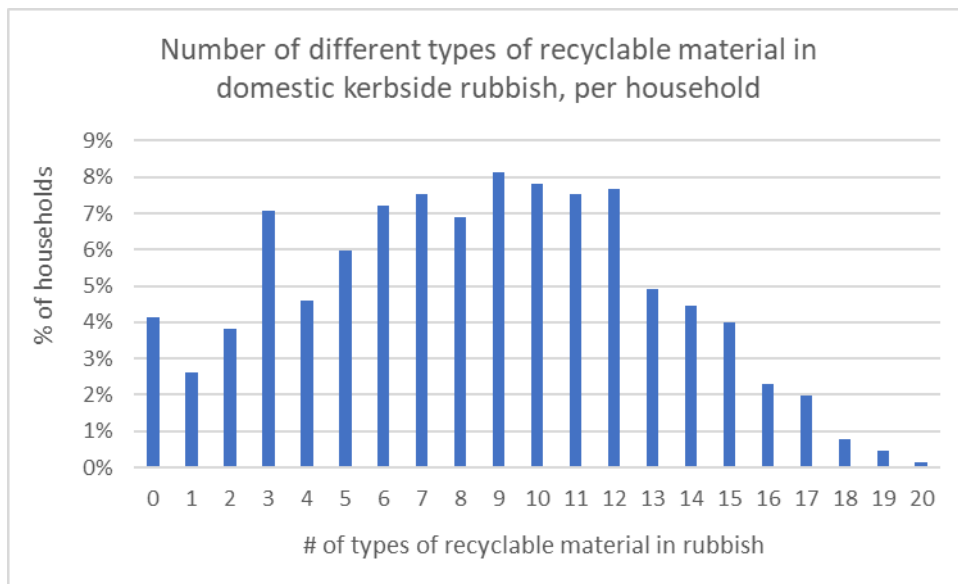
**Table 12.3 – Proportion of households that dispose of missed capture to domestic kerbside rubbish**

| <b>Missed capture in domestic kerbside rubbish</b> | <b>Proportion of households that dispose of missed capture to rubbish</b> |
|--|---|
| Paper board  | 79%   |
| Paper - all other                                  | 74%   |
| Plastic other containers #1                        | 67%   |
| Plastic containers #5                              | 61%   |
| Unidentifiable plastic containers                  | 53%   |
| Plastic bottle tops and lids                       | 54%   |
| Newsprint etc                                      | 51%   |
| Metal lids   | 46%   |
| Aluminium foil                                     | 44%   |
| Steel cans   | 40%   |
| Plastic containers #6                              | 38%   |
| Plastic other containers #2                        | 30%   |
| Aluminium cans                                     | 28%   |
| Plastic drink bottles #1                           | 27%   |
| All other glass containers                         | 26%   |
| Corrugated cardboard                               | 23%   |
| Plastic dairy bottles #2                           | 23%   |
| Small glass drink bottles                          | 18%   |
| Aerosol cans                                       | 17%   |
| Other aluminium containers                         | 10%   |
| Plastic containers #3                              | 8%  |
| Plastic containers #7                              | 7%  |
| Pizza boxes  | 6%  |
| Large glass drink bottles                          | 6%  |
| Plastic containers #4                              | 4%  |

The recyclable materials most often disposed of to rubbish were fibre – Paper board (present in 79% of rubbish bins), and Paper – all other (present in 74% of rubbish bins).

The next most frequent items were plastic Other containers #1 (present in 67% of rubbish bins), and plastic Containers #5 (present in 61% of rubbish bins).

Figure 12.2 shows the number of different types of recyclable items disposed of by households.



**Figure 12.2 – Number of types of recyclable materials in domestic kerbside rubbish**

Six per cent of households only place one or two types of recyclable items into their rubbish, while over 8% of households had nine different types of recyclable materials in their rubbish.

## GLOSSARY

**Bottle or container containing liquid or product** – a bottle or a container was classified as containing product when it still had some of its contents inside (more than just remains stuck to the sides of the container).

**Dirty** – a container was classified as dirty when it was empty, but had visible contents in it, such as an empty sauce bottle or margarine container that had not been washed.

**Domestic kerbside collections** – Collection of materials (rubbish or recycling) from the kerbside, from domestic households. These collections may be provided by territorial authority contractors or private contractors.

**Domestic kerbside recycling** – Materials set out by householders in a predetermined collection container (wheelie bin or crate) for collection at the kerbside by a territorial authority recycling collection contractor.

