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waste insights

Three Rivers Kerbside Waste Composition Analysis

Hertfordshire
Waste Partnership

Summary Report January 2021



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Project details and acknowledgements

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Accuracy Statement

Results from the standard M·E·L sampling protocol for compositional analysis can be taken as accurate for each primary material category to within error bands of +/-10% at the 95% confidence level (2 standard deviations), assuming a normal statistical distribution for:

Kilograms per household per week by:

- individual Acorn Groups at the Partnership level
- collection authority
- Partnership area overall

Overall percentage compositional makeup by:

- individual Acorn Groups at the Partnership level
- collection authority
- Partnership area overall

At the data entry stage, 1 in 10 parts of data that is inputted are checked with the data sheets and if errors are found all the data is then rechecked

Introduction

Background

Local Authority collected waste in Hertfordshire is collected by ten Waste Collection Authorities (WCAs) from the kerbside and by the Waste Disposal Authority from seventeen Household Waste Recycling Centres (HWRCs).

On behalf of the Hertfordshire Waste Partnership, a compositional analysis detailing the breakdown of all waste and recycling types (kerbside collected residual waste and kerbside dry recycling) was commissioned to cover nine participating districts and boroughs (Watford was not part of this project). Each of the participating authorities also had a compositional assessment of the waste and recycling collected from non-kerbside households using shared or communal bins (flats) as well as waste sourced from litter bins. By assessing all these waste streams from member local authorities, it will be possible to provide compositional estimates for the waste collected throughout Hertfordshire as a whole.

Reporting will be used to inform the development of a number of strategic work plans for Hertfordshire, with data additionally used as a basis to apportion costs related to the management of post-consumer packaging in both the residual waste (including litter) and dry recycling streams to support further dialogue and discussion with respect to possible funding from the Government's new extended producer responsibility regime. Residual waste from eight of the seventeen HWRCs operating throughout Hertfordshire have also been compositionally assessed.

This report is specifically for the kerbside waste and recycling generated in the District of Three Rivers. Findings for the litter and flats waste collected in this authority will be contained in separate reports.

Three Rivers currently has a combined recycling and composting rate of 64.1% (2019/20) against a Hertfordshire Waste Partnership average of 52.3%. Decreasing the amount of waste sent to be incinerated or to landfill, will help to reduce the release of harmful greenhouse gases into the atmosphere.

As well as giving indications as to the levels of waste and recycling being generated, this report also provides observations on the levels of materials that are currently recyclable at the kerbside and those which could potentially be recyclable via future schemes.

This report presents results from an analysis of kerbside collected residual and recycling waste collected from five demographic areas sampled during September and October 2020.

Objectives

Specific aims of the work were to:

- Understand the levels of residual waste being generated by the selected households
- Evaluate the amount of specific materials collected in the residual bins that could potentially be collected separately for recycling at the kerbside
- Assess the amount of separate recycling being generated
- Evaluate the levels and types of contamination present within the separated recycling
- Detect capture rates for individual materials which are collected separately for recycling
- Determine the proportion of residual waste and kerbside dry recycling that was formed from packaging

Executive Summary

Key findings

Kerbside residual waste

- Weighted across all Acorn samples, 88% of households sampled throughout Three Rivers presented residual waste for collection.
- In terms of waste generation, households were setting out an average of 4.6kg/hh/wk (5.2kg/hh/wk for those presenting bins).
- Food waste was seen to be the major component of residual waste forming 29% of the total. Of this food waste 41% is home compostable, 86% is deemed to be avoidable with 52% of all discarded food still packaged.
- Paper items made up 9.5% of the residual waste; 25% of this was alternatively recyclable at the kerbside. 6% of residual paper waste was classified as packaging.
- Card and cardboard items made up 3% of the residual waste; 85% of this was alternatively recyclable at the kerbside. 75% of residual card and cardboard waste was classified as packaging.
- Plastic items made up 13% of the residual waste; 34% of this was alternatively recyclable at the kerbside. 80% of residual plastic waste was classified as packaging.
- Metallic items made up 4% of the residual waste; 66% of this was classified as recyclable packaging.
- Glass items made up 5.5% of the residual waste; 99% of this was classified as recyclable packaging.
- Just 0.3% of residual waste was found to be garden vegetation and soil.
- Overall, 20% of collected residual waste could have been placed into the mixed recycling bins available– the equivalent of 0.9kg/hh/wk.
- Overall, 29% of collected residual waste could have been placed into the food recycling bins available– the equivalent of 1.4kg/hh/wk.
- Additionally, 0.3% or 0.01kg/hh/wk of residual waste was due to recyclable garden bin waste

- In total 50% of residual waste collected could have been recycled alternatively at the kerbside – 2.3kg/hh/wk.
- 23% of residual bin contents was classified as packaging waste. The equivalent of 1.1kg/hh/wk.
- 64% of this packaging waste was of a type suitable for kerbside recycling; 15% of residual waste.

Kerbside dry recycling bins

- Over the survey, an average of 84.5% of households presented recycling bins out for collection.
- In terms of waste generation, all kerbside households were setting out an average of 4.8kg/hh/wk of kerbside dry recycling.
- Overall, 20.5% of recycling waste collected from all properties was classified as contamination.
- 35% of contamination was due to non-recyclable plastics with 20% non-recyclable glass and 17% being general mixed residual waste.
- Around 86% of recyclable paper and 91% of recyclable card was correctly captured
- 87% of plastic bottles were recycled along with 57% of plastic containers
- 64% of recyclable metals were captured
- 85% of glass bottles and jars were recycled
- Overall, 83% of all materials compatible with recycling bins were correctly recycled.
- From the collected recycling, 71% or 3.4kg/hh/wk was classified as packaging.
- 94% of this packaging was of the correct type for the scheme.

Total kerbside packaging materials

- When combining the residual waste and kerbside dry recycling a total of 4.5kg/hh/k or 47.7% was classified as packaging materials (both recyclable and non-recyclable).
- Of all the packaging being disposed of, 87% was of a type suitable for recycling.
- Consequently 41% of all kerbside waste or 3.9kg/hh/wk is due to recyclable packaging.
- Of all the recyclable packaging disposed of, 82% was correctly captured in recycling bins.

Residual Waste

Sampling

Five demographic samples (Acorn Types) were selected for the analysis of kerbside properties throughout Three Rivers. These were taken from the most representative households for each of the five main Acorn categories -

- 1.B.8 Prosperous Suburban Families
- 2.E.19 First time buyers in small modern homes
- 3.H.29 Established suburbs, older families
- 4.M.42 Struggling young families in post war terraces
- 5.Q.57 * Social rented flats, families, and single parents

**This Acorn type covers various property types. As indicated, only kerbside properties with their own individual waste containers were surveyed. Developments (flats) using communal bins were not used as part of this sampling. Communal bin waste was surveyed separately, details are in an accompanying report.*

Each sample was formed from the waste presented by around fifty selected households. Waste generation is recorded in kilograms per household per week (kg/hh/wk). This is the average amount of weekly material generated per household from each sample of 50 households; not just those that are participating. Across the five samples a total of 1,577kg of residual waste was surveyed.

For residual waste, Three Rivers residents generally have a 140L grey wheelie bin collected fortnightly. Residents additionally use green lidded bins for the separation of dry recycling into paper, cardboard, plastics, metals and glass bottles & jars. This is collected on a weekly basis and acceptable items include: -

Paper - Newspapers, magazines, printer paper, junk mail, shredded paper, envelopes (including windows), wrapping paper and greeting cards.

Cardboard - Toilet roll centres, plain greeting cards, corrugated card, cardboard boxes, sleeves and tubes.

Food and drink cartons - Tetra Paks

Plastics - Plastic bottles, Drinks, toiletry bottles, and cleaning/detergent bottles, pots/tubs/trays

Glass - Bottles/jars: Any colour.

Metals - Drink cans and food tins, Aluminium foil/foil trays, Chocolate/biscuit tins/trays/tubs, Aerosol cans.

Residents have a 23L food bin for the weekly collection of all food waste. Residents are advised to use small plastic bags or newspaper to wrap food. A chargeable collection of garden vegetation is available to residents using a fortnightly collected 240L brown wheelie bin.

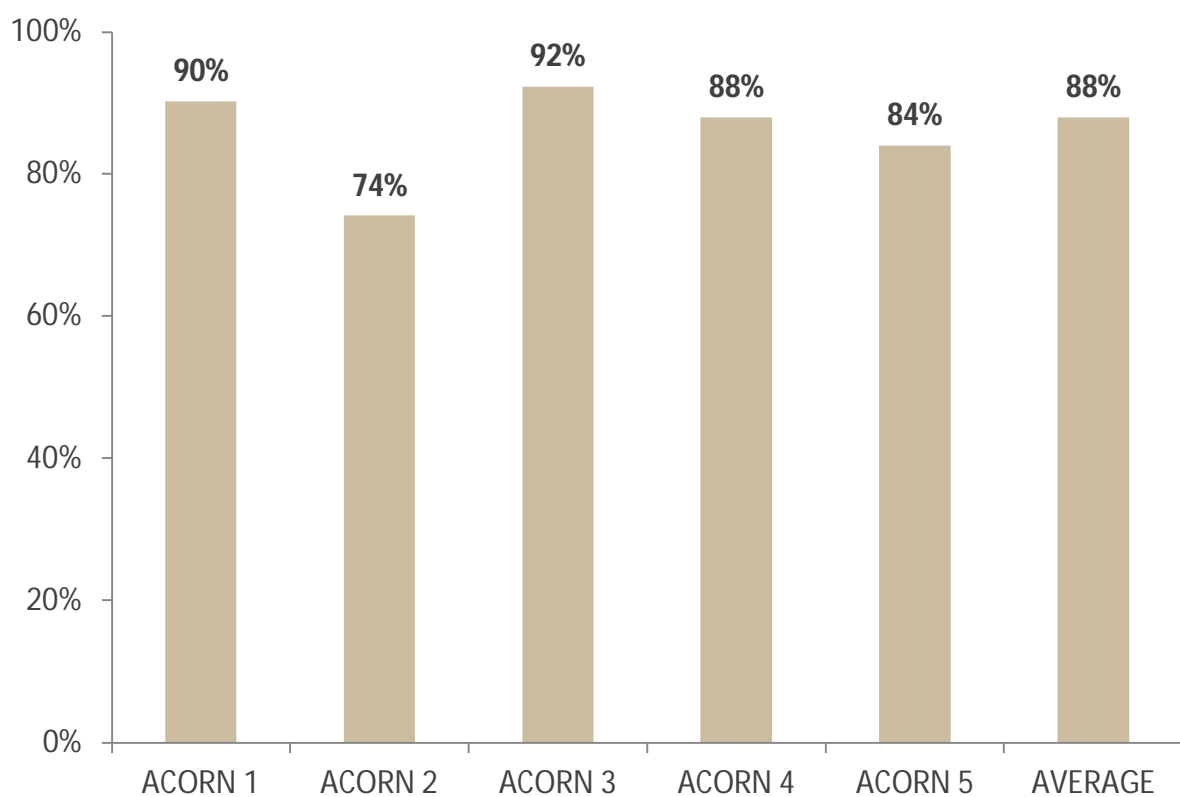
Residents can also book a free collection of textiles from the kerbside. Acceptable items include - clothes, belts, handbags, curtains, towels, bed linen and paired shoes.

Results

Set out rates

Set out rates refer to the proportion of surveyed kerbside households actively placing out their waste at the time of collection. Three Rivers households generally have fortnightly collections of residual waste using wheeled bins. Results suggested (figure 1) that an average of 88% of households are setting out these bins for collection. Observed ranges were between 74% for Acorn 2 and 92% for Acorn 3.

Figure 1 – Set out rates for residual bins

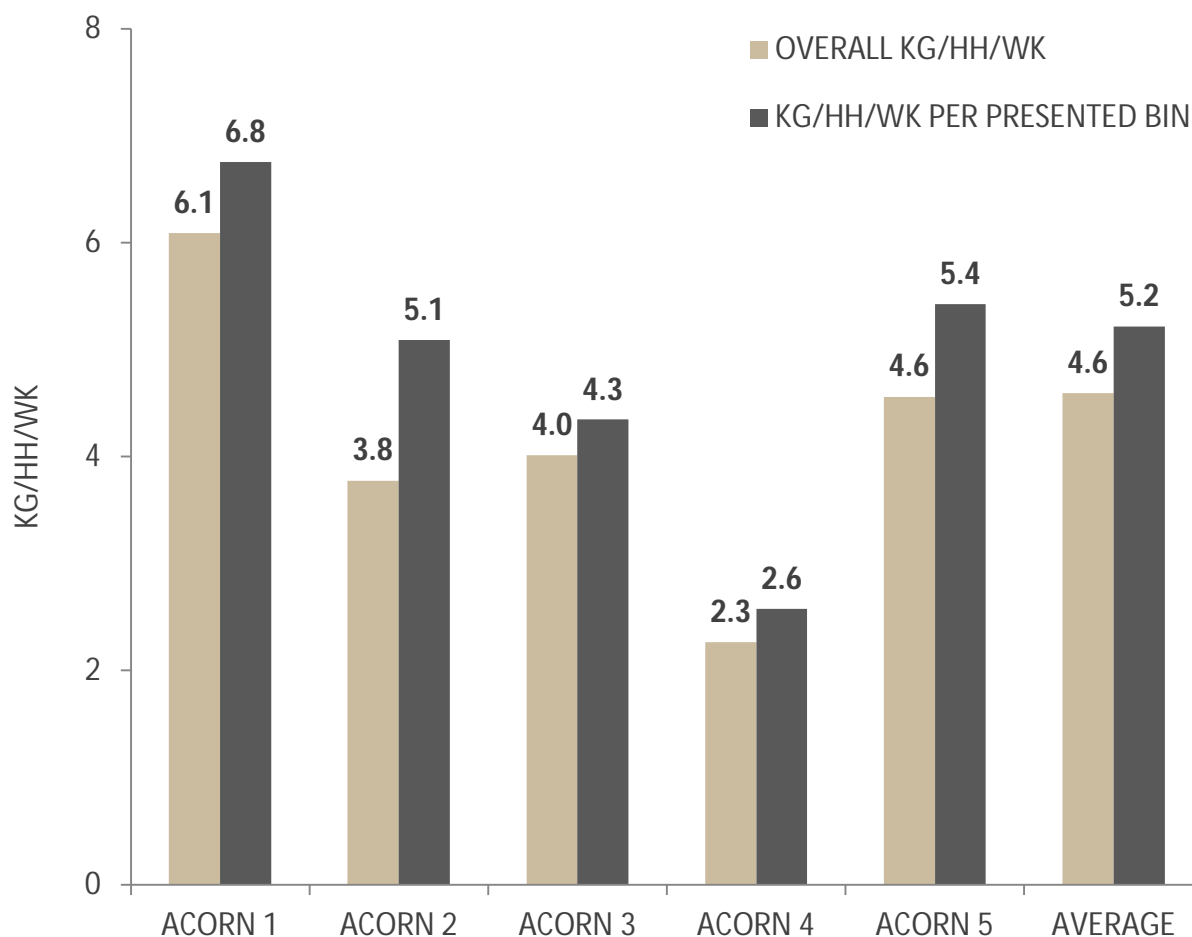


Residual waste generation

From observed results (figure 2), the level of residual waste being disposed of at the kerbside ranged between 2.3kg/hh/wk in Acorn 4, to 6.1kg/hh/wk in Acorn 1. On average 4.6kg/hh/wk of residual waste is being disposed of by the households sampled. This represents an average figure of 239kg/hh/yr. This figure accounts for the average set out of 88% thus including households that did not put out waste at the time of collection. This represents normal behaviour as you would not expect all households to present waste at

every opportunity. Solely considering presented bins, the average generated is 5.2kg/hh/wk or 272kg/hh/yr. This higher figure estimates the waste level that would be present if every household presented waste for every collection (i.e., 100% set out).

Figure 2 – Residual waste levels (kg/hh/wk)



Compositional analysis of residual waste

This section looks at the average amount and composition of the residual waste presented by the selected Three Rivers households. Hand sorting of the residual waste gave concentration by weight figures for the main categories of waste as well as the more detailed sub-categories. Looking at the concentration percentages gives an indication as to the proportions of each waste category. This can be translated into a figure relating to the average waste generation expected for each waste category; this is given in kilograms per household per week (kg/hh/wk). Detailed residual composition tables can be found in a separate data appendix. Figure 3 breaks down the main waste types present within the residual waste. All residual waste

will contain a proportion that is classified as potentially recyclable. That is to say that it should have been placed into one of the recycling receptacles provided.

Table 1: Average residual waste composition weighted by Acorn (%)

WASTE MATERIAL (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
PAPER	8.79%	9.79%	11.49%	3.44%	7.13%	9.49%
CARD & CARDBOARD	2.98%	5.36%	1.80%	1.31%	1.12%	1.90%
PLASTIC FILM	7.50%	6.09%	12.35%	4.78%	3.53%	7.63%
DENSE PLASTICS	7.37%	5.76%	3.90%	1.14%	1.84%	5.65%
TEXTILES	2.99%	4.96%	3.98%	5.73%	1.49%	3.48%
MISCELLANEOUS COMBUSTIBLES*	21.45%	12.30%	17.30%	40.52%	23.23%	21.91%
NON-COMBUSTIBLE INERTS**	1.32%	4.74%	1.26%	11.04%	11.93%	3.32%
GLASS	8.55%	3.62%	0.94%	0.19%	1.28%	5.51%
FERROUS METALS	2.51%	1.03%	1.96%	0.12%	0.26%	1.89%
NON-FERROUS METALS	2.45%	1.06%	1.48%	3.47%	1.66%	2.21%
ORGANIC CATERING - HOME COMPOSTABLE	6.67%	16.71%	26.77%	6.56%	21.00%	11.94%
ORGANIC CATERING - NON-HOME COMPOSTABLE	18.96%	25.66%	13.58%	19.53%	18.18%	18.66%
ORGANIC NON-CATERING	6.20%	2.28%	0.00%	0.00%	6.46%	4.25%
HHW	0.25%	0.47%	0.34%	1.26%	0.46%	0.40%
WEEE	1.47%	0.18%	2.42%	0.90%	0.42%	1.38%
FINES	0.52%	0.00%	0.45%	0.00%	0.00%	0.37%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2: Average residual waste generation weighted by Acorn (kg/hh/wk)

WASTE MATERIAL (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
PAPER	0.54	0.37	0.46	0.08	0.32	0.44
CARD & CARDBOARD	0.18	0.20	0.07	0.03	0.05	0.09
PLASTIC FILM	0.46	0.23	0.50	0.11	0.16	0.35
DENSE PLASTICS	0.45	0.22	0.16	0.03	0.08	0.26
TEXTILES	0.18	0.19	0.16	0.13	0.07	0.16
MISCELLANEOUS COMBUSTIBLES*	1.31	0.46	0.69	0.92	1.06	1.01
NON-COMBUSTIBLE INERTS**	0.08	0.18	0.05	0.25	0.54	0.15
GLASS	0.52	0.14	0.04	0.00	0.06	0.25
FERROUS METALS	0.15	0.04	0.08	0.00	0.01	0.09
NON-FERROUS METALS	0.15	0.04	0.06	0.08	0.08	0.10
ORGANIC CATERING - HOME COMPOSTABLE	0.41	0.63	1.07	0.15	0.96	0.55
ORGANIC CATERING - NON-HOME COMPOSTABLE	1.15	0.97	0.54	0.44	0.83	0.86
ORGANIC NON-CATERING	0.38	0.09	0.00	0.00	0.29	0.20
HHW	0.02	0.02	0.01	0.03	0.02	0.02
WEEE	0.09	0.01	0.10	0.02	0.02	0.06
FINES	0.03	0.00	0.02	0.00	0.00	0.02
TOTAL	6.09	3.77	4.01	2.27	4.56	4.59

*Miscellaneous items deemed combustible. Includes nappies & sanitary, wood, carpet and other general bric-a-brac etc.

