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Measurement Evaluation Learning

Cambridge City Waste Composition Analysis

Cambridge Council

May / June 2012

FINAL REPORT

Measurement ◆ Evaluation ◆ Learning

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1) Project details and acknowledgements

Title	Cambridge City Waste Composition Analysis.
Client	Cambridge City
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Measurement Evaluation Learning

2) Introduction

Background

Cambridge City Council currently has a combined recycling and composting rate of 43.7% (2010/11). The Authority now wishes to study the composition of domestic kerbside collected residual and recycling waste streams to provide current baseline data and to help inform future communication campaigns. As well as giving indications as to the current levels of waste and recycling being generated, observations will be made showing the levels of materials that are currently recyclable at the kerbside and those which could potentially be recyclable via future schemes. The Council hopes to achieve 45% by the end of 2012 with a future target for 2015-16 of 50-55%.

This report presents results from the analysis of kerbside collected residual and recycling waste collected during a two week period in May / June 2012. The survey focused on the levels and composition of all waste containers that are currently available for residents to place for collection at the kerbside. The sampling regime involved the direct collection and compositional analysis of residual waste from a target of 300 properties representing each of the five main socio-demographic categories (Acorns). Results could therefore be weighted to give an even better picture of the waste being collected by the authority as a whole. Additionally around 120 properties were highlighted from a low performing area and a group of properties using communal bins. Knowledge of the waste in these differing areas will help the City Council develop strategies to increase the efficiency with which its residents are recycling their waste. The overall findings of this project will highlight several factors important for improving the recycling rate and directing future strategy and communication campaigns:

Objectives

Specific aims of the work were to:

- Understand, using socio-demographic profiling which sectors of the community are producing which types of waste and which are using the recycling provision most effectively
- Detect capture rates for individual materials which are already collected separately for recycling
- Evaluate the amount of specific materials collected in the residual bin that could potentially be collected separately for recycling
- Evaluate the use of the receptacles used for collecting waste and recycling
- Detect the amount of packaging and biodegradable material present
- Assess the amount of contamination in receptacles meant for recycling material
- Assess the amount of recyclable material being placed in the residual bin

This report will highlight key results recorded for Cambridge City showing data for individual socio-demographics as well as weighted for the City as a whole.

Acknowledgements

M·E·L Research would like to thank the collection authority and their staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results, presents the results in tables and charts and discusses the findings. The views and opinions expressed in this report are those of M.E.L Research Ltd. and are not necessarily shared by officers from Cambridge City Council.

Accuracy Statement

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

3) Executive Summary

Key findings

Kerbside residual waste

- Weighted across all Acorn samples, 84% of households sampled throughout Cambridge presented residual waste bins for collection.
- In terms of waste generation, households were setting out an average of 6.36kg/hh/wk.
- Food waste was seen to be the major component of residual waste forming 20.6% of the total, equating to 1.31kg/hh/wk – 45% of this is potentially home compostable
- Paper items made up 10.2% of the residual waste; 53% of this (0.35kg/hh/wk) was alternatively recyclable at the kerbside.
- Card and cardboard made up around 3.5% of collected residual waste; 84% of this (0.18kg/hh/wk) was alternatively recyclable at the kerbside.
- Plastics formed 14.9% of the residual waste; 10% of dense plastic waste (0.05kg/hh/wk) was due to recyclable plastic bottles with a further 0.21kg/hh/wk formed from the types of plastic containers that will be recyclable from July 2012.
- Just under 3% of residual waste was metallic; 53% of this (0.09kg/hh/wk) was recyclable in blue bins.
- Around 3% of residual waste was seen to be glass; 94% of this (0.16kg/hh/wk) was recyclable in blue bins.
- Over 6% of residual waste was due to textiles; 53% of these items (0.21kg/hh/wk) were seen to consist of reusable clothing and shoes
- Just under 1.6% of residual waste was deemed to be either Hazardous or WEEE. An additional 17% consisted of disposable nappies
- Just over 1.3% of residual waste was found to be garden waste. Around 17% of this was non-recyclable soil and turf, with the remainder consisting of recyclable garden trimmings
- Overall just over 13% of collected residual waste could have been placed into the blue recycling containers available– the equivalent of 0.84kg/hh/wk.
- Just under 22% of collected residual waste could have been placed into the green recycling containers available– the equivalent of 1.40kg/hh/wk.
- In total over 35% of residual waste collected could have been recycled alternatively at the kerbside – 2.23kg/hh/wk.
- Around 59% of potentially recyclable materials consisted of food waste with 15% being paper and 8% being card and cardboard.
- Residual waste collected from Cambridge households was deemed to be around 51% biodegradable.
- Collected waste had a packaging content of 17%.