**Domestic kerbside rubbish** – Materials set out by householders in a predetermined collection container (wheelie bin or bag) for collection at the kerbside by either a territorial authority rubbish collection contractor or a private rubbish collection contractor.

**Empty** – a container was classified as empty when it did not contain any contents. This does not mean it has been cleaned, it simply has no visible contents.

**Fibre** – All paper and cardboard products

**Soft plastic** – All soft, flexible plastic packaging, such as plastic bags, bread bags, cling film etc.

**Trigger or pump** – The term ‘Trigger or pump’ is used to describe janitorial or personal care bottles that have a spray trigger or a push pump to dispense the product (i.e. window cleaner with a trigger, hand soap with a pump). These are often made from a different type of plastic to the bottle.

## APPENDIX A - AUDIT CLASSIFICATIONS

| <b>Primary categories</b> |   |
|---------------------------|---|
| Fibre                     | All materials in the rubbish and recycling that are made predominantly from fibre, including paper, cardboard, and Multimaterial containers such as Tetra Pak®                                    |
| Plastic containers        | All plastic containers, including bottles, jars, pottles, trays etc.  |
| Metal packaging           | All metal packaging such as steel and aluminium cans, as well as aluminium foil, aerosol cans, other aluminium packaging (such as aluminium pet food individual serve containers), and metal lids |
| Glass bottles and jars    | All glass jars and bottles  |
| All other materials       | All other materials in the rubbish or recycling that do not fit into the above categories   |

| <b>Fibre</b>                              |   |
|---|---|
| Corrugated cardboard                      | All cardboard with a corrugated insert between two outer layers of card   |
| Newsprint, magazines, flyers              | All newspapers, magazines, flyers and other printed materials, excluding books  |
| Paper all other                           | All other recyclable paper that does not fit into other listed categories, including office paper, books, wrapping paper etc.               |
| Paper board                               | All paper board, e.g. cereal boxes, tea boxes etc.  |
| Paper cups                                | All cups made from fibre products, including single use soft drink cups, coffee cups, take away noodle bowls etc.                           |
| Pizza boxes                               | All pizza boxes (including contents)  |
| Tetra Pak® and gable top drink containers | All fibre based Tetra Pak® and gable top drink containers, including soymilk, rice milk, cow's milk etc.                                    |
| Tetra Pak® and gable top other containers | All fibre based Tetra Pak® and gable top non-drink containers, such as stock and yoghurt containers.  |
| All other non-recyclable fibre            | All other non-recyclable paper, including food contaminated paper, laminated paper, photographs, paper ream wrappers, receipts etc.         |
| <b>Plastic containers</b>                 |   |
| Plastic drink bottles #1                  | All drink bottles displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic    |
| Plastic other containers #1               | All other containers displaying a #1 recycling symbol – signalling that they are manufactured from PET (Polyethylene Terephthalate) plastic |
| Plastic dairy bottles #2                  | All dairy bottles displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)            |
| Plastic other containers #2               | All other containers displaying a #2 recycling symbol – signalling that they are manufactured from HDPE (High-Density Polyethylene)         |
| Plastic containers #3                     | All containers displaying a #3 recycling symbol – signalling that they are manufactured from PVC (Polyvinyl Chloride)                       |
| Plastic containers #4                     | All containers displaying a #4 recycling symbol – signalling that they are manufactured from LDPE (Low-Density Polyethylene)                |