**Mixed materials deemed non-combustible. Includes rubble, DIY cement, ceramics, cat litter etc.

Figure 3: Average residual waste composition weighted by Acorn (%)

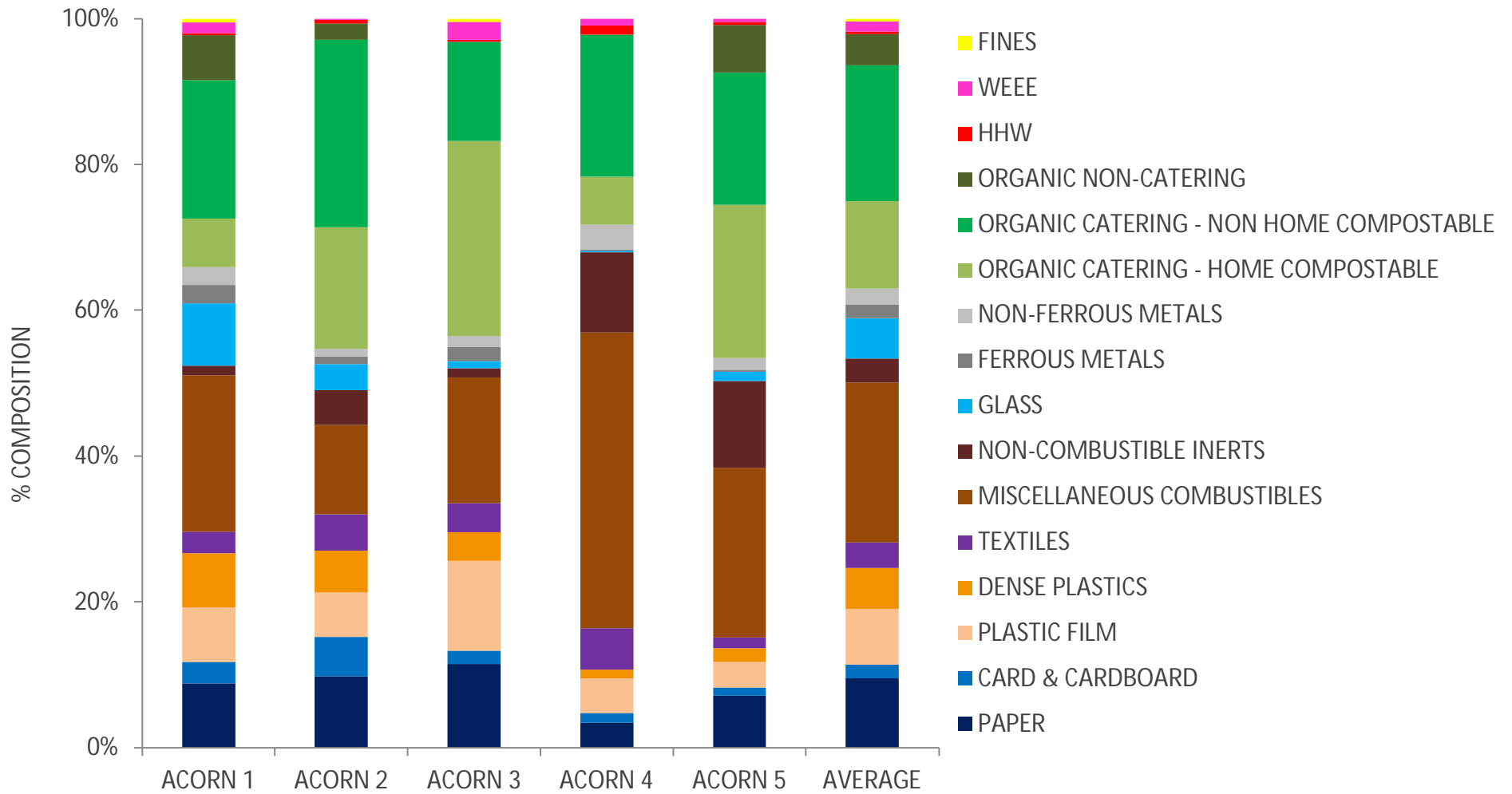
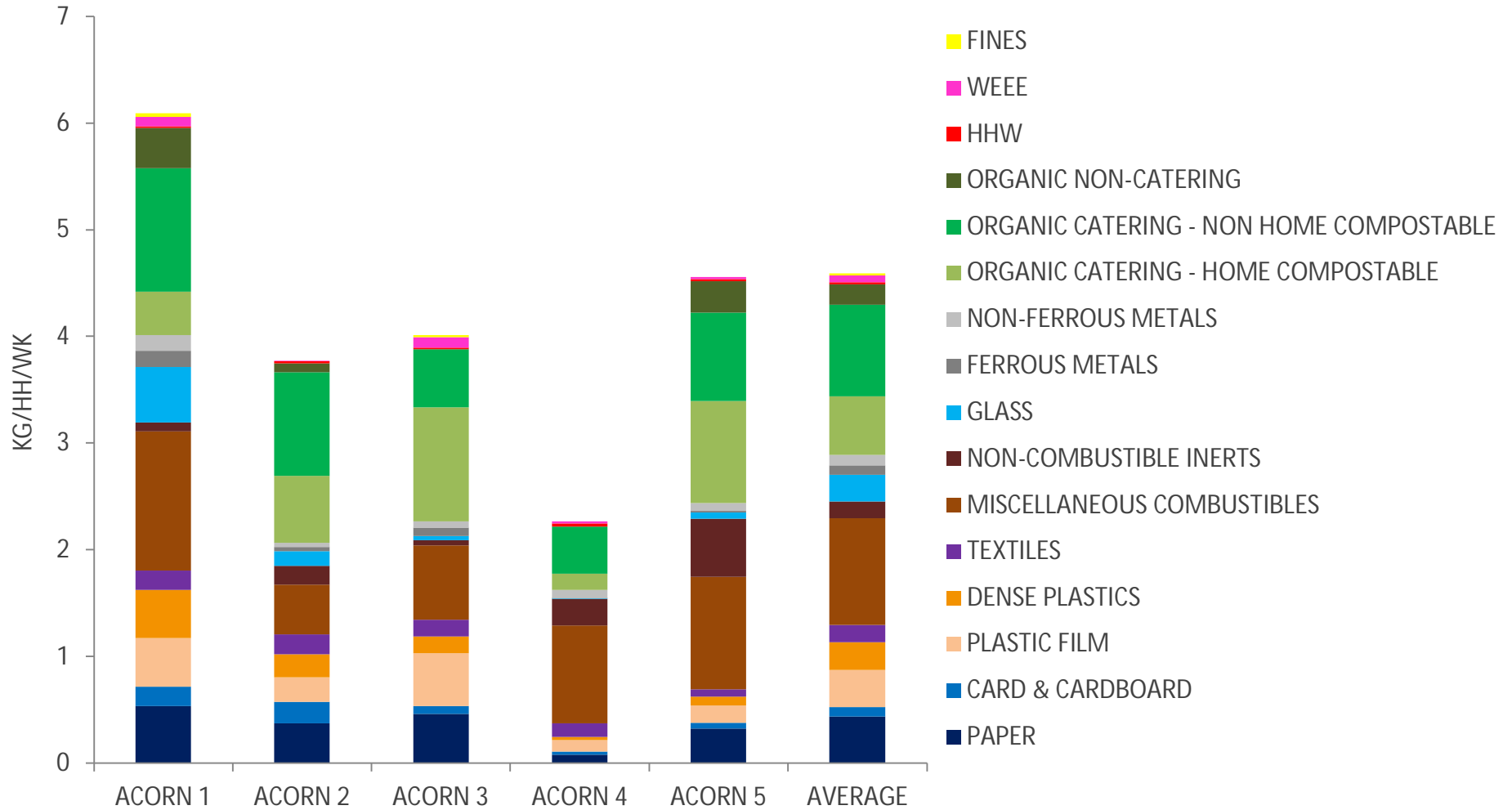


Figure 4: Average residual waste generation weighted by Acorn (kg/hh/wk)



Organic Waste

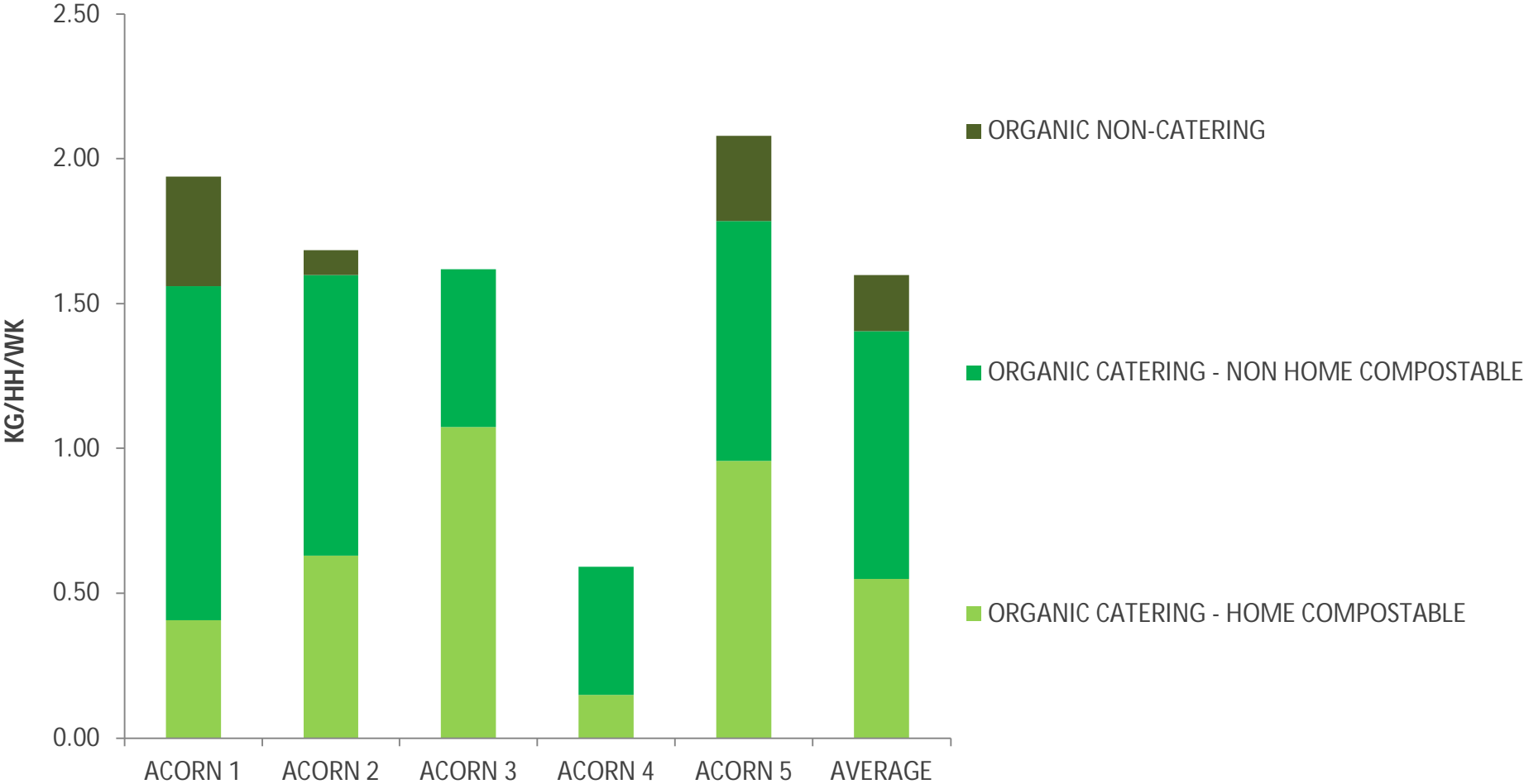
Organic waste (which includes garden waste, food waste and non-catering organics such as pet bedding) formed the greatest weight concentration of the primary waste categories for most Acorns. Ranges seen were 26.1% from Acorn 4 households to 45.6% in Acorn 5 households. Across Three Rivers around 34.8% of all residual waste (1.60kg/hh/wk) is classified as organic.

Food waste alone accounted for between 24.1% (Acorn 1) and 40.3% (Acorn 3) of residual waste. Around 29.3% of all residual waste (1.35kg/hh/wk) is classified as food waste. Currently Three Rivers residents can recycle food waste at the kerbside. Residents from Acorn 5 placed the most food into their residual bins at 1.77kg/hh/wk.

Table 3: Level of organics within the residual waste of each Acorn (kg/hh/wk)

RESIDUAL ORGANICS (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
ORGANIC CATERING - HOME COMPOSTABLE	0.41	0.63	1.07	0.15	0.96	0.55
ORGANIC CATERING - NON-HOME COMPOSTABLE	1.15	0.97	0.54	0.44	0.83	0.86
ORGANIC NON-CATERING	0.38	0.09	0.00	0.00	0.29	0.20
KG/HH/WK ORGANICS	1.94	1.68	1.62	0.59	2.08	1.60
% ORGANICS	31.8%	44.6%	40.3%	26.1%	45.6%	34.8%
KG/HH/WK FOOD WASTE	1.47	1.49	1.62	0.57	1.77	1.35
% FOOD WASTE	24.1%	39.6%	40.3%	25.2%	38.9%	29.3%

Figure 5: Level of organics within the residual waste of each Acorn (kg/hh/wk)



Food waste was separated into home compostable and non-home compostable fractions. Further separation identified whether the food was avoidable (uneaten, unused, or spoiled) or unavoidable (inedible by products such as shells, stones, skin etc). Finally, all avoidable food waste was assessed to determine whether it was disposed of packaged or loose.

Table 4: Breakdown of residual food waste

RESIDUAL FOOD WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
KG/HH/WK TOTAL FOOD WASTE	1.47	1.49	1.62	0.57	1.77	1.35
KG/HH/WK HOME COMPOSTABLE FOOD WASTE	0.41	0.63	1.07	0.15	0.96	0.55
% OF ALL FOOD WASTE HOME COMPOSTABLE	27.7%	42.2%	66.3%	26.1%	54.0%	40.7%
KG/HH/WK AVOIDABLE FOOD WASTE	1.14	1.14	1.60	0.57	1.73	1.16
% OF ALL FOOD WASTE AVOIDABLE	77.8%	76.4%	99.0%	100.0%	97.7%	86.2%
KG/HH/WK PACKAGED FOOD WASTE	0.95	0.56	0.43	0.39	0.91	0.70
% OF ALL FOOD WASTE PACKAGED	65.0%	37.7%	26.6%	69.3%	51.4%	52.0%
% OF AVOIDABLE FOOD WASTE PACKAGED	83.5%	49.3%	26.8%	69.3%	52.6%	60.2%

Of the 1.35kg/hh/wk of residual food waste, 40.7% or 0.55kg/hh/wk was deemed to be home compostable. Home composting can be used as an alternative to kerbside recycling of raw fruit and vegetable waste. Whereas just 26% of Acorn 4 food waste was home compostable this rate was 66% for Acorn 3.

When looking at all the food waste present, around 86.2% was deemed avoidable; this equates to 1.16kg/hh/wk. In the Acorn 2 sample, 76% of all discarded food was avoidable rising to 100% for Acorn 4.

Around 60.2% of all the avoidable food waste is due to packaged food which is therefore responsible for 52.0% of all the food in the residual bins. Packaged food therefore accounts for 0.70kg/hh/wk of average bin contents. Two thirds of the avoidable food waste being disposed of from Acorns 1 and 4 was packaged.

Residents throughout Three Rivers can also use a chargeable service to recycle garden waste at the kerbside. Alternatively, residents can purchase home composting units at a discounted price or simply build a compost heap. Just 0.3% of residual waste was due to garden based waste. Around 92% of this garden waste was due to vegetation with the remainder being soil. Therefore, an average of 0.3% or 0.01kg/hh/wk

Paper

On average, Acorn 3 residents had the highest concentrations of this type of waste (11.5%), with Acorn 1 disposing of the most at 0.54kg/hh/wk. In comparison just 3.4% of residual waste from Acorn 4 (0.08kg/hh/wk) was due to paper-based materials. Across Three Rivers it was seen that around 9.5% or 0.44kg/hh/wk of residual waste consisted of discarded paper.

A proportion of this paper is available for recycling at the kerbside. Three Rivers residents can use their kerbside recycling bins for collecting paper such as newspapers, junk mail, envelopes, and directories. It was found that between 13.1% (Acorn 4) and 48.3% (Acorn 3) of paper could have been placed into recycling bins as opposed to the residual bins.

When accounting for all the various types of paper within the residual waste, it is seen that 24.6% of residual paper was recyclable which accounted for 2.3% of all the residual waste or 0.11kg/hh/wk.