Mixed recycling – Blue bins

- Over the survey, 78% of households presented blue bins for collection
- In terms of waste generation, kerbside households were setting out an average of 3.16kg/hh/wk in their blue bins.
- Overall 6.4% of blue bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.20kg/hh/wk.
- Around 77% of paper, 87% of recyclable glass, 73% of card and cardboard, 78% of plastic bottles and 59% of the recyclable metals available for mixed recycling were correctly captured.
- Kerbside properties diverted around 23.7% of their waste through their blue bins.

Organic waste recycling – Green bins

- Over the survey, 58% of households opted to present their green organic recycling bins at the kerbside for collection.
- In terms of waste generation, households were setting out an average of 2.96kg/hh/wk at the kerbside.
- Overall 2.6% of green bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.08kg/hh/wk.
- Green bins collected from households on a communal service had very high contamination levels of 31.3%. Bins had significant levels of residual waste and also large amounts of paper and cardboard.
- The majority of contamination of green bin waste was due to general residual materials; forming 69% of the contamination. Up to 23% of contamination was due to textiles.
- 21% of food waste and 97% of garden waste was correctly captured by households using the scheme.
- Properties on the green bin collection scheme diverted an average of around 23.1% of their waste through these collections.
- When combined with the diversion through mixed recycling collections, Cambridge households are diverting around 46.8% (5.84kg/hh/wk) of their total waste (12.48kg/hh/wk) through recycling collections.

4) Compositional Analysis of Residual Waste

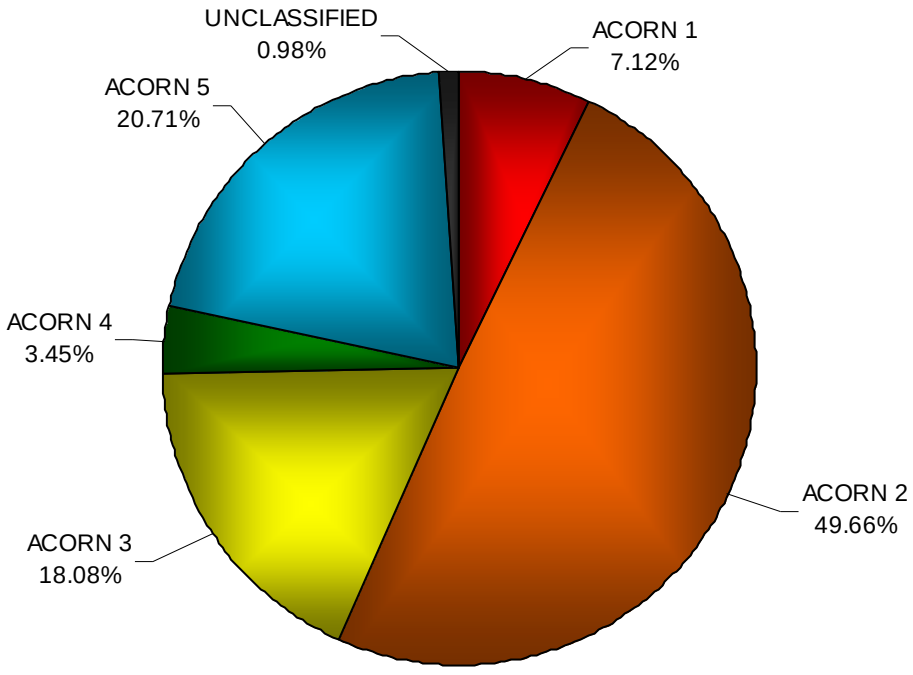
4.1 Set out rates and waste generation levels