|  |   |
|--|---|
| Plastic containers #5                                  | All containers displaying a #5 recycling symbol – signalling that they are manufactured from PP (Polypropylene)   |
| Plastic containers #6                                  | All containers displaying a #6 recycling symbol – signalling that they are manufactured from PS (Polystyrene)   |
| Plastic containers #7                                  | All containers displaying a #7 recycling symbol – signalling that they are manufactured from a type of plastic other than those listed in #1 to 6.                |
| Unidentifiable plastic containers                      | All plastic containers with no recycling symbol, or on which a recycling symbol could not be located.   |
| Plastic bottle tops and lids (loose)                   | All plastic bottle tops and lids that were not attached to their original container   |
| <b>Metal packaging</b>                                 |   |
| Steel cans   | All steel cans (e.g. baked beans, canned fruit etc).  |
| Aluminium cans   | All aluminium drink cans  |
| Other aluminium containers                             | All aluminium containers used for food packaging (e.g. small cat food packaging)  |
| Aluminium foil   | Aluminium foil  |
| Aerosol cans   | All aerosol cans  |
| Metal bottle tops and lids                             | All metal bottle tops and lids that were not attached to their original container (e.g. glass bottle caps, metal can and jar lids)                                |
| <b>Glass bottles and jars</b>                          |   |
| Small glass drink bottles (<750ml)                     | All glass drink bottles, alcoholic or non-alcoholic, under 750 ml. Includes small glass beer bottles, juice bottles and soft drink bottles                        |
| Large glass drink bottles (750ml +)                    | All large alcoholic drink bottles, 750 ml and larger. Includes wine bottles, liqueurs and spirits   |
| All other glass bottles and jars                       | All glass bottles larger than 750 ml used for non-alcoholic drinks, all glass bottles used for non-beverages (e.g. olive oil, soy sauce etc), and all glass jars  |
| <b>Materials defined as contamination in recycling</b> |   |
| Paper cups   | All cups made from fibre products, including single use soft drink cups, coffee cups, takeaway noodle bowls etc   |
| Tetra Pak® and gable top drink containers              | All fibre-based Tetra Pak® and gable top drink containers, including soymilk, rice milk, cow's milk, fruit juice, etc   |
| Tetra Pak® and gable top other containers              | All fibre-based Tetra Pak® and gable top non-drink containers, such as stock and yoghurt containers   |
| All other non-recyclable fibre                         | All other non-recyclable paper, including food contaminated paper, laminated paper, photographs, paper ream wrappers, receipts etc                                |
| Soft plastic   | All soft plastic, including plastic bags, bread bags, cling film, soft plastic packaging such as the outer wrapping on a packet of biscuits, plastic sachets etc. |
| Food   | All items of food (placed in recycling with or without packaging)   |
| Nappies  | Baby nappies only (adult sanitary products were classified as 'All other materials')  |
| Fabric   | All clothing, soft toys, bags, shoes and other fabrics  |
| Mixed materials (potentially recyclable)               | All mixed material packaging that could have been recycled (or part thereof could have been recycled) if the different types of material had                      |

|                     |  |
|---------------------|--|
|                     | been separated e.g. magazine wrapped in plastic, toy packaging with paperboard attached to hard plastic.   |
| All other materials | All other materials in the recycling that are not recyclable and do not fit into the above categories (e.g. green waste, polystyrene, timber, non-packaging items made from plastic, metal or glass) |