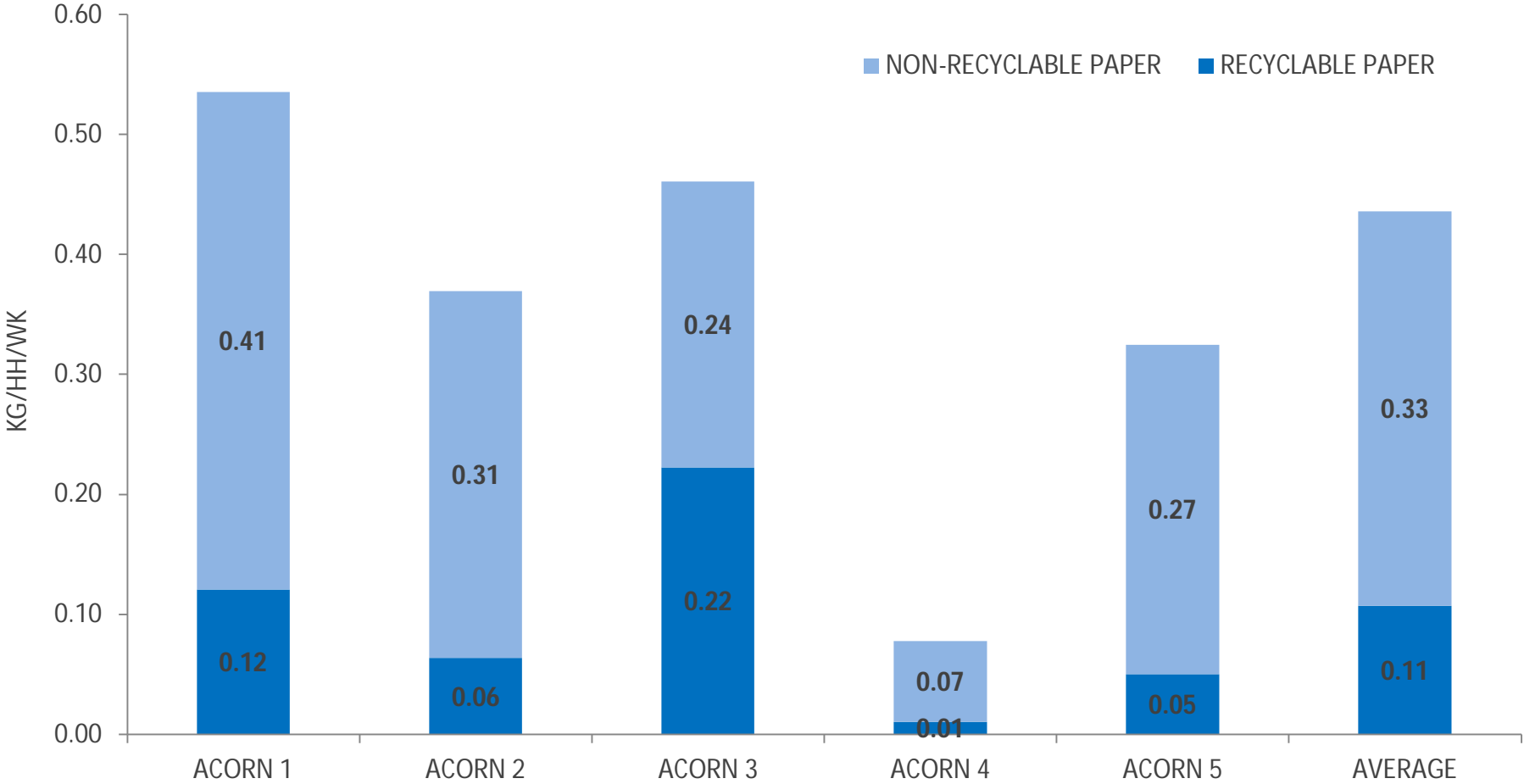
Table 5 and Figure 6 show the amounts of the different forms of paper waste for each Acorn.

Table 5: Level of paper within the residual waste of each Acorn (kg/hh/wk)

RESIDUAL PAPER	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE PAPER	0.12	0.06	0.22	0.01	0.05	0.11
NON-RECYCLABLE PAPER	0.41	0.31	0.24	0.07	0.27	0.33
KG/HH/WK TOTAL PAPER	0.54	0.37	0.46	0.08	0.32	0.44
% OF PAPER RECYCLABLE	22.6%	17.3%	48.3%	13.1%	15.4%	24.6%
% OF PAPER DEEMED PACKAGING	6.8%	2.2%	5.5%	2.8%	11.8%	5.7%

There is an interest in the overall packaging content of the residual waste. This is discussed in more detail in subsequent sections. Of the paper in the residual bin, just under 6% was classified as packaging which equates to just 0.5% of the total. Commonly this will be due to items such as grocery bags, sugar and flour bags, envelopes etc. Across the samples the proportion of paper due to packaging ranged between 2.2% (Acorn 2) and 11.8% (Acorn 5).

Figure 6: Level of paper within the residual waste of each Acorn (kg/hh/wk)



Card & Cardboard

On average, Acorn 2 residents had the highest concentrations of this type of waste (5.4%) disposing of 0.20kg/hh/wk. In comparison 0.03kg/hh/wk of residual waste from Acorn 4 was due to card and cardboard based materials. Across Three Rivers it was seen that around 2.7% or 0.12kg/hh/wk of residual waste consisted of discarded card and cardboard.

A proportion of this card & cardboard is available for recycling at the kerbside. Three rivers residents can recycle card and cardboard in (or alongside) their recycling bins. It was found that between 71.8% (Acorn 2) and 94.6% (Acorn 4) of card and cardboard could have been recycled rather than disposed of in residual bins. Across Three Rivers, 84.5% of residual card and cardboard was compatible with recycling bins which accounted for 2.3% of all the residual waste or 0.10kg/hh/wk.

Table 6 and Figure 7 show the amounts of the different forms of card and cardboard waste for each Acorn.

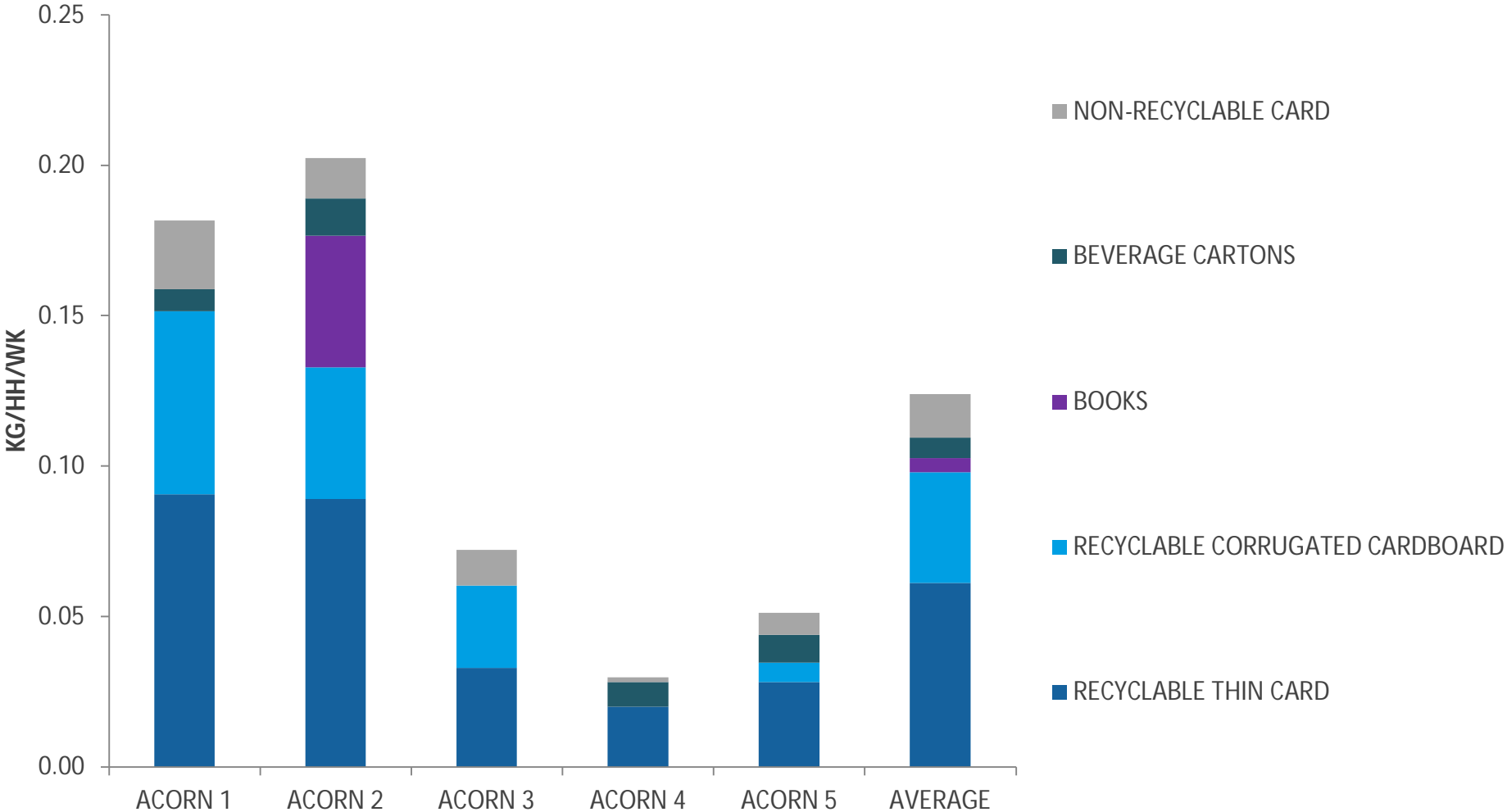
When combining paper and card together it is estimated that 37.9% of that present in residual bins could have been recycled via kerbside recycling collections. This amounts to 4.6% of all the residual waste being collected – a total of 0.21kg/hh/wk.

Table 6: Level of card and cardboard within the residual waste of each Acorn (kg/hh/wk)

RESIDUAL CARD	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE THIN CARD	0.09	0.09	0.03	0.02	0.03	0.06
RECYCLABLE CORRUGATED CARDBOARD	0.06	0.04	0.03	0.00	0.01	0.04
BOOKS	0.00	0.04	0.00	0.00	0.00	0.00
BEVERAGE CARTONS	0.01	0.01	0.00	0.01	0.01	0.01
NON-RECYCLABLE CARD	0.02	0.01	0.01	0.00	0.01	0.01
KG/HH/WK TOTAL CARD & CARDBOARD	0.18	0.20	0.07	0.03	0.05	0.12
KG/HH/WK RECYCLABLE CARD & CARDBOARD	0.16	0.15	0.06	0.03	0.04	0.10
% CARD KERBSIDE RECYCLABLE	87.5%	71.8%	83.5%	94.6%	85.6%	84.5%
% OF CARD DEEMED PACKAGING	77.5%	63.8%	75.2%	77.9%	74.9%	74.8%

Of the card in the residual bin, just under 75% was classified as packaging which equates to 2.0% of the total. Commonly this will be due to food packaging card and thicker corrugated box packaging. Across the samples the proportion of card due to packaging ranged between 64% (Acorn 2) and 78% (Acorn 4).

Figure 7: Level of card and cardboard within the residual waste of each Acorn (kg/hh/wk)



Plastics

In this sampling campaign average ranges for waste plastics were 5.4% from Acorn 5 households to 16.3% in the waste from Acorn 3 households. Three Rivers residents currently recycle plastic bottles and selected containers as part of their kerbside dry recycling. Across the district, 13.3% of residual waste was classified as plastic which equates to 0.61kg/hh/wk. On the whole plastic material, although not heavy in itself, can produce large volumes of waste.

Figure 8 clearly shows the levels of recyclable plastics within the residual waste. On average, around 34.1% of the plastic waste present in the residual was recyclable, equating to 0.21kg/hh/wk. In the Acorn 1 sample almost 43% of plastic waste was recyclable where it accounted for 0.39kg/hh/wk of total waste.

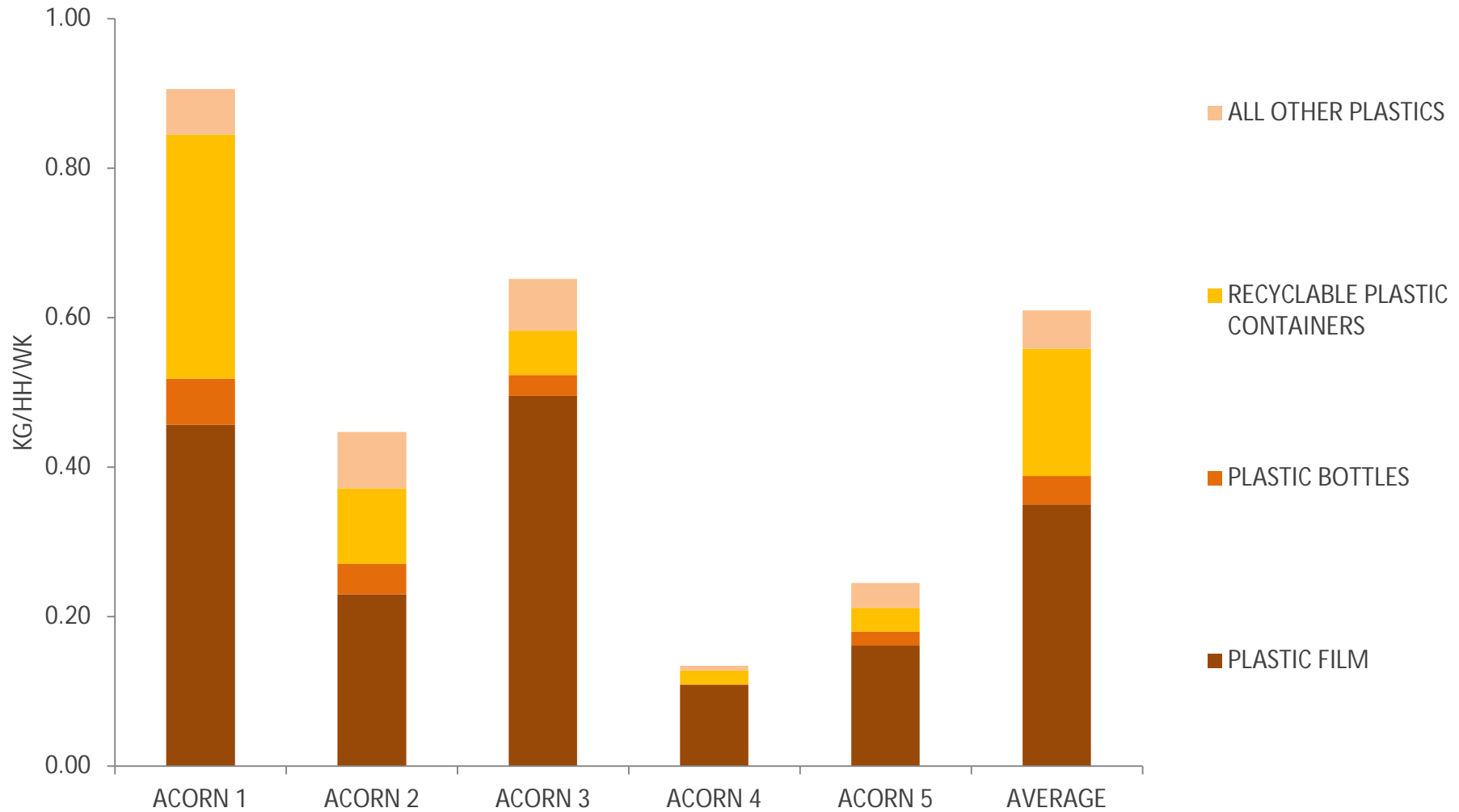
Table 7 and Figure 8 show the amounts of the different forms of plastic waste found within the residual samples from each Acorn.

Table 7: Levels of plastics within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PLASTICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
PLASTIC FILM	0.46	0.23	0.50	0.11	0.16	0.35
PLASTIC BOTTLES	0.06	0.04	0.03	0.00	0.02	0.04
RECYCLABLE PLASTIC FOOD CONTAINERS	0.33	0.10	0.06	0.02	0.03	0.17
ALL OTHER PLASTICS	0.06	0.08	0.07	0.01	0.03	0.05
KG/HH/WK TOTAL PLASTIC	0.91	0.45	0.65	0.13	0.24	0.61
KG/HH/WK RECYCLABLE PLASTIC	0.39	0.14	0.09	0.02	0.05	0.21
% PLASTIC RECYCLABLE	42.9%	31.7%	13.4%	14.8%	20.7%	34.1%
% OF PLASTIC DEEMED PACKAGING	85.2%	82.2%	60.0%	95.4%	81.8%	80.2%

Of the plastics in the residual bin, 80% were classified as packaging which equates to 10.6% of the total. Around 52% of the plastic packaging was due to bags and film with 35% food packaging containers and 8% plastic bottles. Across the samples the proportion of plastic due to packaging ranged between 60% (Acorn 3) and 95% (Acorn 4).

Figure 8: Level of plastic within the residual waste of each Acorn (kg/hh/wk)



Metals

In this sampling campaign average concentrations of residual metals were seen to be 1.9% total metal by weight from Acorn 5 households to 5.0% in the waste from Acorn 1 households, averaging 4.1% overall. Three Rivers residents have access to a recycling collection of food and drink cans as well as aerosols and clean foil via their kerbside dry recycling collection. The average weight of metals in the residual waste from Acorn 2 and 4 was 0.08kg/hh/wk rising to 0.30kg/hh/wk in Acorn 1, an average of 0.30kg/hh/wk.

A proportion of this metal waste is available for recycling at the kerbside. It was found that 45.5% of Acorn 3 metals were recyclable rising to 100% for the metals in Acorns 4 and 5 residual waste. Across Three Rivers an average of 66.1% or 0.12kg/hh/wk of residual metal is classified as recyclable, this equates to 2.7% of all collected residual waste.