Table 4.1.2 and Figure 4.1.2 highlight the average set out rates for residual waste observed at the time waste was collected for compositional analysis. Table 4.1.3 and Figure 4.1.3 show the average amount of residual waste generated in kg/hh/wk. Around 60 households were selected for each sample from each Acorn category with the set out relating to the proportion of these households actively placing out their waste. The amount of waste in kilograms per household per week is collected from each sample of 60 households, not just those that are participating. Results are shown by Acorn; as all five Acorn categories were sampled it was possible to weight the results according to the socio-demographic profile for Cambridge as per Table 4.1.1. A table giving a brief description of the types of households typical for each Acorn category is shown in the appendix section.

Table 4.1.1: Acorn profile for Cambridge

ACORN	% SET OUT
1	7.12%
2	49.66%
3	18.08%
4	3.45%
5	20.71%
UNCLASSIFIED	0.98%
TOTAL	100%

Figure 4.1.1: Acorn profile for Cambridge



Observed set out rates for residual waste ranged between 71% in the low performing Acorn 5 area (LPA) to 95% in Acorn 3. On average 84% of households in Cambridge are projected to be setting out their residual waste for collection.

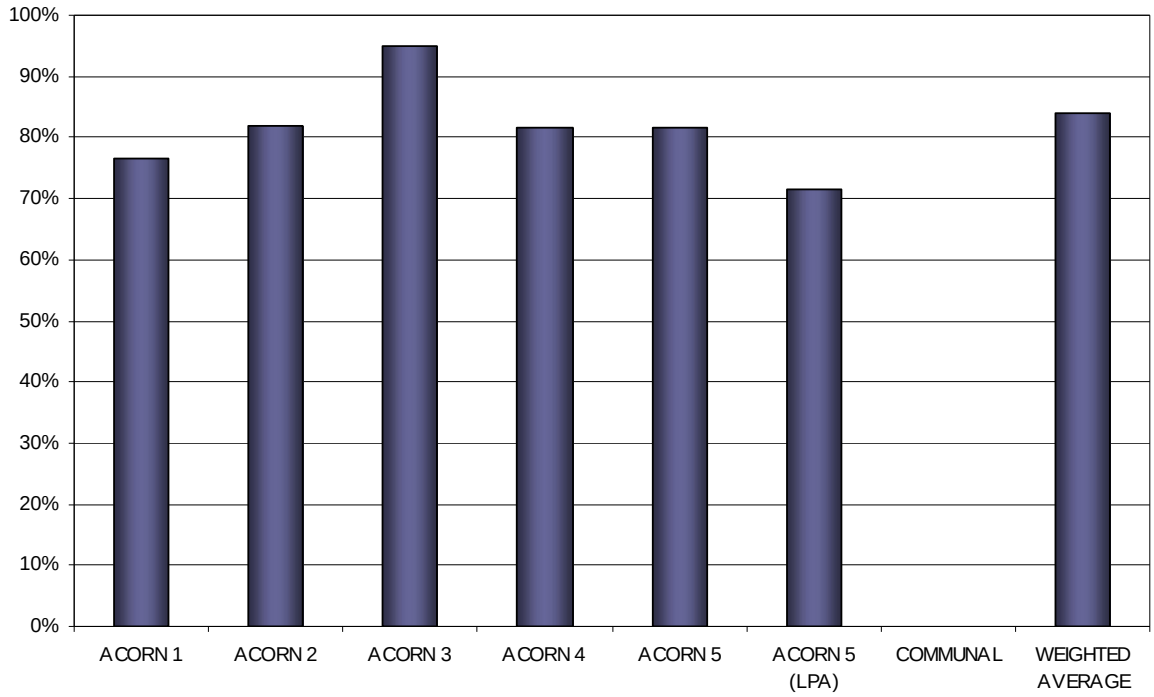
Table 4.1.2: Kerbside residual waste set out rates for each Acorn sample

ACORN	% SET OUT
1	77%
2	82%
3	95%
4	82%
5	82%
5 (LPA)*	71%
COMMUNAL	N/A**
WEIGHTED AVERAGE	84%

***Acorn 5 Low Performing Area**

**** Do not have their own bin so set out is not applicable**

Figure 4.1.2: Kerbside residual waste set out rates by Acorn (%)