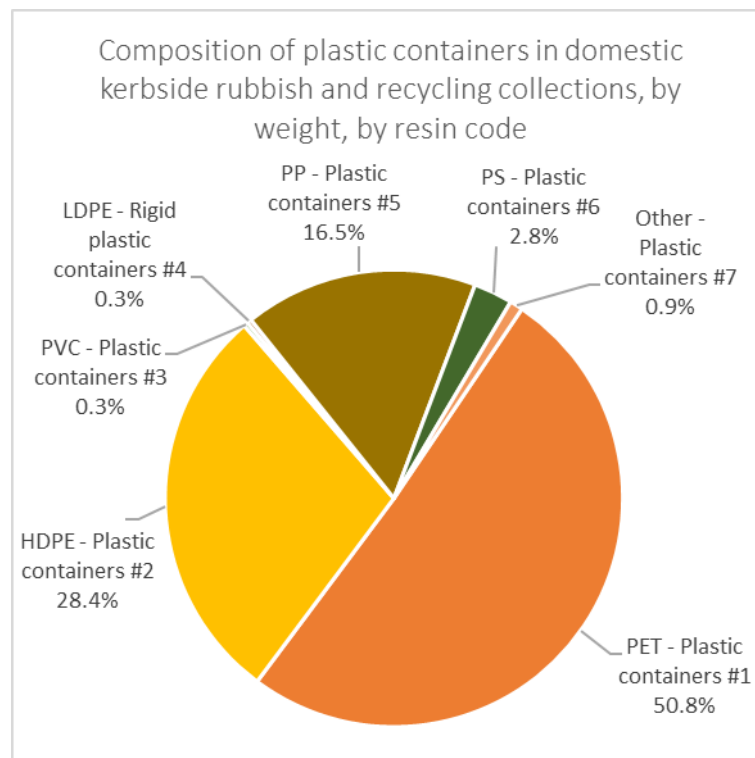
## APPENDIX B - COMPOSITION OF RUBBISH AND RECYCLING

| Composition of domestic kerbside rubbish and recycling - with contents removed | Domestic kerbside rubbish |                 | Domestic kerbside recycling |                 |
|--|---------------------------|-----------------|-----------------------------|-----------------|
|  | %                         | Kg/hh/annum     | %                           | Kg/hh/annum     |
| Corrugated cardboard   | 0.48%                     | 2.1 kg          | 10.03%                      | 23.6 kg         |
| Newsprint etc  | 1.05%                     | 4.7 kg          | 8.14%                       | 19.1 kg         |
| Paper - all other  | 2.53%                     | 11.3 kg         | 5.60%                       | 13.2 kg         |
| Paper board  | 1.91%                     | 8.5 kg          | 5.81%                       | 13.7 kg         |
| Paper cups   | 0.15%                     | 0.7 kg          | 0.19%                       | 0.5 kg          |
| Pizza boxes  | 0.11%                     | 0.5 kg          | 1.16%                       | 2.7 kg          |
| Tetra Pak®/gable top drink   | 0.29%                     | 1.3 kg          | 0.41%                       | 1.0 kg          |
| Tetra Pak®/gable top other   | 0.03%                     | 0.1 kg          | 0.03%                       | 0.1 kg          |
| All other non-recyclable fibre   | 0.12%                     | 0.5 kg          | 0.10%                       | 0.2 kg          |
| <b>Subtotal - Fibre</b>  | <b>6.67%</b>              | <b>29.7 kg</b>  | <b>31.47%</b>               | <b>74.0 kg</b>  |
| Plastic drink bottles #1   | 0.48%                     | 2.2 kg          | 2.96%                       | 7.0 kg          |
| Plastic other containers #1  | 0.81%                     | 3.6 kg          | 1.64%                       | 3.8 kg          |
| Plastic dairy bottles #2   | 0.21%                     | 0.9 kg          | 1.79%                       | 4.2 kg          |
| Plastic other containers #2  | 0.40%                     | 1.8 kg          | 1.03%                       | 2.4 kg          |
| Plastic containers #3  | 0.01%                     | 0.03 kg         | 0.02%                       | 0.0 kg          |
| Plastic containers #4  | 0.01%                     | 0.0 kg          | 0.04%                       | 0.1 kg          |
| Plastic containers #5  | 0.59%                     | 2.6 kg          | 1.18%                       | 2.8 kg          |
| Plastic containers #6  | 0.13%                     | 0.6 kg          | 0.15%                       | 0.3 kg          |
| Plastic containers #7  | 0.02%                     | 0.1 kg          | 0.09%                       | 0.2 kg          |
| Unidentifiable plastic containers  | 0.43%                     | 1.9 kg          | 0.49%                       | 1.2 kg          |
| Plastic bottle tops and lids   | 0.17%                     | 0.8 kg          | 0.25%                       | 0.6 kg          |
| <b>Subtotal - Plastic</b>  | <b>3.26%</b>              | <b>14.5 kg</b>  | <b>9.62%</b>                | <b>22.6 kg</b>  |
| Steel cans   | 0.82%                     | 3.7 kg          | 3.01%                       | 7.1 kg          |
| Aluminium cans   | 0.20%                     | 0.9 kg          | 1.19%                       | 2.8 kg          |
| Other aluminium containers   | 0.04%                     | 0.2 kg          | 0.02%                       | 0.1 kg          |
| Aerosol cans   | 0.38%                     | 1.7 kg          | 0.22%                       | 0.5 kg          |
| Aluminium foil   | 0.19%                     | 0.9 kg          | 0.09%                       | 0.2 kg          |
| Metal bottle tops and lids   | 0.10%                     | 0.4 kg          | 0.25%                       | 0.6 kg          |
| <b>Subtotal - Metal</b>  | <b>1.73%</b>              | <b>7.7 kg</b>   | <b>4.80%</b>                | <b>11.3 kg</b>  |
| Small glass drink bottles  | 1.17%                     | 5.2 kg          | 18.90%                      | 44.4 kg         |
| Large glass drink bottles  | 0.28%                     | 1.3 kg          | 15.06%                      | 35.4 kg         |
| All other glass containers   | 0.86%                     | 3.8 kg          | 6.37%                       | 15.0 kg         |
| <b>Subtotal - Glass</b>  | <b>2.31%</b>              | <b>10.3 kg</b>  | <b>40.33%</b>               | <b>94.8 kg</b>  |
| <b>All other materials</b>   | <b>86.03%</b>             | <b>383.3 kg</b> | <b>13.79%</b>               | <b>32.4 kg</b>  |
| <b>Grand Total</b>   | <b>100.0%</b>             | <b>445.6 kg</b> | <b>100.0%</b>               | <b>235.0 kg</b> |