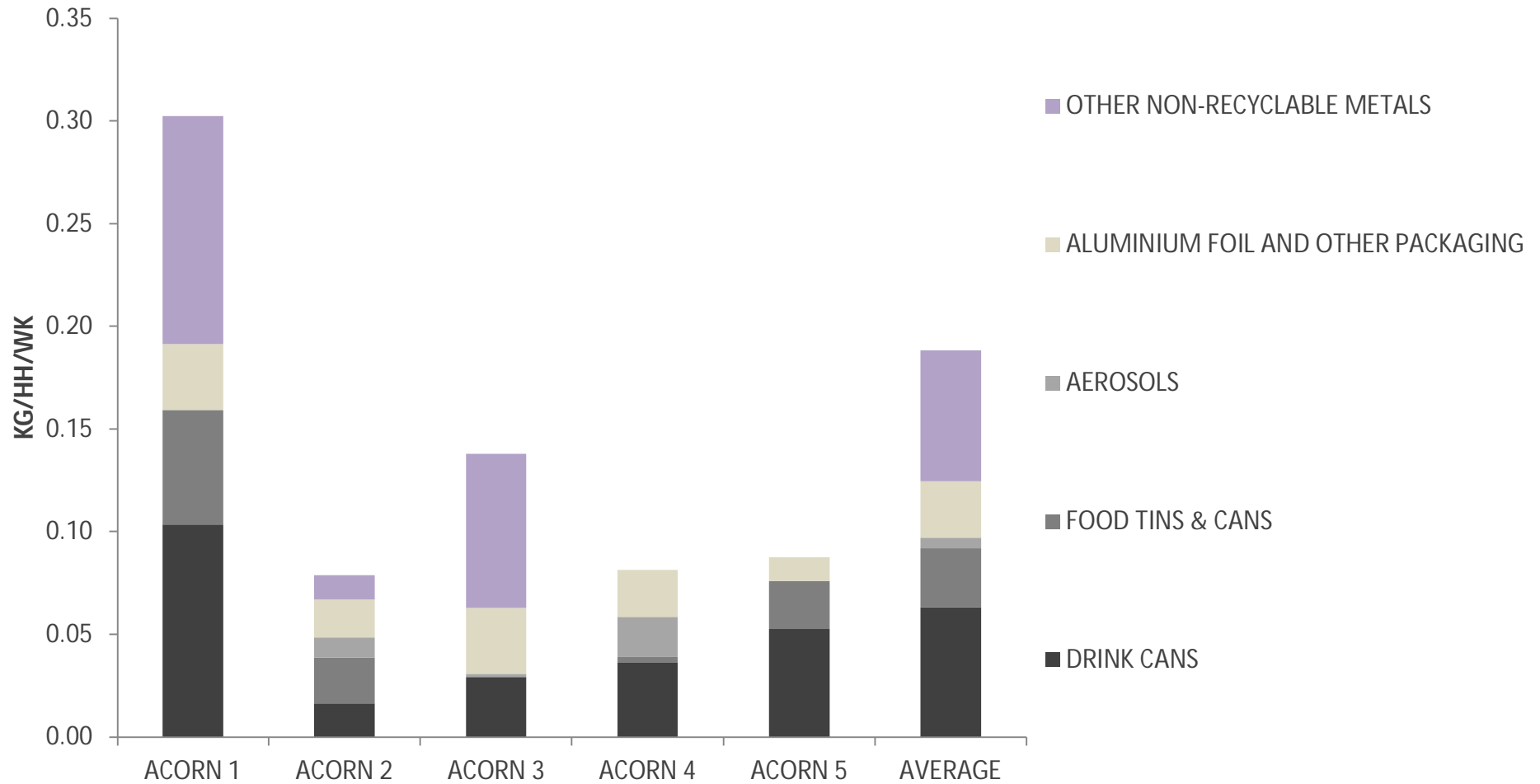
46% of all residual metals were ferrous. All recyclable metals are classified as packaging. Around 51% of the recyclable packaging was drink cans with 23% food tins, 22% foils and 4% aerosols.

Table 8 and Figure 9 show the amounts of the different forms of metallic waste found within the samples from each Acorn. Food cans tend to require a degree of washing before being placed into recycling containers and as such are often less well diverted than cleaner drinks cans.

Table 8: Level of metals within residual waste of each Acorn (kg/hh/wk)

RESIDUAL METALS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
DRINK CANS	0.10	0.02	0.03	0.04	0.05	0.06
FOOD TINS & CANS	0.06	0.02	0.00	0.00	0.02	0.03
AEROSOLS	0.00	0.01	0.00	0.02	0.00	0.01
ALUMINIUM FOIL AND OTHER PACKAGING	0.03	0.02	0.03	0.02	0.01	0.03
OTHER NON-RECYCLABLE METALS	0.11	0.01	0.08	0.00	0.00	0.06
RECYCLABLE METALS	0.19	0.07	0.06	0.08	0.09	0.12
TOTAL METALS	0.30	0.08	0.14	0.08	0.09	0.19
% FERROUS	50.6%	49.3%	56.9%	3.4%	13.4%	46.2%
% OF METALS RECYCLABLE	63.3%	85.1%	45.5%	100.0%	100.0%	66.1%
% OF METAL DEEMED PACKAGING	63.3%	85.1%	45.5%	100.0%	100.0%	66.1%

Figure 9: Level of metals within residual waste of each Acorn (kg/hh/wk)



Glass

In this sampling campaign the average concentration of residual glass was seen to be 0.2% total glass by weight from Acorn 4 households, rising to 8.5% in the waste from Acorn 1 residual bins. Three Rivers residents can recycle glass bottles and jars at the kerbside in their kerbside dry recycling bins. The weight of glass in the residual waste from Acorn 4 was <0.01kg/hh/wk rising to 0.52kg/hh/wk for Acorn 1. This represented a district wide average of 5.5% or 0.25kg/hh/wk.

A proportion of this glass consists of bottles and jars which could have been recycled rather than placed into residual bins. It was found that across Three Rivers an average of 99.5% or 0.25kg/hh/wk of residual glass is classified as recyclable, this equates to 5.5% of all collected residual waste.

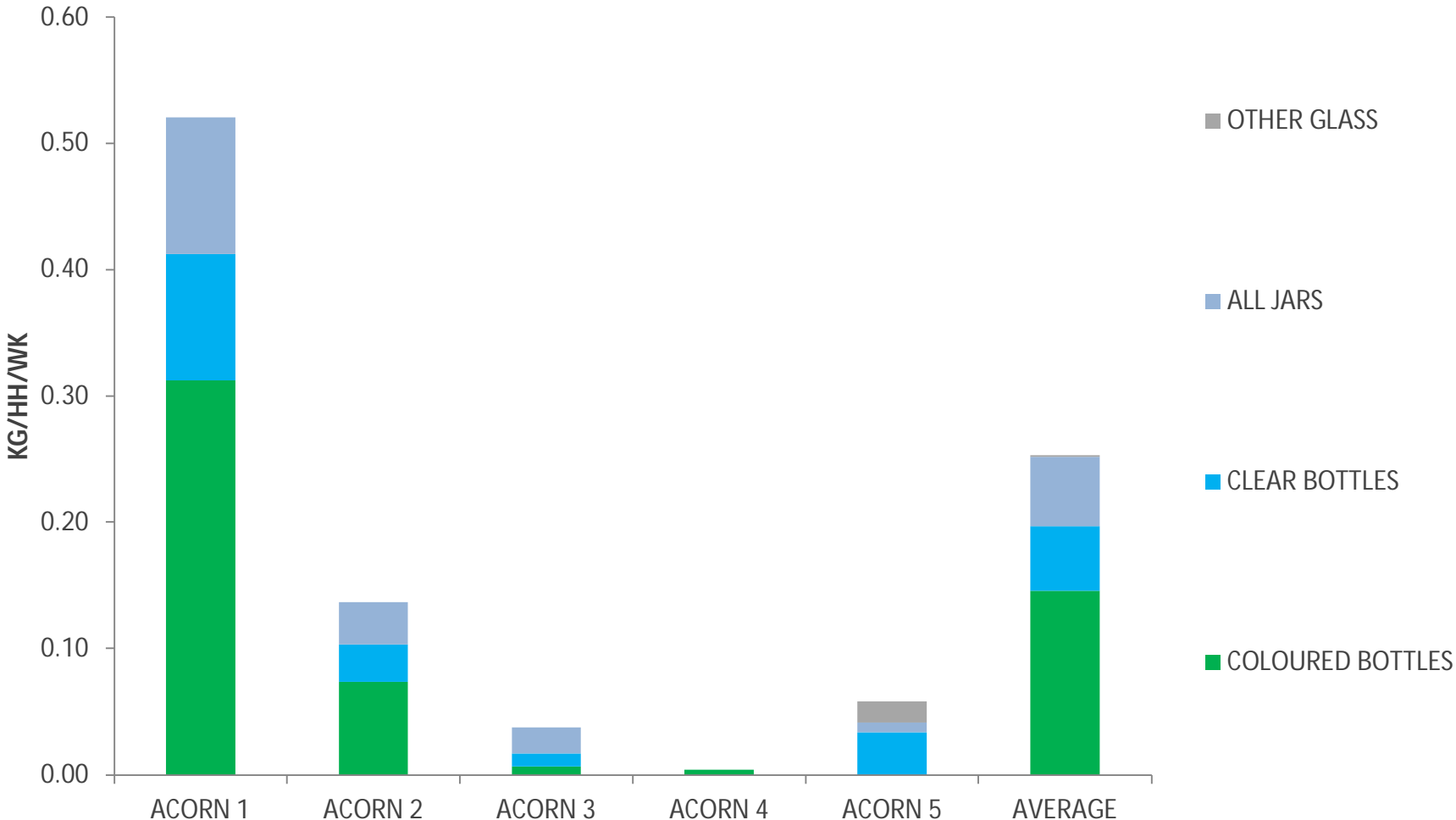
Overall, 42% of recyclable glass was clear, 52% of which was due to jars as opposed to bottles. Jars often need more cleaning than bottles and are generally less effectively recycled.

Table 9 and Figure 10 show the amounts of the different forms of glass waste found within the samples from each Acorn.

Table 9: Level of glass within the residual waste of each Acorn (kg/hh/wk)

RESIDUAL GLASS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
COLOURED BOTTLES	0.31	0.07	0.01	<0.01	0.00	0.15
CLEAR BOTTLES	0.10	0.03	0.01	0.00	0.03	0.05
ALL JARS	0.11	0.03	0.02	0.00	0.01	0.06
OTHER GLASS	0.00	0.00	0.00	0.00	0.02	0.00
KG/HH/WK TOTAL GLASS	0.52	0.14	0.04	<0.01	0.06	0.25
KG/HH/WK RECYCLABLE GLASS	0.52	0.14	0.04	<0.01	0.04	0.25
% RECYCLABLE	100.0%	100.0%	100.0%	100.0%	70.7%	99.5%
% OF RECYCLABLE GLASS - CLEAR	40.0%	46.0%	82.6%	0.0%	100.0%	42.2%
% OF GLASS DEEMED PACKAGING	100.0%	100.0%	100.0%	100.0%	70.7%	99.5%

Figure 10: Level of glass within residual waste of each Acorn (kg/hh/wk)



Other notable materials within the residual waste

Textiles - From the survey, around 5.7% of the residual waste from Acorn 4 was seen to consist of textiles with Acorn 2 disposing of 0.19kg/hh/wk.

Three Rivers households can arrange for free collections of recyclable bagged textiles at the kerbside. Overall, an average of 3.5% or 0.16kg/hh/wk of residual waste across all households consisted of textile waste. Of the textiles present, around 88.5% were potentially recyclable and these accounted for 3.1% of the residual waste – 0.14kg/hh/wk.

Disposable Nappies & AHP (Absorbent Hygiene Products) - Disposable nappy levels within the residual bins of households with babies can be extremely high. These households will be more prevalent in demographic samples typical for young families. This form of waste also encompasses adult incontinence products which will be more typically prevalent in demographic samples with a higher density of senior residents. In this survey, the concentrations of disposable nappies and AHP averaged 14.8% or 0.68kg/hh/wk. In Acorn 4 samples the average was 31.3% with Acorn 1 disposing of 0.89g/hh/wk.

Inert rubble – This type of waste is generally one of the densest materials placed into residual bins. Although more suited for disposal at HWRC's small amounts kerbside dry with general residual waste are to be expected. Often it is seen that a small number of individual houses may place increased levels of construction / clearance type waste into their bins. On average 3.3% or 0.15kg/hh/wk consisted of mixed non-combustible waste. Around 11.9% (0.54kg/hh/wk) of the residual waste in the Acorn 5 sample consisted of these inert materials compared with 1.3% for the Acorn 3 residual waste.

Hazardous waste and WEEE – On average just 1.8% or 0.08kg/hh/wk of residual waste consisted of hazardous waste and WEEE. Levels were highest at 2.8% for the Acorn 3 sample.

Potential recyclability of the residual waste

The overall recyclability of the residual waste relates to all items present that could have been accepted into the kerbside recycling schemes currently running in Three Rivers. Results from the survey showed that the overall recyclability of the residual waste was highest in Acorn 2 households at 61.2%, and lowest in Acorn 4 at 37.2%. Across Three Rivers it is expected that 50.0% of all residual waste being disposed of is recyclable at the kerbside. Overall, around 29.3% of residual waste was compatible with food waste collections with a further 20.4% acceptable in kerbside dry recycling bins and 0.3% collectable in garden waste bins.

Table 10: Proportion of residual waste currently recyclable relative to current schemes (%)

% RECYCLABLES IN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
KERBSIDE DRY RECYCLABLES	25.0%	19.7%	15.7%	12.1%	7.5%	20.4%
RECYCLABLE FOOD	24.1%	39.6%	40.3%	25.2%	38.9%	29.3%
GARDEN RECYCLABLE	0.1%	2.0%	0.0%	0.0%	0.1%	0.3%
TOTAL RECYCLABLE	49.2%	61.2%	56.0%	37.2%	46.5%	50.0%

In terms of the amount of recyclables disposed of it is seen that Acorn 1 householders place 2.99kg/hh/wk of materials in residual bins that could be placed into the various kerbside recycling containers. This is almost four times the amount seen in the Acorn 4 sample (0.84kg/hh/wk). Across Three Rivers around 2.30kg/hh/wk of recyclable material is being disposed of in the residual waste.

Table 11: Kg/hh/wk of residual waste currently recyclable relative to current schemes

KG/HH/WK RECYCLABLES IN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
KERBSIDE DRY RECYCLABLES	1.52	0.74	0.63	0.27	0.34	0.94
RECYCLABLE FOOD	1.47	1.49	1.62	0.57	1.77	1.35
GARDEN RECYCLABLE	0.01	0.08	0.00	0.00	0.00	0.01
TOTAL RECYCLABLE	2.99	2.31	2.25	0.84	2.12	2.30

Figure 11 clearly shows the levels of residual materials currently collectable in the recycling collections available in Three Rivers. Different households were seen to dispose of differing levels of recyclable materials, both in terms of volume and composition (Table 12 & 13).

Table 12: Amount of residual waste recyclable relative to Acorn (Kg/hh/wk)

KG/HH/WK RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE PAPER	0.12	0.06	0.22	0.01	0.05	0.11
RECYCLABLE CARD & CARDBOARD	0.16	0.15	0.06	0.03	0.04	0.10
RECYCLABLE PLASTICS	0.39	0.14	0.09	0.02	0.05	0.21
RECYCLABLE TEXTILES	0.14	0.19	0.16	0.13	0.07	0.14
RECYCLABLE GLASS	0.52	0.14	0.04	0.00	0.04	0.25
RECYCLABLE METALS	0.19	0.07	0.06	0.08	0.09	0.12
TOTAL DRY RECYCLABLES	1.52	0.74	0.63	0.27	0.34	0.94
RECYCLABLE FOOD WASTE	1.47	1.49	1.62	0.57	1.77	1.35
RECYCLABLE GARDEN WASTE	0.01	0.08	0.00	0.00	0.00	0.01
TOTAL ORGANIC RECYCLABLES	1.47	1.57	1.62	0.57	1.78	1.36
TOTAL RECYCLABLE CONTENT	2.99	2.31	2.25	0.84	2.12	2.30

Table 13: Proportion of residual waste recyclable relative to Acorn (%)

% RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE	SPLIT*
RECYCLABLE PAPER	2.0%	1.7%	5.5%	0.4%	1.1%	2.3%	4.7%
RECYCLABLE CARD & CARDBOARD	2.6%	3.9%	1.5%	1.2%	1.0%	2.3%	4.6%
RECYCLABLE PLASTICS	6.4%	3.8%	2.2%	0.9%	1.1%	4.5%	9.1%
RECYCLABLE TEXTILES	2.3%	5.0%	4.0%	5.7%	1.5%	3.1%	6.2%
RECYCLABLE GLASS	8.5%	3.6%	0.9%	0.2%	0.9%	5.5%	11.0%
RECYCLABLE METALS	3.1%	1.8%	1.6%	3.6%	1.9%	2.7%	5.4%
TOTAL DRY RECYCLABLES	25.0%	19.7%	15.7%	12.1%	7.5%	20.4%	40.8%
RECYCLABLE FOOD WASTE	24.1%	39.6%	40.3%	25.2%	38.9%	29.3%	58.6%
RECYCLABLE GARDEN WASTE	0.1%	2.0%	0.0%	0.0%	0.1%	0.3%	0.5%
TOTAL ORGANIC RECYCLABLES	24.2%	41.6%	40.3%	25.2%	39.0%	29.6%	59.2%
TOTAL RECYCLABLE CONTENT	49.2%	61.2%	56.0%	37.2%	46.5%	50.0%	100.0%

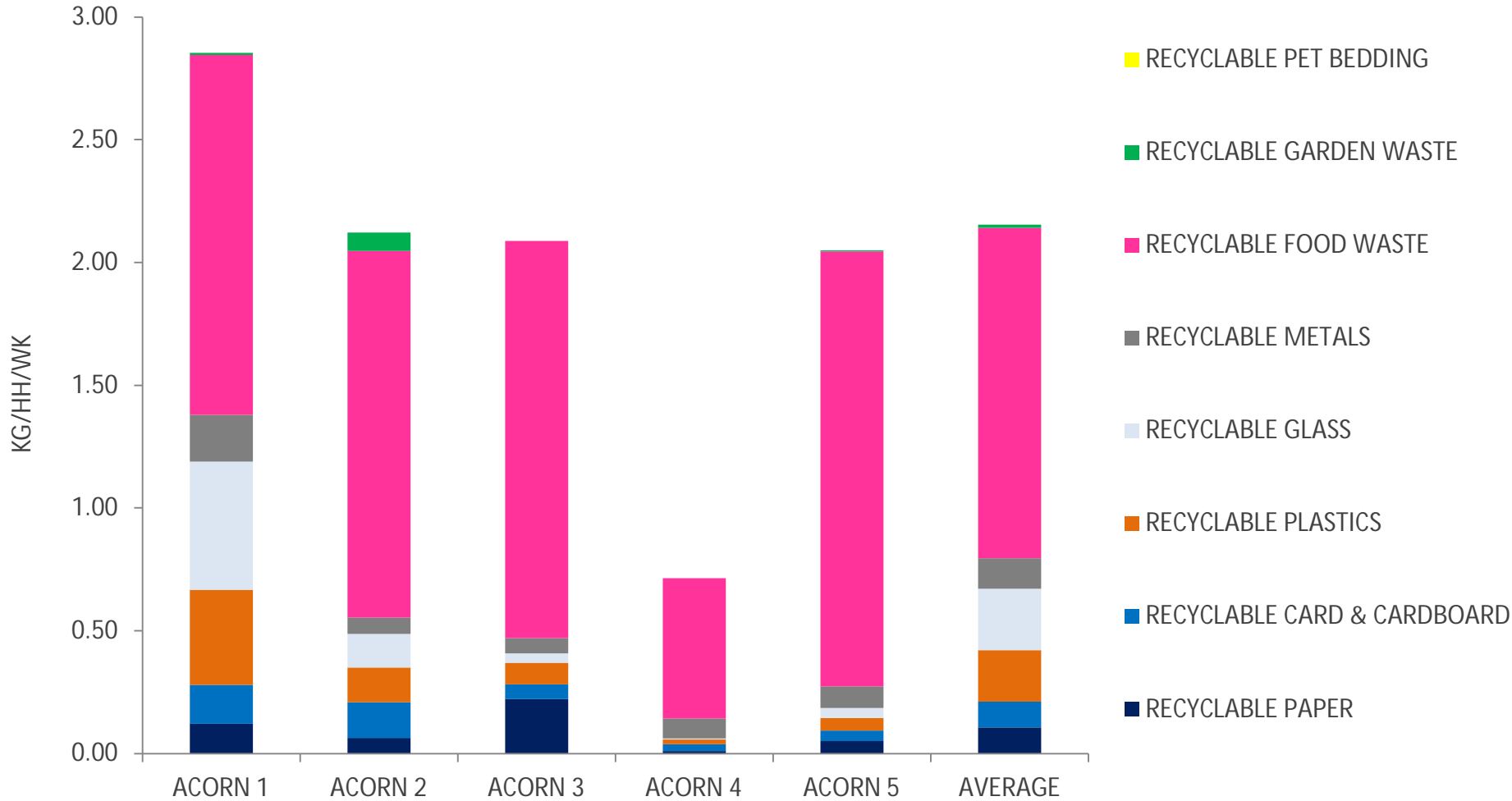
*Split is the proportional breakdown of the recyclable content. E.g., Recyclable paper forms 2.3% of the residual waste equating to 4.7% of the recyclable content

Figures show that food waste was responsible for 58.6% of the recyclable material present in residual bins where it formed 29.3% or 1.35kg/hh/wk of the total.