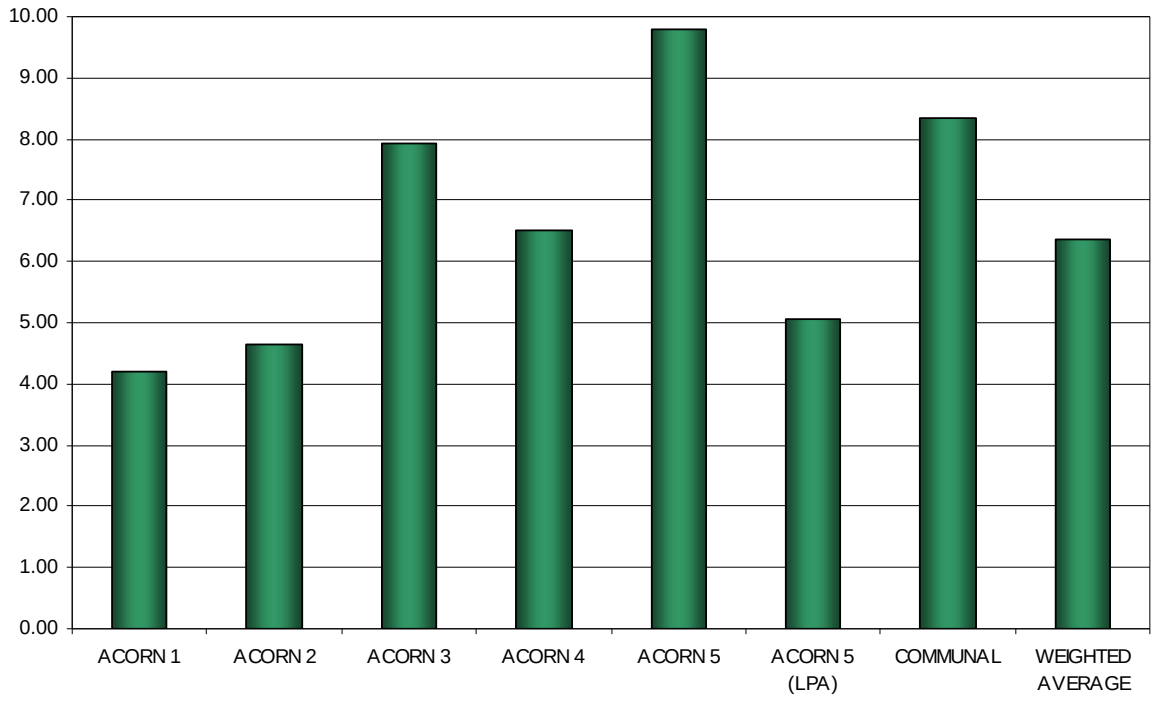


From observed results, the level of residual waste being disposed of at the kerbside ranged between 4.20kg/hh/wk in Acorn 1 to 9.80kg/hh/wk in Acorn 5. On average 6.36kg/hh/wk of residual waste is being disposed of by households throughout Cambridge.

Table 4.1.3: Kerbside residual waste generation rates for each Acorn sample (kg/hh/wk)

ACORN	KG/HH/WK
1	4.20
2	4.66
3	7.93
4	6.50
5	9.80
5 (LPA)	5.06
COMMUNAL	8.33
WEIGHTED AVERAGE	6.36

Figure 4.1.3: Average residual waste generation rates by Acorn (kg/hh/wk)



4.2 Compositional analysis of household residual waste

This section looks at the average amount and composition of the residual waste presented by various socio-demographic households sampled throughout the City. Hand sorting of the residual waste gave concentration by weight figures for the fifteen 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).

By knowing the composition of waste from the various Acorn samples it is possible to gain an insight into the make-up and volumes of the residual waste that can be expected from the City as a whole. Additional information on the selected lower performing and communal bins areas can also be gained. Detailed residual composition tables can be found in a separate data appendix.

Table 4.2.1 and Figure 4.2.1 show residual waste data in terms of percentage composition with Table 4.2.2 and Figure 4.2.2 showing generation rates for major materials in terms of kg/hh/wk. All residual waste will contain a proportion that is classified as potentially recyclable. That is to say that is should have been placed into one of the recycling receptacles supplied by the Council.