## APPENDIX C - COMPOSITION OF PLASTICS BY RESIN CODE

Composition of plastic containers in domestic kerbside rubbish and recycling collections, by weight, by resin code, without contents

| Plastic containers, by resin type, in domestic kerbside collections | Proportion of each type of plastic container | Kg per household per annum |
|---|--|----------------------------|
| PET - Plastic containers #1   | 50.76%                                       | 16.6 kg                    |
| HDPE - Plastic containers #2  | 28.44%                                       | 9.3 kg                     |
| PVC - Plastic containers #3   | 0.31%  | 0.1 kg                     |
| LDPE - Rigid plastic containers #4                                  | 0.31%  | 0.1 kg                     |
| PP - Plastic containers #5  | 16.51%                                       | 5.4 kg                     |
| PS - Plastic containers #6  | 2.75%  | 0.9 kg                     |
| Other - Plastic containers #7                                       | 0.92%  | 0.3 kg                     |
| <b>Total</b>  | <b>100.00%</b>                               | <b>32.7 kg</b>             |



## APPENDIX D - ITEM COUNT PER TONNE OF RUBBISH OR RECYCLING

This table provides the average number of each type of container found in a tonne of domestic kerbside rubbish or recycling. These results are based on the results of an audit of 8.4 tonnes of rubbish and 5.5 tonnes of recycling and should be seen as indicative only.

**Number of containers in a tonne of domestic kerbside rubbish or recycling**

| <b>Number of containers per tonne of domestic kerbside collections</b> | <b>Rubbish</b> | <b>Recycling</b> |
|--|----------------|------------------|
| Pizza boxes  | 9.2            | 57.8             |
| Tetra Pak®/gable top drink   | 54.8           | 71.8             |
| Tetra Pak®/gable top other   | 7.6            | 6.5              |
| Plastic drink bottles #1   | 81.2           | 646.1            |
| Plastic other containers #1  | 249.4          | 492.8            |
| Plastic dairy bottles #2   | 35.0           | 414.5            |
| Plastic other containers #2  | 51.0           | 138.2            |
| Plastic containers #3  | 8.7            | 15.5             |
| Plastic containers #4  | 3.5            | 3.6              |
| Plastic containers #5  | 192.8          | 366.3            |
| Plastic containers #6  | 102.6          | 112.0            |
| Plastic containers #7  | 9.3            | 12.4             |
| Unidentifiable plastic containers                                      | 142.7          | 142.3            |
| Plastic bottle tops and lids   | 181.5          | 358.7            |
| Steel cans   | 105.8          | 458.8            |
| Aluminium cans   | 112.5          | 715.5            |
| Other aluminium containers   | 28.4           | 44.4             |
| Aerosol cans   | 20.7           | 20.5             |
| Metal bottle tops and lids   | 177.8          | 386.7            |
| Small glass drink bottles  | 92.5           | 1192.7           |
| Large glass drink bottles  | 11.2           | 249.4            |
| All other glass containers   | 46.4           | 215.6            |

## APPENDIX E - VOLUME OF BEVERAGE CONTAINERS

The average volume of a beverage container was calculated during this project. The volume does not refer to the beverage containers' carrying capacity. Rather, it refers to the amount of space it takes up when placed in a bin.

The following table provides the volumes determined by the audit. These are to be considered approximate volumes only and have been calculated based on relatively small sample numbers.

These volumes do not account for the effect of having different sized and shaped containers (and other materials) disposed of together in a bin.

These volumes also do not take into account the different sized beverage containers in each category. For example, large dairy bottles #2 range in size from 1-litre to 3-litres. These volume calculations are based on the sample of beverage containers that was available after one-week of auditing domestic rubbish and recycling.

**Estimated volume of beverage containers**

| <b>Volume of beverage containers in a bin</b> | <b>Average volume of each beverage container – in litres</b> | <b>Number of beverage containers in 100-litre bin</b> |
|---|--|---|
| Small plastic drink bottles #1 (< 1-litre)    | 1.12   | 90  |
| Large plastic drink bottles #1 (1-litre +)    | 3.18   | 31  |
| Small plastic dairy bottles #2 (< 1-litre)    | 0.90   | 111   |
| Large plastic dairy bottles #2 (1-litre +)    | 3.12   | 32  |
| All aluminium cans                            | 0.61   | 164   |
| Small glass drink bottles (<750ml)            | 0.87   | 115   |
| Large glass drink bottles (750ml +)           | 1.88   | 53  |
| All Tetra Pak®/gable top drink containers     | 1.82   | 55  |