Recyclable glass made up 11.0% of the recyclable content forming 5.5% of the residual waste or 0.25kg/hh/wk.

Recyclable paper and card made up 9.2% of the recyclable content forming 4.6% of the residual waste or 0.21kg/hh/wk.

Figure 11: Amount of residual waste recyclable relative to Acorn (Kg/hh/wk)



Packaging content of the residual waste

Hertfordshire Waste Partnership has an interest in the levels of packaging material in its various waste streams. A large proportion of the material that are available for kerbside recycling consist of packaging items so ideally would not be present in the residual waste. On average, 1.07kg/hh/wk of residual waste consists of packaging items. Acorns 1, 3, and 5 each placed over 1.2kg/hh/wk of packaging items in their residual bins. This compares with 0.6kg/hh/wk for Acorn 4.

Table 14: Amount of packaging material in the residual waste (kg/hh/wk)

PACKAGING CONTENT (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
PAPER PACKAGING	0.04	0.01	0.03	0.00	0.04	0.02
CARD PACKAGING	0.14	0.13	0.05	0.02	0.04	0.09
PLASTIC FILM PACKAGING	0.35	0.19	0.26	0.10	0.12	0.25
DENSE PLASTIC PACKAGING	0.42	0.17	0.13	0.03	0.08	0.24
METAL PACKAGING	0.19	0.07	0.06	0.08	0.09	0.12
GLASS PACKAGING	0.52	0.14	0.04	0.00	0.04	0.25
OTHER PACKAGING	0.08	0.04	0.09	0.06	0.02	0.07
FOOD ASSOCIATED PACKAGING*	0.05	0.03	0.02	0.02	0.05	0.04
TOTAL PACKAGING	1.79	0.78	0.68	0.32	0.47	1.09

* Estimated for food waste disposed of in original packaging (5% of discarded weight)

Table 15: Amount of packaging material in the residual waste (kg/hh/wk)

PACKAGING CONTENT (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE	SPLIT*
PAPER PACKAGING	0.6%	0.2%	0.6%	0.1%	0.8%	0.5%	2.3%
CARD PACKAGING	2.3%	3.4%	1.4%	1.0%	0.8%	2.0%	8.5%
PLASTIC FILM PACKAGING	5.8%	5.2%	6.5%	4.5%	2.7%	5.5%	23.2%
DENSE PLASTIC PACKAGING	6.9%	4.6%	3.3%	1.1%	1.7%	5.1%	21.7%
METAL PACKAGING	3.1%	1.8%	1.6%	3.6%	1.9%	2.7%	11.5%
GLASS PACKAGING	8.5%	3.6%	0.9%	0.2%	0.9%	5.5%	23.2%
OTHER PACKAGING	1.2%	1.0%	2.3%	2.5%	0.5%	1.5%	6.2%
FOOD ASSOCIATED PACKAGING**	0.9%	0.9%	0.5%	0.9%	1.0%	0.8%	3.5%
TOTAL PACKAGING	29.4%	20.7%	17.1%	13.9%	10.4%	23.7%	100.0%

* Split is the proportional breakdown of the packaging content. E.g., Card packing forms 2.0% of the residual waste equating to 8.5% of the packaging content

** Estimated for food waste disposed of in original packaging (5% of discarded weight)

Almost a quarter of all residual waste was due to packaging. This ranged between 10.4% for Acorn 5 up to 29.4% for Acorn 1. Up to 45% of all packaging was plastic accounting for 10.6% or 0.49kg/hh/wk of total waste. An average of 23.2% of packaging was formed from glass with 11.5% metal packaging, 10.8% paper & card packaging, 6.2% other packaging and 3.5% food associated packaging.

Figure 12: Amount of packaging material in the residual waste (kg/hh/wk)

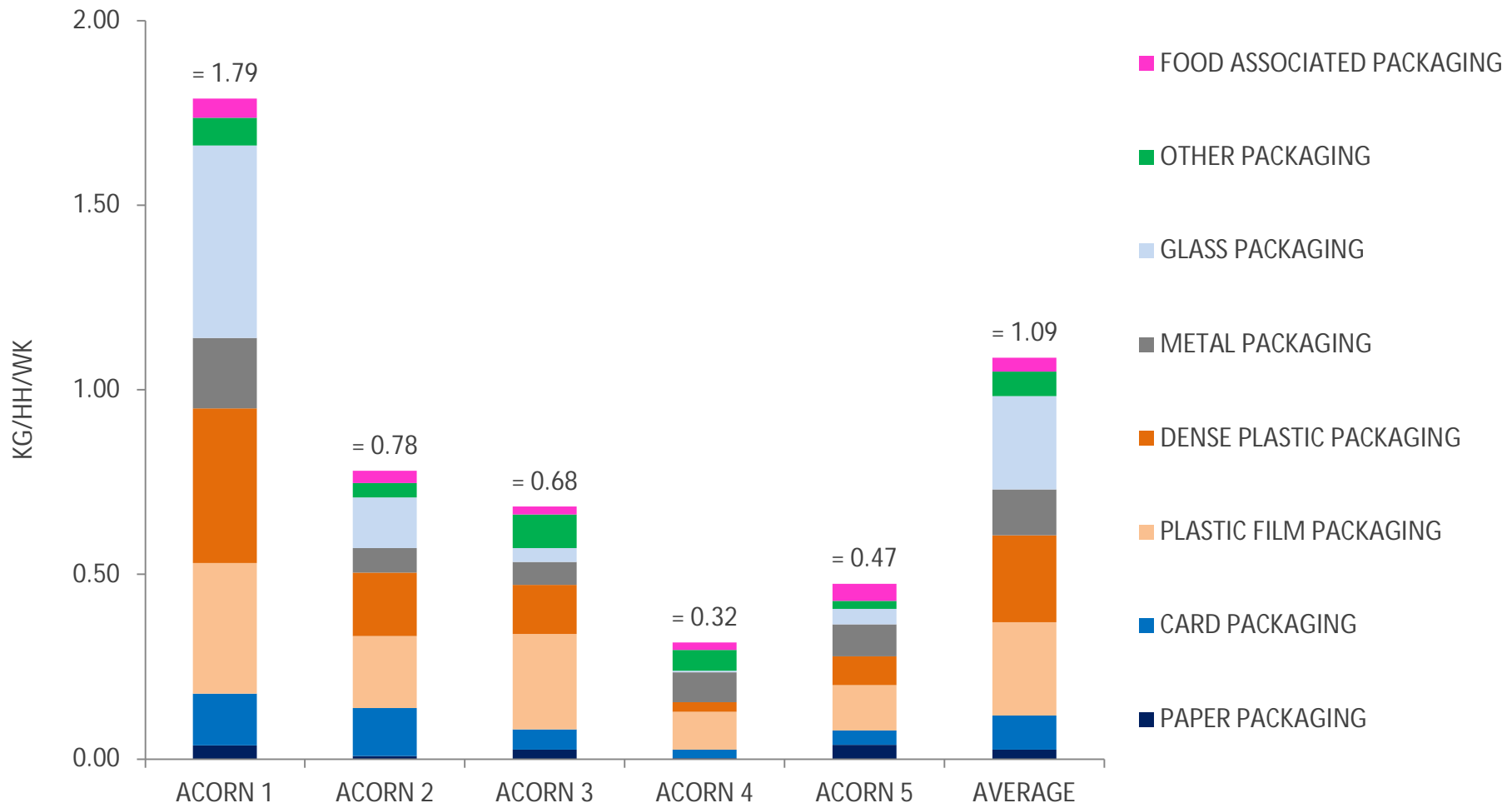
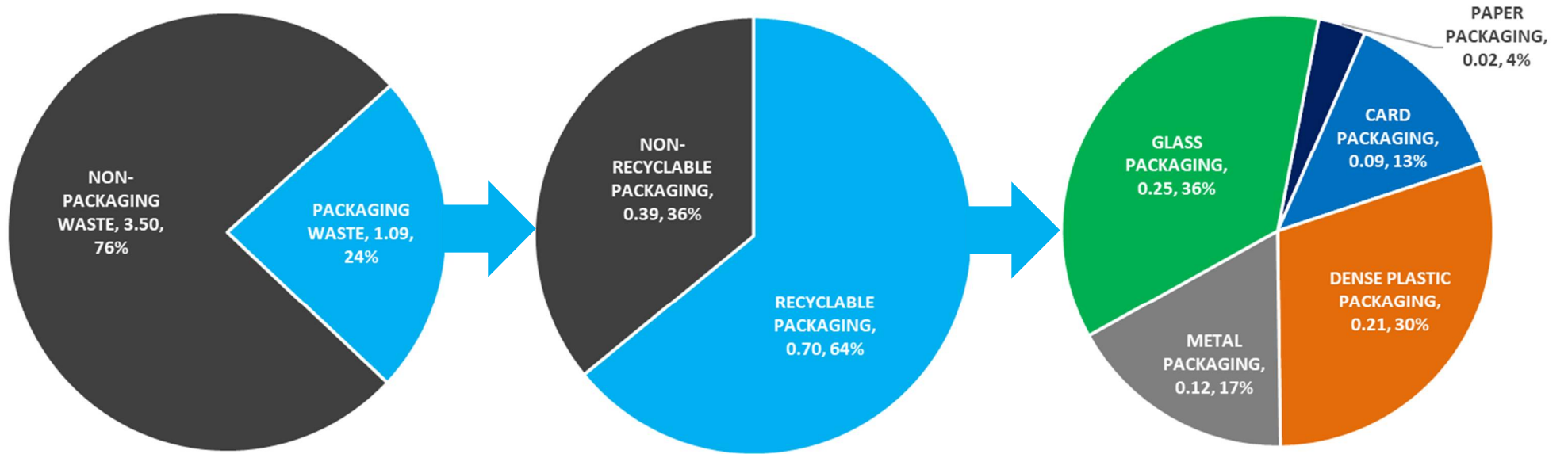


Figure 13: Proportion of residual waste due to packaging and recyclable content (%)



Packaging recyclability

Of the packaging material present in the residual bins, an average of 64.1% or 0.70kg/hh/wk was of a type that could have been recycled at the kerbside. Therefore, an estimated 15.2% of residual waste is due to recyclable packaging items.

In the Acorn 1 sample as much as 1.4% of packaging was recyclable. This compares with levels of 35% for Acorn 4. Acorn 4 households placed 0.11kg/hh/wk of recyclable packaging in their residual bins compared with 1.28kg/hh/wk for Acorn 1.

Over 21% of all residual waste from Acorn 1 was due to recyclable packaging. This compares with 12.5% from the next highest sample (Acorn 2) and was more than three times that of the remaining samples.

Table 16: Recyclable content of packaging in residual bins

PACKAGING CONTENT (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
TOTAL PACKAGING	1.79	0.78	0.68	0.32	0.47	1.09
RECYCLABLE PACKAGING	1.28	0.47	0.27	0.11	0.26	0.70
% OF PACKAGING RECYCLABLE	71.4%	60.6%	38.8%	35.1%	54.0%	64.1%
% OF WASTE DUE TO RECYCLABLE PACKAGING	21.0%	12.5%	6.6%	4.9%	5.6%	15.2%

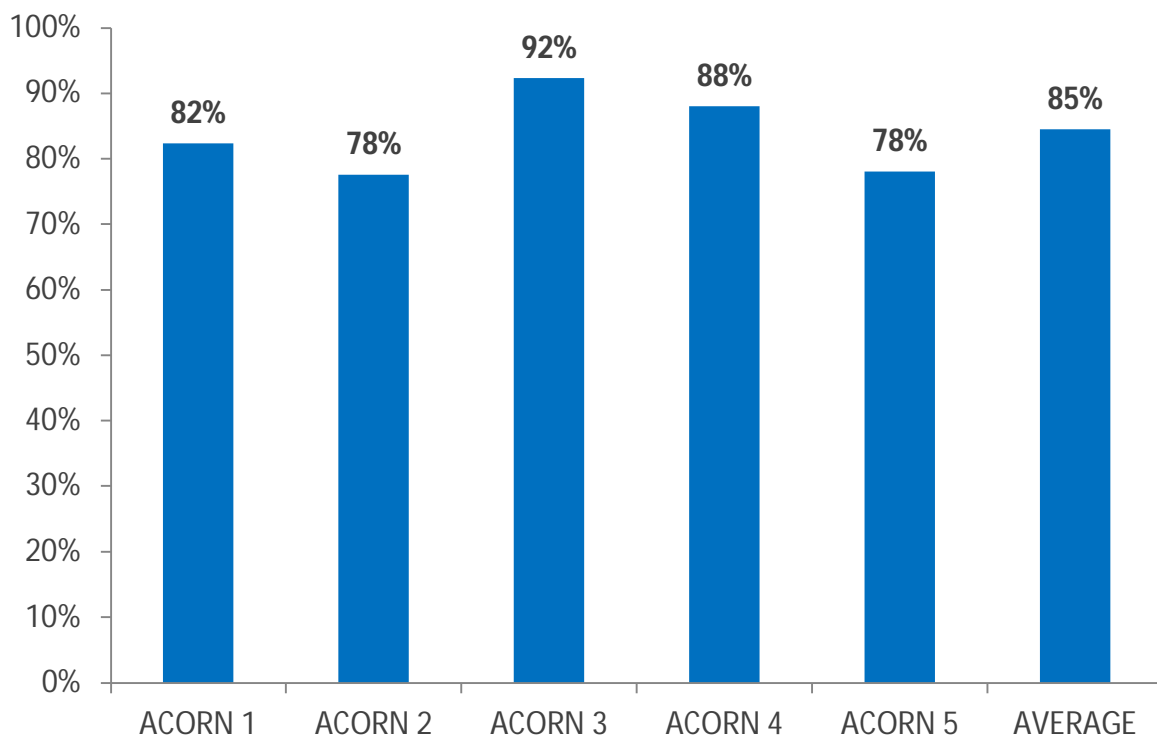
Dry recycling waste

Set out rates and waste generation

Figure 14 highlight the set-out rates for kerbside dry recycling bins observed at the time waste was collected for compositional analysis. Figure 15 show the amount of this recycling waste generated in kg/hh/wk. The same houses were sampled as those included in the residual survey above. As for the residual waste analysis, the overall amount of waste in kilograms per household per week is derived from the number of households who could set out waste and not just those that are participating. These aggregated figures for the recycling waste are shown in tables and figures with additional information relating to individual household samples given where relevant.

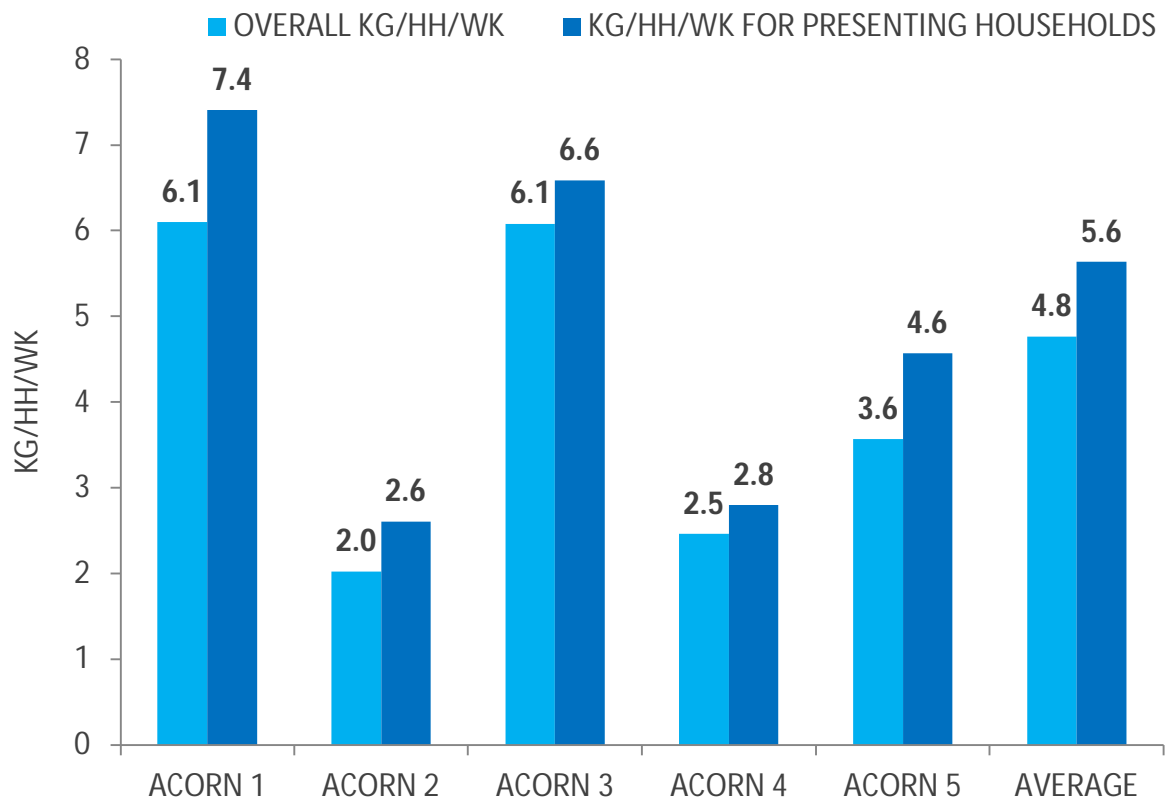
An average of 84.5% of households across the Three Rivers samples set out recycling bins for collection. This ranged between 77.6% for Acorn 2 up to 92.3% for Acorn 3.

Figure 14: Average Set Out for kerbside dry recycling waste (%)



An average of 4.76kg/hh/wk of kerbside dry recycling is being generated, this ranged between 2.02kg/hh/wk for Acorn 2 up to 6.10kg/hh/wk for Acorn 1. Solely considering presenting households the average level generated is 5.64kg/hh/wk.

Figure 15: Average kerbside recycling waste generation rates (kg/hh/wk)



Compositional of kerbside dry recycling bins

This section looks at average amounts and composition of the recycling bins presented by households sampled throughout Three Rivers. Hand sorting of the recycling waste gave concentration by weight figures for the fifteen main categories of waste as well as the more detailed sub-categories. Results can again be expressed in terms of percentage concentration and kg/hh/wk for individual samples and in relation to the household Acorn type surveyed. Table 17 and Figure 16 show recycling data in terms of percentage composition with Table 18 and Figure 17 showing generation rates for major materials in kg/hh/wk across all households in each sample area.

As residual waste will contain a proportion that is classified as recyclable; then recycling waste will contain a fraction that is deemed to contamination. That is to say that it is not compatible with the materials currently acceptable to the recycling container it is placed into.

Table 17: Composition of kerbside dry recycling (% concentration) by Acorn

KERBSIDE DRY RECYCLING (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE PAPER	10.9%	11.0%	23.1%	5.8%	12.6%	13.43%
RECYCLABLE CARD & CARDBOARD	20.0%	16.3%	16.8%	56.7%	10.7%	22.20%
RECYCLABLE PLASTICS	8.6%	12.9%	10.8%	14.1%	15.1%	10.26%
RECYCLABLE TEXTILES	0.0%	0.0%	0.0%	0.0%	0.0%	0.00%
RECYCLABLE GLASS	32.0%	34.5%	27.6%	11.0%	32.5%	28.97%
RECYCLABLE METALS	2.9%	7.2%	8.5%	3.7%	4.7%	4.60%
TOTAL DRY RECYCLABLES	74.4%	81.8%	86.7%	91.2%	75.6%	79.5%
TOTAL CONTAMINATION	25.6%	18.2%	13.3%	8.8%	24.4%	20.5%

Table 18: Composition of kerbside dry recycling (kg/hh/wk) by Acorn

KERBSIDE DRY RECYCLING (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE PAPER	0.66	0.22	1.41	0.14	0.45	0.64
RECYCLABLE CARD & CARDBOARD	1.22	0.33	1.02	1.39	0.38	1.06
RECYCLABLE PLASTICS	0.53	0.26	0.65	0.35	0.54	0.49
RECYCLABLE GLASS	1.95	0.70	1.68	0.27	1.16	1.38
RECYCLABLE METALS	0.17	0.15	0.52	0.09	0.17	0.22
TOTAL DRY RECYCLABLES	4.54	1.65	5.27	2.24	2.70	3.78
TOTAL CONTAMINATION	1.56	0.37	0.81	0.22	0.87	0.98

Figure 16: Composition of kerbside dry recycling (%) by Acorn

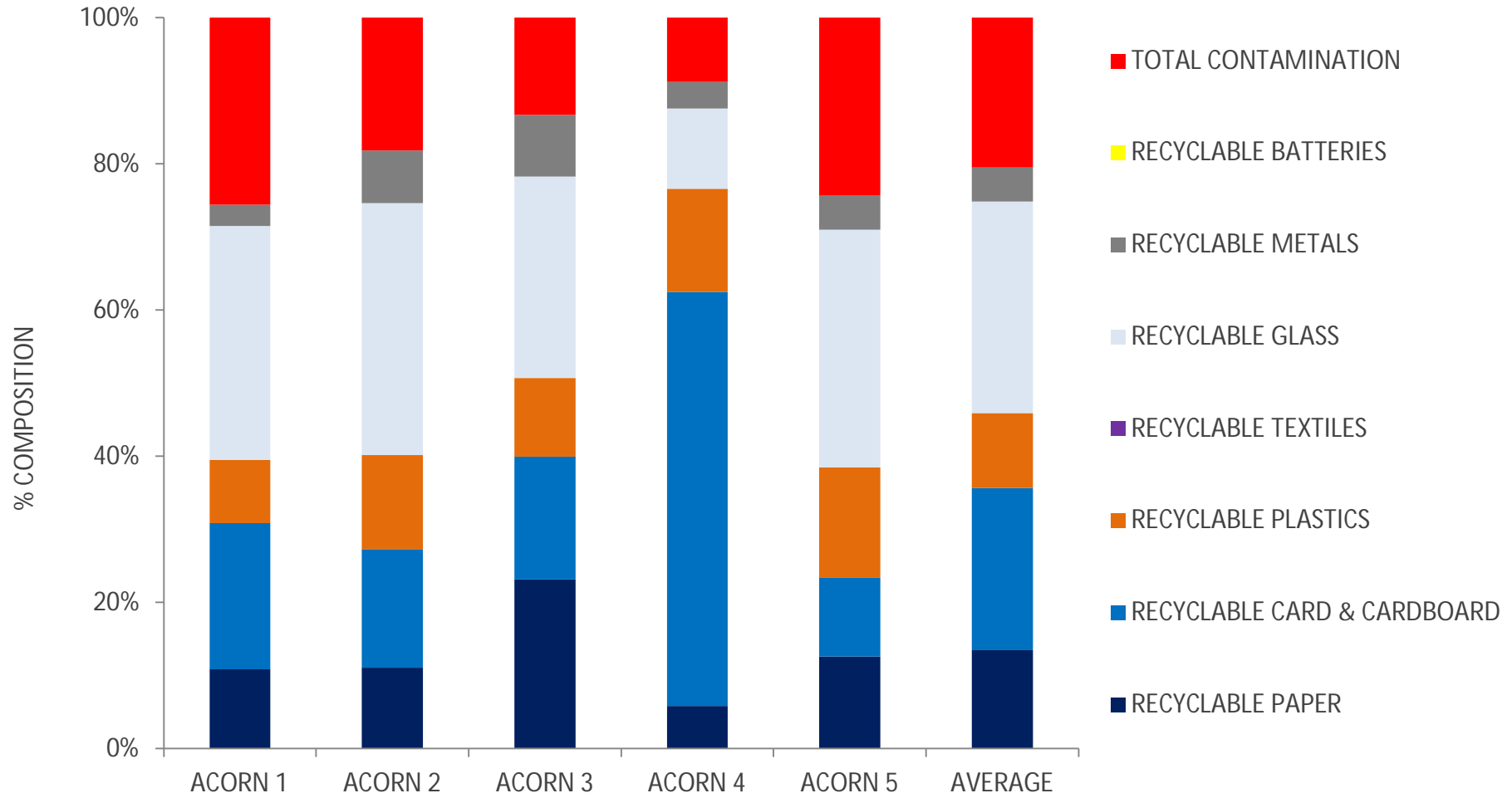
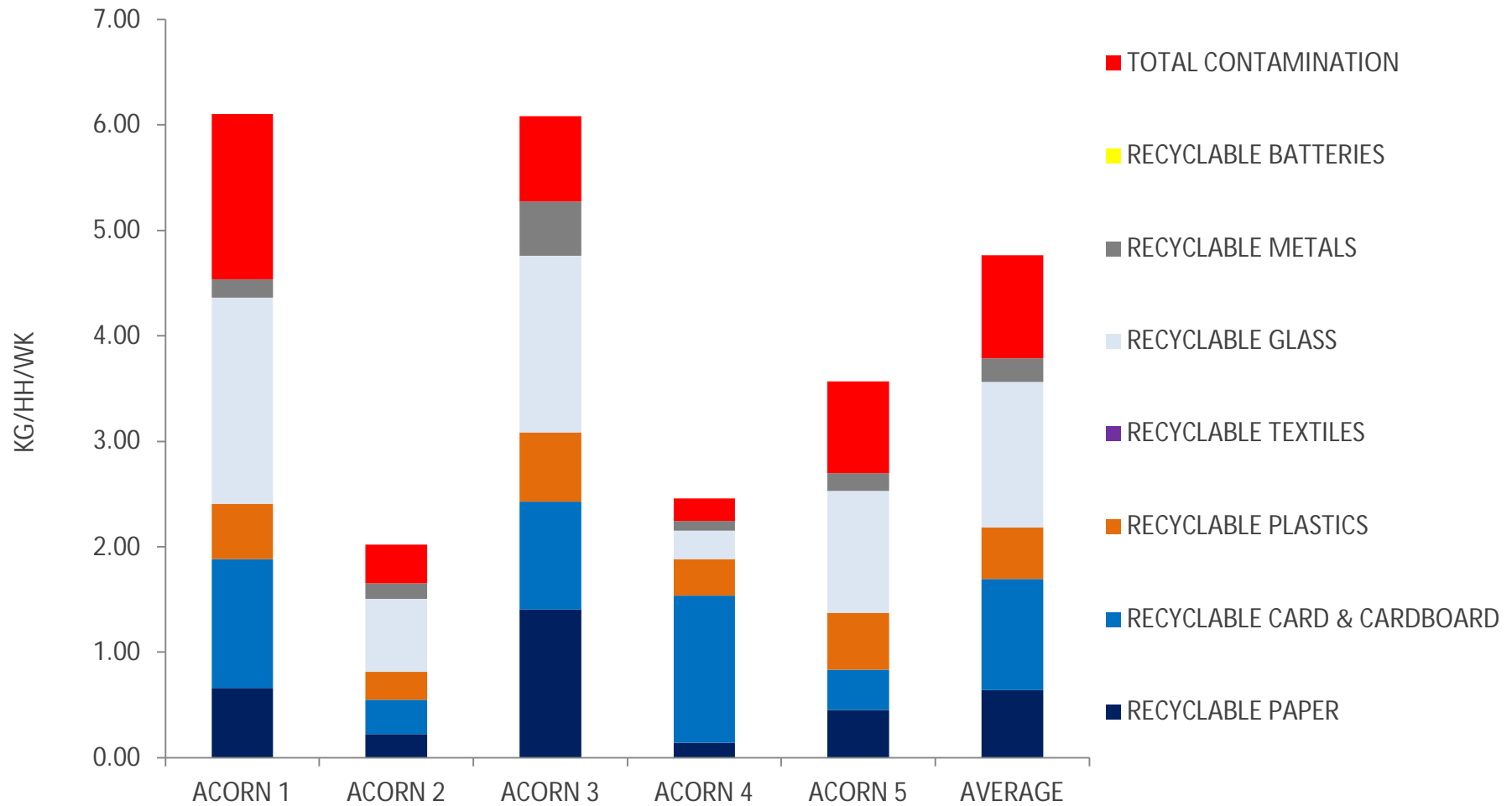


Figure 17: Level of kerbside dry recycling (kg/hh/wk) by Acorn



This section looks in more detail at the individual materials placed out for kerbside dry recycling collections and highlights the effectiveness with which this scheme is capturing these items.

Table 19 summarises the capture rates seen for the range of materials collected in kerbside dry recycling bins. These figures are calculated by determining the distribution of recyclables across residual and kerbside dry recycling waste streams for all households surveyed.

It is estimated that Three Rivers households are recycling 85.6% of their recyclable paper and 91.0% of their recyclable card and cardboard using their recycling bins.

Around 70.1% of the available recyclable plastics are captured.

Glass bottles and jars are effectively recycled with 84.6% placed into recycling bins.

Just under 64% of recyclable metals are captured.

Table 19: Summary table for material capture rates (%) kerbside dry recycling

% CORRECTLY RECYCLED	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
RECYCLABLE PAPER	84.6%	77.7%	86.3%	93.3%	90.0%	85.6%
RECYCLABLE CARD & CARDBOARD	88.5%	69.3%	94.4%	98.0%	89.8%	91.0%
RECYCLABLE PLASTICS	57.6%	64.7%	88.2%	94.6%	91.4%	70.1%
RECYCLABLE GLASS	79.0%	83.6%	97.8%	98.5%	96.6%	84.6%
RECYCLABLE METALS	47.7%	68.5%	89.2%	52.6%	65.6%	63.8%
TOTAL DRY RECYCLABLES	76.7%	74.9%	91.8%	94.0%	90.8%	82.6%

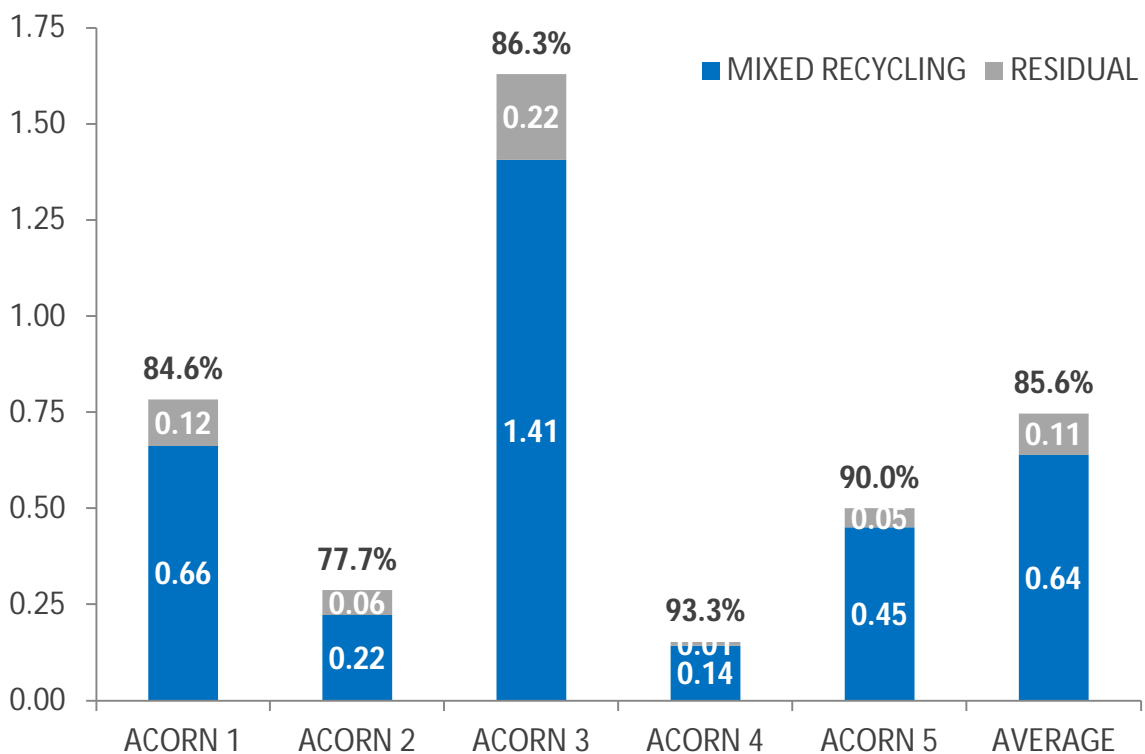
Paper Capture

Acorn 4 residents captured the highest proportion of their recyclable paper with 93.3% correctly being recycled. Acorn 4 households also generated the least recyclable paper at 0.15kg/hh/wk. Residents in Acorn 2 areas captured the least at 77.7%, with Acorn 3 disposing of by far the greatest amount at 1.63kg/hh/wk.

Across Three Rivers it is estimated that 0.75kg/hh/wk of recyclable paper compatible with recycling collections is generated with around 85.6% being correctly recycled.

There are many different forms of paper and therefore decisions must be made by residents as to whether a particular piece is to go into the recycling or residual waste. Across the samples there was a range of efficiency of paper separation. Consequently, around 0.11kg/hh/wk of potentially recyclable paper is not disposed of in recycling bins. Figure 18 shows the distribution of recyclable paper throughout the residual and recycling waste by Acorn category along with the associated capture rate.

Figure 18: Distribution of recyclable paper within residual and recycling samples (kg/hh/wk)

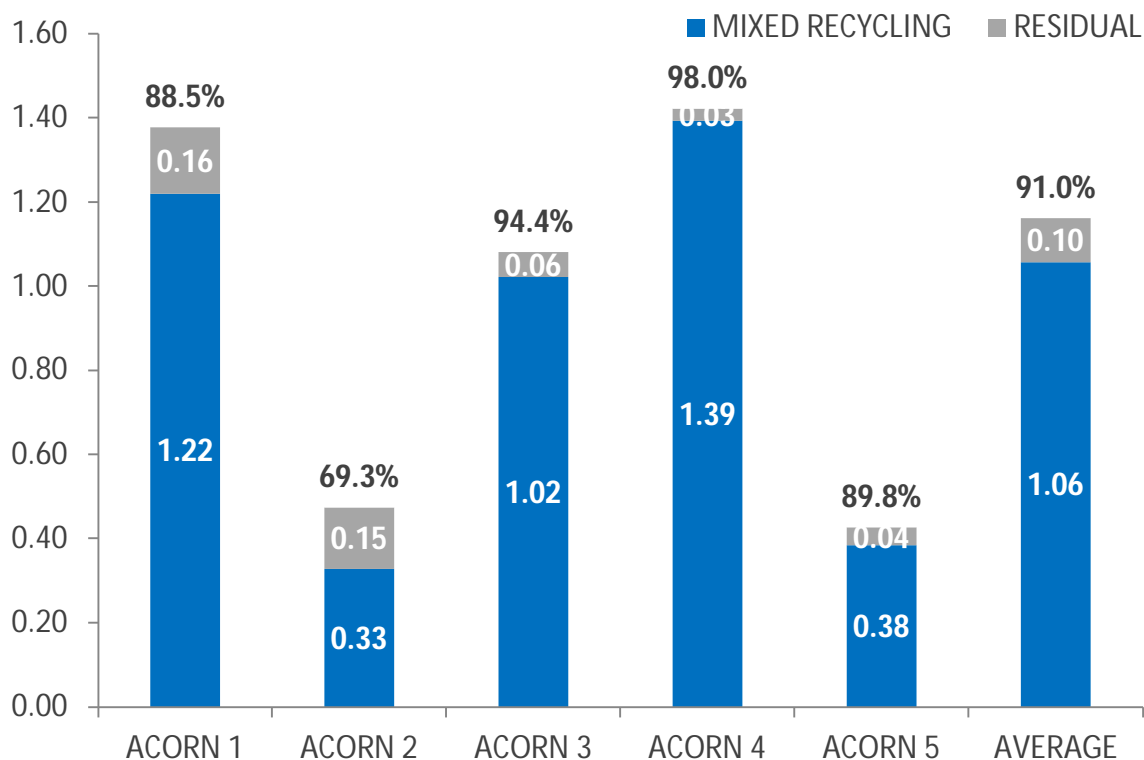


Card & Cardboard Capture

Acorn 4 residents captured the highest proportion of their recyclable card & cardboard with 98% correctly being recycled. These households also disposed of the most recyclable card at 1.42kg/hh/wk. Residents in Acorn 2 areas captured the least at 69.3%, with Acorn 5 generating the lowest amount of recyclable card & cardboard at 0.43kg/hh/wk. Across Three Rivers it is estimated that 1.016kg/hh/wk of recyclable card & cardboard is generated with around 91.0% being correctly placed into (or alongside) recycling bins.

There are many different forms of card & cardboard and therefore decisions must be made by residents as to whether a particular piece is to go into the recycling or residual waste. The majority of all recyclable forms of card & cardboard are being correctly diverted by the residents surveyed although there is around 0.10kg/hh/wk of potentially recyclable card & cardboard not being recycled. Results from this survey indicated that corrugated cardboard is recycled most efficiently with 95% captured. In comparison 85% of thin card is recycled along with 83.5% of Tetrapak cartons. Figure 19 shows the distribution of recyclable card & cardboard throughout the residual and recycling waste by Acorn category along with the associated capture rate.

Figure 19: Distribution of recyclable card within residual and kerbside recycling samples (kg/hh/wk)



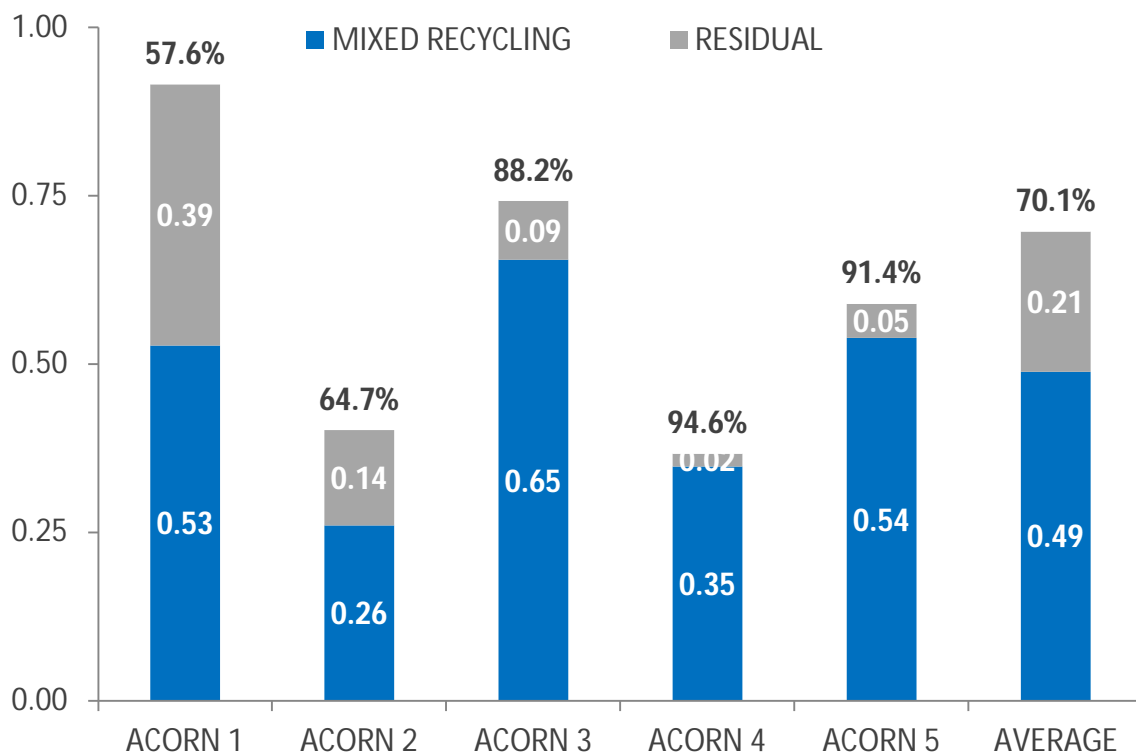
Plastics Capture

Acorn 4 residents captured the highest proportion of their recyclable plastics with 94.6% correctly being recycled. Acorn 4 households also generated the least at 0.37kg/hh/wk of this material. Acorn 1 captured the lowest proportion at 57.6% also generating the most at 0.92kg/hh/wk. Across Three Rivers it is estimated that 0.70kg/hh/wk of recyclable plastics are generated with around 70.1% being correctly placed into recycling bins

There are many different forms of plastic waste and therefore decisions must be made by residents as to whether a particular piece is to go into the recycling or residual waste. The majority of all recyclable forms of plastic are being correctly diverted by most residents surveyed, however, 0.21kg/hh/wk remains unrecycled.

Results from this survey indicated that plastic bottles are recycled most efficiently with 87% captured. Ranges were 77% for Acorn 2 up to 99% for Acorn 4. In contrast, 57% of recyclable tubs, pots and trays were captured. Acorn 3 captured almost 86% of these whilst Acorn 1 households managed to recycle less than 46%

Figure 20: Distribution of recyclable plastics within residual and kerbside recycling samples (kg/hh/wk)

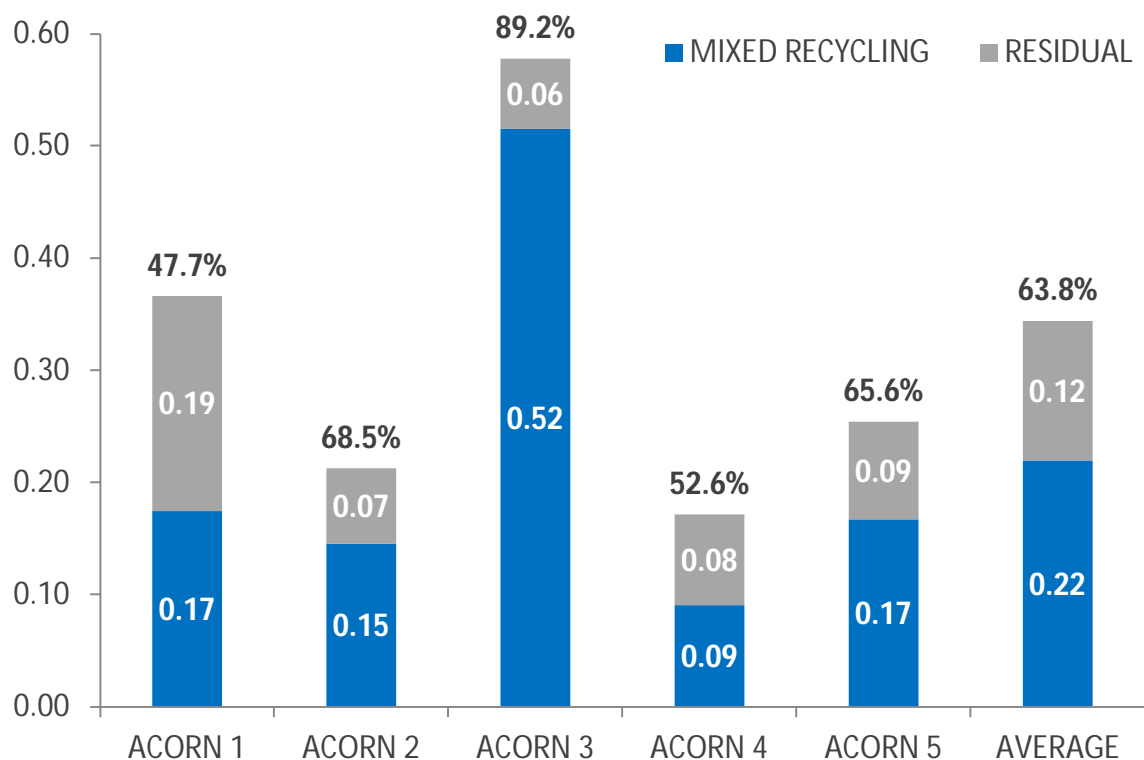


Metals Capture

Acorn 3 residents captured the highest proportion of their recyclable metals with 89.2% correctly being recycled. Acorn 3 households also disposed of the most recyclable metals at 0.58kg/hh/wk. Less than half of recyclable metal was captured by Acorn 1 households with Acorn 4 disposing of just 0.17kg/hh/wk. On average, 63.8% of all recyclable metals are being correctly diverted by the Three Rivers residents sampled with around 0.34kg/hh/wk being generated.

The majority of all recyclable forms of metal are being correctly diverted by most residents surveyed with 0.12kg/hh/wk in residual bins. Results from this survey indicated that food tins are recycled most efficiently with 75% correctly captured. In comparison, 64% of drink cans, 59% of aerosols and just 33% of foil are recycled. Figure 21 shows the distribution of recyclable metals throughout the residual and recycling waste by Acorn category.

Figure 21: Distribution of recyclable metals within residual and kerbside recycling samples (kg/hh/wk)

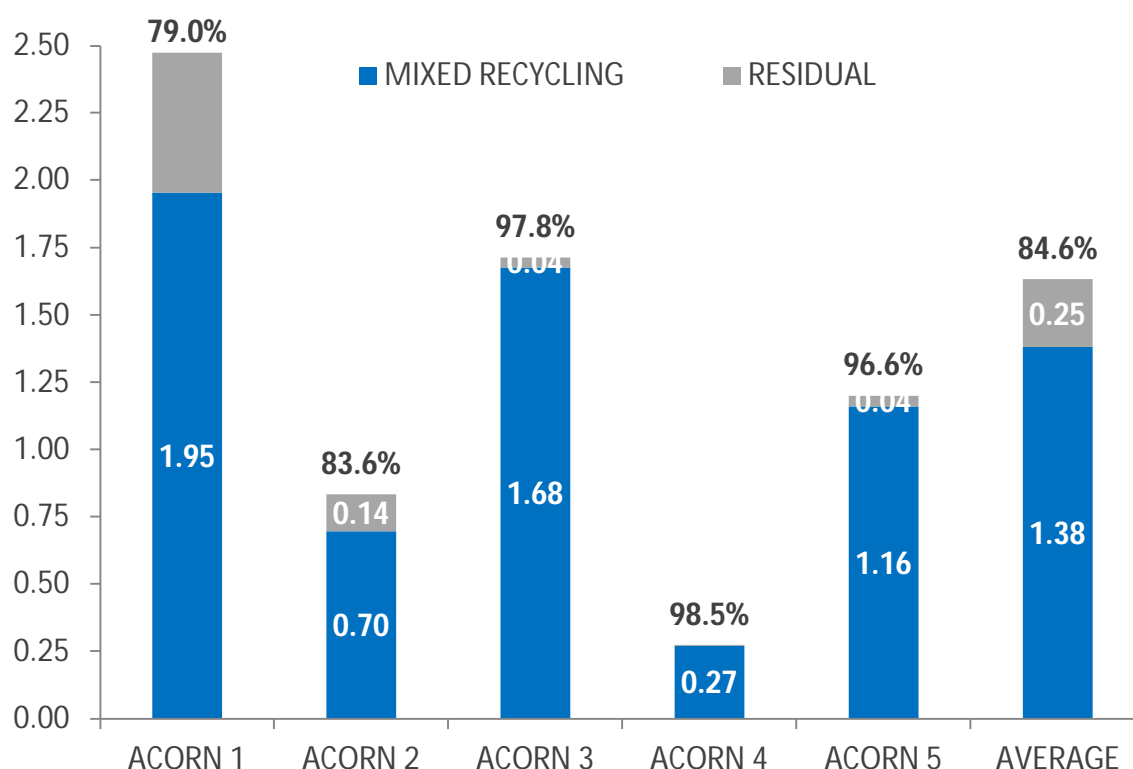


Glass Capture

Acorn 3, 4 and 5 residents captured around 97-98% of their recyclable glass whilst residents from Acorn 1 captured just 79%. Acorn 1 users produced by far the most recyclable glass in their combined kerbside waste at 2.47kg/hh/wk compared with 0.27kg/hh/wk from Acorn 4. On average, 84.6% of all recyclable glass is being correctly diverted by Three Rivers residents sampled with around 1.63kg/hh/wk being generated.

The majority of all recyclable forms of glass are being correctly diverted by the residents surveyed with 0.25kg/hh/wk of in the residual waste. Results from this survey indicated that glass bottles are recycled most efficiently with 85% correctly captured compared with 81% of glass jars. Whereas bottles (especially coloured) tend mainly to contain liquids that leave the bottle clean once empty; jars often contain sauces and preserves etc. These require cleaning once empty which can impact on the efficiency of recycling. Figure 22 shows the distribution of recyclable glass throughout the residual and kerbside recycling waste.

Figure 22: Distribution of recyclable glass within residual and kerbside recycling samples (kg/hh/wk)



Recycling Contamination

Table 20 shows that on average 0.98kg/hh/wk of the items present in recycling bins are made up of contamination. This equates to around 20.5%. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the recycling in Three Rivers.

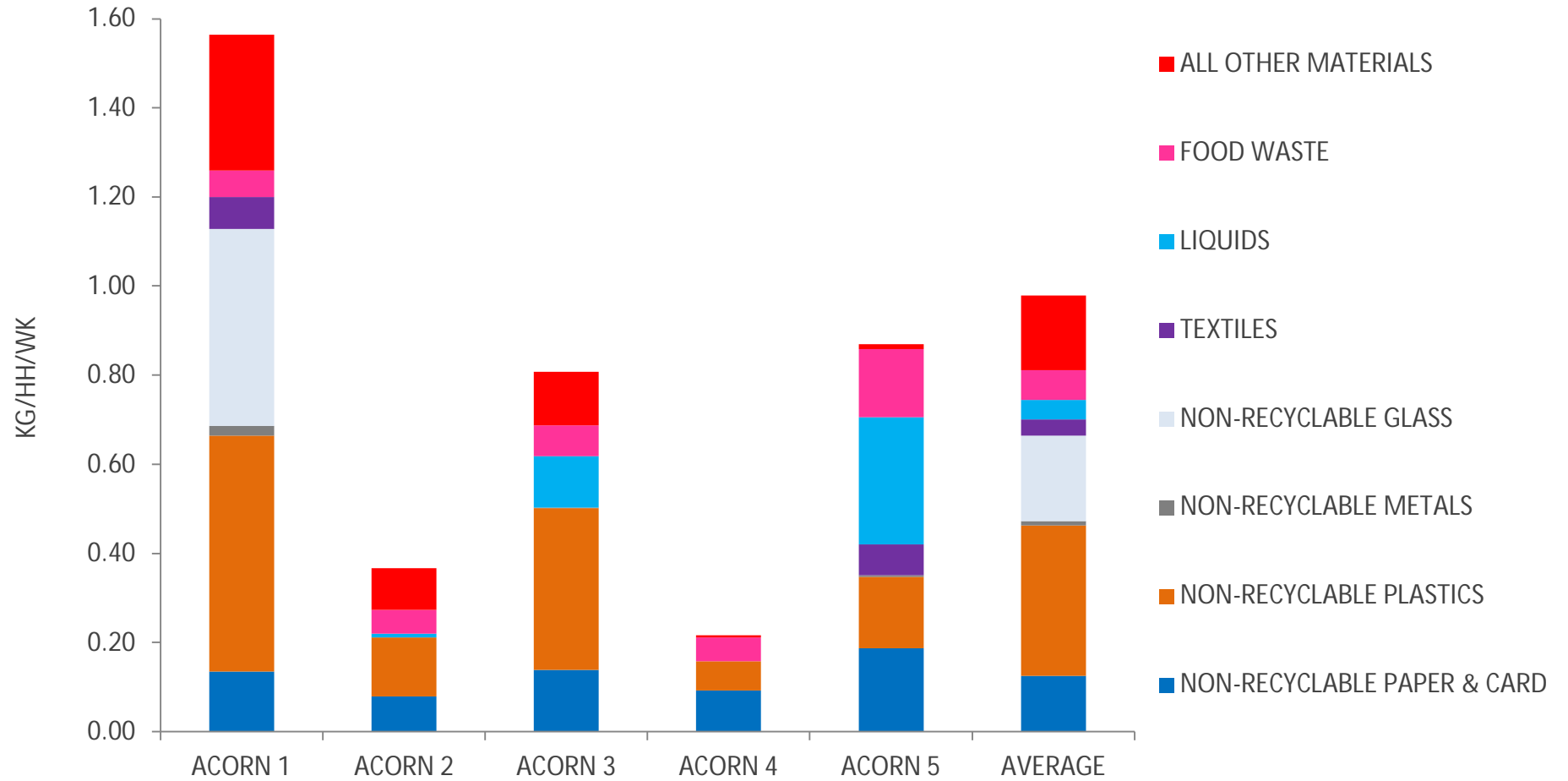
Some forms of contamination may be due to residents' lack of knowledge in relation to the recycling scheme. For example, a householder may believe anything metallic is acceptable with tins and cans. Other contamination will be formed from waste that is totally unrelated to the materials collected (i.e., disposable nappies, wood, or food waste). Table 19 and Figure 23 show the amounts of contamination materials recovered from the recycling bins.

Across the samples, the collected recycling contained between 0.22kg/hh/wk (Acorn 4) and 1.56kg/hh/wk (Acorn 1) of contamination.

Table 20: Unacceptable materials within in the kerbside dry recycling bins (kg/hh/wk)

CONTAMINATION (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
NON-RECYCLABLE PAPER & CARD	0.13	0.08	0.14	0.09	0.19	0.12
NON-RECYCLABLE PLASTICS	0.53	0.13	0.36	0.07	0.16	0.34
NON-RECYCLABLE METALS	0.02	0.00	0.00	0.00	0.00	0.01
NON-RECYCLABLE GLASS	0.44	0.00	0.00	0.00	0.00	0.19
TEXTILES	0.07	0.00	0.00	0.00	0.07	0.04
LIQUIDS	0.00	0.01	0.12	0.00	0.28	0.04
FOOD WASTE	0.06	0.05	0.07	0.05	0.15	0.07
ALL OTHER MATERIALS	0.31	0.09	0.12	0.00	0.01	0.17
TOTAL CONTAMINATION	1.56	0.37	0.81	0.22	0.87	0.98

Figure 23: Breakdown of contamination materials present within kerbside dry recycling bins (kg/hh/wk).



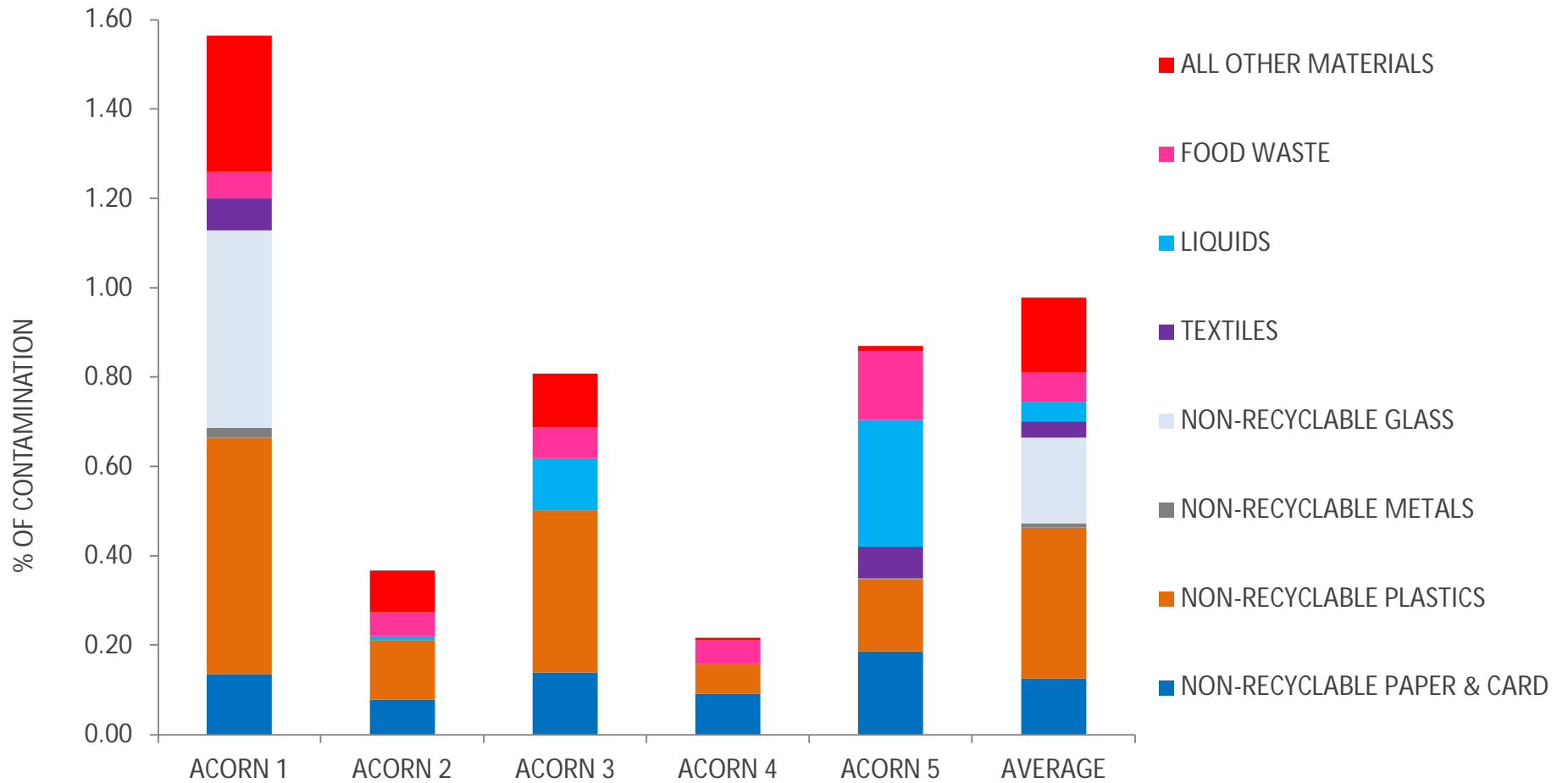
On average 20.5% of the material collected in recycling bins was deemed to be contamination. The recycling collected from Acorn 4 households was under 9% contamination. In contrast the recycling collected from Acorn 1 households was 25.6% contamination.

Table 21: Breakdown of kerbside dry recycling bin contaminants (% of contamination)

CONTAMINATION (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE	SPLIT
NON-RECYCLABLE PAPER & CARD	2.2%	3.9%	2.3%	3.7%	5.2%	2.6%	12.8%
NON-RECYCLABLE PLASTICS	8.7%	6.6%	6.0%	2.7%	4.5%	7.1%	34.6%
NON-RECYCLABLE METALS	0.4%	0.0%	0.0%	0.0%	0.1%	0.2%	1.0%
NON-RECYCLABLE GLASS	7.2%	0.0%	0.0%	0.0%	0.0%	4.0%	19.6%
TEXTILES	1.2%	0.0%	0.0%	0.0%	2.0%	0.8%	3.7%
LIQUIDS	0.0%	0.4%	1.9%	0.0%	8.0%	0.9%	4.5%
FOOD WASTE	1.0%	2.6%	1.1%	2.2%	4.3%	1.4%	6.8%
ALL OTHER MATERIALS	5.0%	4.6%	2.0%	0.2%	0.3%	3.5%	17.1%
TOTAL CONTAMINATION	25.6%	18.2%	13.3%	8.8%	24.4%	20.5%	100.0%

- Overall, it was seen that the most prevalent single contaminant in the recycling bins was non-recyclable plastics which formed 7.1% of recycling or 34.6% of the contamination. Almost half of this was due to plastic film.
- Non-recyclable glass formed 19.6% of the contamination; accounting for 4.0% of recycling.
- Other general residual waste formed 17.1% of the contamination; accounting for 3.5% of recycling.
- Non-recyclable paper and card formed 12.8% of the contamination; accounting for 2.6% of recycling.
- Food waste formed 1.4% of recycling or 6.8% of the contamination. Contained liquids (mainly drinks inside plastic bottles) contributed an additional 4.5% or contamination or 0.9% of collected waste.
- Textiles formed 3.7% of the contamination; accounting for 0.8% of recycling.
- Non-recyclable scrap metal formed 1.0% of the contamination; accounting for 0.2% of recycling.

Figure 24: Breakdown of contaminants present within kerbside dry recycling bins (% of contamination).



Packaging content of the kerbside dry recycling

Hertfordshire Waste Partnership has an interest in the levels of packaging material in its various waste streams. A large proportion of the material that are available for kerbside recycling consist of packaging items.

Table 22: Amount of packaging material in the kerbside dry recycling (kg/hh/wk)

PACKAGING CONTENT (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
PAPER PACKAGING	0.10	0.03	0.12	0.11	0.00	0.09
CARD PACKAGING	1.17	0.30	0.96	1.36	0.36	1.01
PLASTIC FILM PACKAGING	0.09	0.10	0.32	0.07	0.08	0.13
DENSE PLASTIC PACKAGING	0.62	0.26	0.66	0.35	0.54	0.53
METAL PACKAGING	0.17	0.15	0.52	0.09	0.17	0.22
GLASS PACKAGING	1.95	0.70	1.68	0.27	1.16	1.38
OTHER PACKAGING	0.03	0.00	0.02	0.00	0.00	0.02
FOOD ASSOCIATED PACKAGING*	0.00	0.00	0.01	0.00	0.02	0.00
TOTAL PACKAGING	4.13	1.54	4.28	2.24	2.33	3.38

* Estimated for food waste disposed of in original packaging (5% of discarded weight)

On average, 3.38kg/hh/wk of Three Rivers kerbside dry recycling consists of packaging items. Acorn 3 placed 4.3kg/hh/wk of packaging in their recycling bins. This compares with 1.5kg/hh/wk for Acorn 2.

Table 23: Levels of packaging material in the kerbside dry recycling (%)

PACKAGING CONTENT (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE	SPLIT
PAPER PACKAGING	1.6%	1.5%	1.9%	4.3%	0.0%	1.9%	2.6%
CARD PACKAGING	19.1%	14.7%	15.8%	55.2%	10.0%	21.2%	29.9%
PLASTIC FILM PACKAGING	1.4%	5.2%	5.3%	2.7%	2.3%	2.7%	3.8%
DENSE PLASTIC PACKAGING	10.2%	12.9%	10.8%	14.1%	15.1%	11.1%	15.7%
METAL PACKAGING	2.9%	7.2%	8.5%	3.7%	4.7%	4.6%	6.5%
GLASS PACKAGING	32.0%	34.5%	27.6%	11.0%	32.5%	29.0%	40.8%
OTHER PACKAGING	0.5%	0.0%	0.4%	0.0%	0.0%	0.4%	0.5%
FOOD ASSOCIATED PACKAGING*	0.0%	0.2%	0.1%	0.1%	0.6%	0.1%	0.1%
TOTAL PACKAGING	67.7%	76.0%	70.4%	91.1%	65.2%	70.9%	100.0%

* Estimated for food waste disposed of in original packaging (5% of discarded weight)

Over 70% of all kerbside dry recycling was due to packaging. This ranged between 65.2% for Acorn 5 up to 91.1% for Acorn 4. Almost 41% of all packaging was glass accounting for 29.0% or 1.38kg/hh/wk of total waste. An average of 32.5% of packaging was formed from paper and card with 19.5% plastics and 6.5% metal packaging.

Figure 25: Amount of packaging material in the kerbside dry recycling (kg/hh/wk)

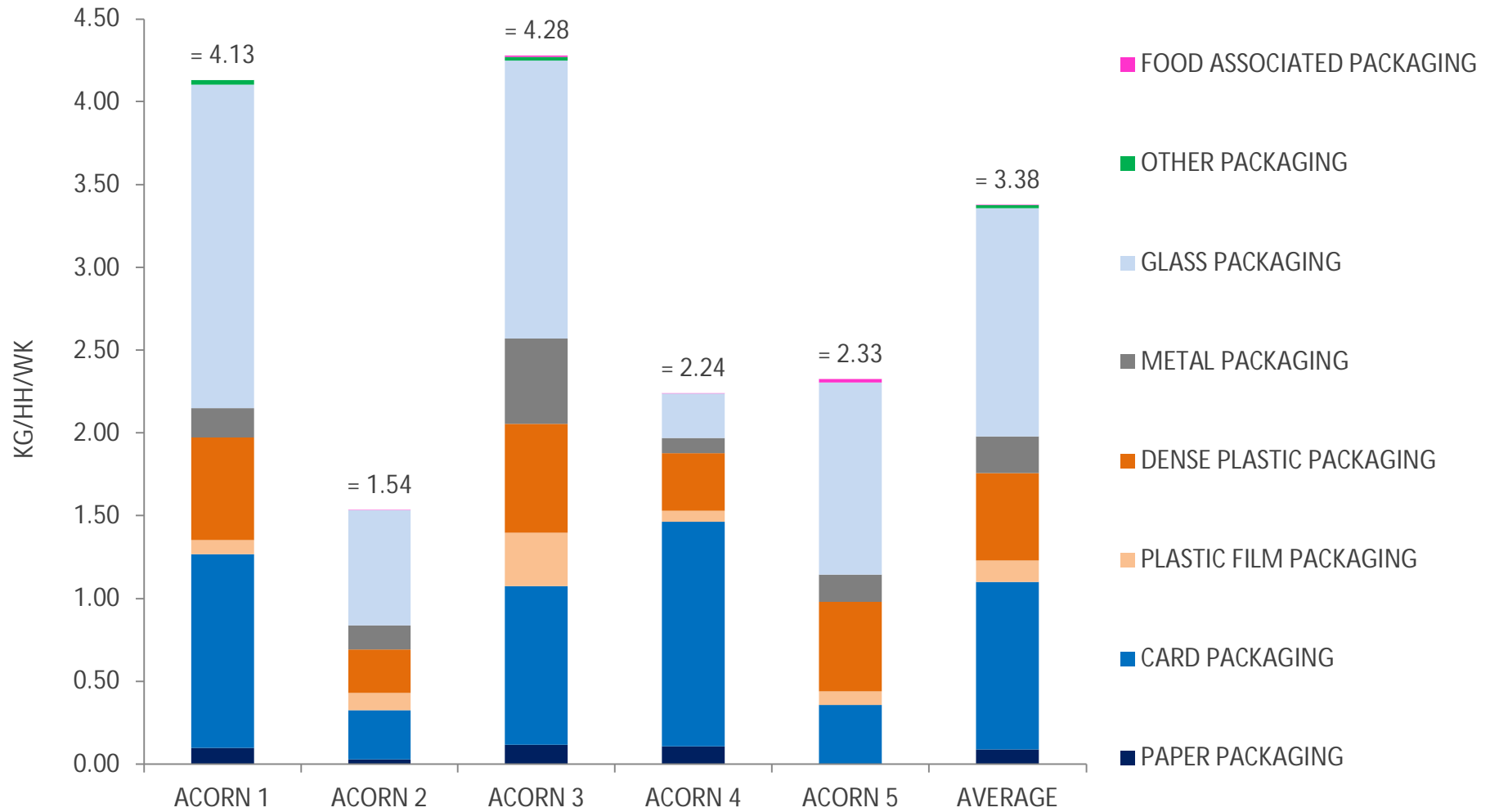
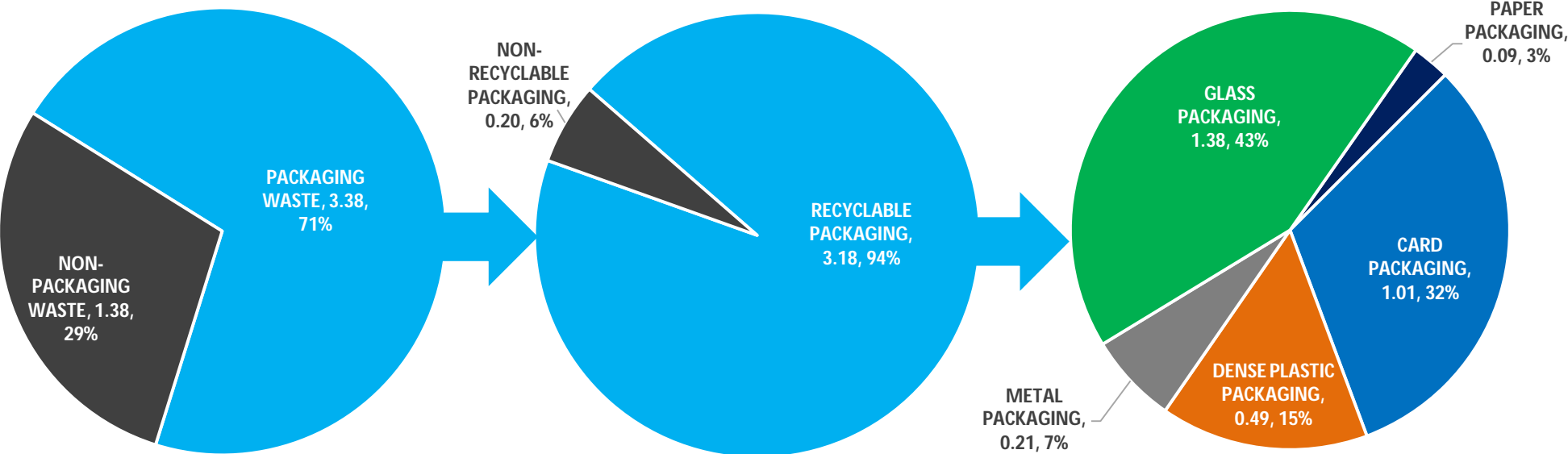


Figure 26: Proportion of dry recycling due to packaging and recyclable content (%)



Total Packaging & Capture

The total amount of residual waste and kerbside dry recycling generated averaged 9.4kg/hh/wk for Three Rivers. Acorn 4 households generated the least at 4.7kg/hh/wk compared with 12.2kg/hh/wk for Acorn 1.

Table 24: Total kerbside waste (kg/hh/wk)

TOTAL KERBSIDE WASTE & KERBSIDE DRY RECYCLING (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
	12.19	5.79	10.09	4.72	8.12	9.35

When combining both the residual and kerbside dry recycling waste it is estimated that 4.47kg/hh/wk of packaging is disposed of. This represents 47.7% of total kerbside waste. Of this packaging it is seen that 86.8% is of a type that is compatible with kerbside recycling. Therefore 3.87kg/hh/wk or 41.4% of total kerbside waste consists of recyclable packaging.

Of all the recyclable packaging disposed of, 82.0% is correctly recycled. The efficiency of recycling ranged between 75% for Acorns 1 and 2 up to 95% for Acorn 4.

Table 25: Total kerbside packaging waste (kg/hh/wk)

PACKAGING CONTENT (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	AVERAGE
TOTAL PACKAGING RESIDUAL	1.79	0.78	0.68	0.32	0.47	1.09
RECYCLABLE PACKAGING RESIDUAL	1.28	0.47	0.27	0.11	0.26	0.70
TOTAL PACKAGING RECYCLING	4.13	1.54	4.28	2.24	2.33	3.38
RECYCLABLE PACKAGING RECYCLING	3.90	1.43	3.92	2.17	2.22	3.18
TOTAL COMBINED PACKAGING	5.92	2.32	4.96	2.56	2.80	4.47
TOTAL COMBINED RECYCLABLE PACKAGING	5.18	1.90	4.19	2.28	2.48	3.87
% OF ALL PACKAGING RECYCLABLE	87.5%	82.1%	84.4%	89.3%	88.4%	86.8%
% CAPTURE OF RECYCLABLE PACKAGING	75.3%	75.1%	93.7%	95.1%	89.7%	82.0%

Figure 27: Packaging and non-packaging waste (kg/hh/wk and % by weight)