Table 4.2.1: Average residual waste composition weighted by Acorn (%)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	13.84%	11.35%	8.51%	7.78%	9.78%	5.93%	6.74%	10.19%
CARD & CARDBOARD	5.01%	3.32%	3.11%	2.57%	3.71%	1.92%	2.77%	3.45%
PLASTIC FILM	5.36%	7.98%	6.54%	4.06%	6.07%	8.81%	5.45%	6.77%
DENSE PLASTIC	10.76%	8.28%	12.09%	6.64%	4.78%	9.45%	5.83%	8.08%
TEXTILES	1.00%	6.24%	5.48%	7.74%	7.24%	3.66%	5.71%	6.19%
MISC COMBUSTIBLES	22.52%	16.70%	28.71%	17.69%	33.61%	30.14%	35.67%	25.19%
MISC NON-COMBUSTIBLES	12.58%	7.20%	11.17%	5.22%	11.50%	0.71%	0.34%	9.67%
GLASS	1.01%	4.13%	2.48%	2.21%	1.70%	4.42%	4.59%	2.75%
FERROUS METAL	5.19%	1.92%	2.02%	2.96%	2.06%	1.03%	2.48%	2.18%
NON-FERROUS METAL	0.57%	0.78%	0.53%	0.43%	0.55%	0.83%	0.74%	0.63%
GARDEN WASTE	2.49%	2.34%	0.52%	4.26%	0.31%	4.02%	1.57%	1.35%
PUTRESCIBLES	16.52%	28.37%	16.20%	32.97%	17.10%	28.45%	24.13%	21.57%
FINES	0.52%	0.00%	0.00%	1.22%	0.93%	0.20%	0.97%	0.37%
HHW	1.47%	0.30%	1.33%	0.00%	0.00%	0.03%	0.10%	0.48%
WEEE	1.17%	1.10%	1.32%	4.27%	0.67%	0.41%	2.91%	1.13%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
BLUE BIN RECYCLABLE	**17.47%**	**15.67%**	**11.43%**	**10.41%**	**11.16%**	**11.48%**	**14.01%**	**13.15%**
GREEN BIN RECYCLABLE	**18.94%**	**29.72%**	**15.72%**	**32.64%**	**16.78%**	**31.01%**	**23.21%**	**21.95%**
TOTAL RECYCLABLE	**36.41%**	**45.39%**	**27.15%**	**43.05%**	**27.94%**	**42.50%**	**37.21%**	**35.11%**

Table 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
DENSE PLASTIC	0.45	0.39	0.96	0.43	0.47	0.48	0.49	0.51
TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
MISC COMBUSTIBLES	0.95	0.78	2.28	1.15	3.29	1.52	2.97	1.60
MISC NON-COMBUSTIBLES	0.53	0.34	0.89	0.34	1.13	0.04	0.03	0.62
GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
FERROUS METAL	0.22	0.09	0.16	0.19	0.20	0.05	0.21	0.14
NON-FERROUS METAL	0.02	0.04	0.04	0.03	0.05	0.04	0.06	0.04
GARDEN WASTE	0.10	0.11	0.04	0.28	0.03	0.20	0.13	0.09
PUTRESCIBLES	0.69	1.32	1.28	2.14	1.68	1.44	2.01	1.37
FINES	0.02	0.00	0.00	0.08	0.09	0.01	0.08	0.02
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	**4.20**	**4.66**	**7.93**	**6.50**	**9.80**	**5.06**	**8.33**	**6.36**
BLUE BIN RECYCLABLE	**0.73**	**0.73**	**0.91**	**0.68**	**1.09**	**0.58**	**1.17**	**0.84**
GREEN BIN RECYCLABLE	**0.80**	**1.38**	**1.25**	**2.12**	**1.64**	**1.57**	**1.93**	**1.40**
TOTAL RECYCLABLE	**1.53**	**2.11**	**2.15**	**2.80**	**2.74**	**2.15**	**3.10**	**2.23**

Figure 4.2.1: Average residual waste composition weighted by Acorn (%)

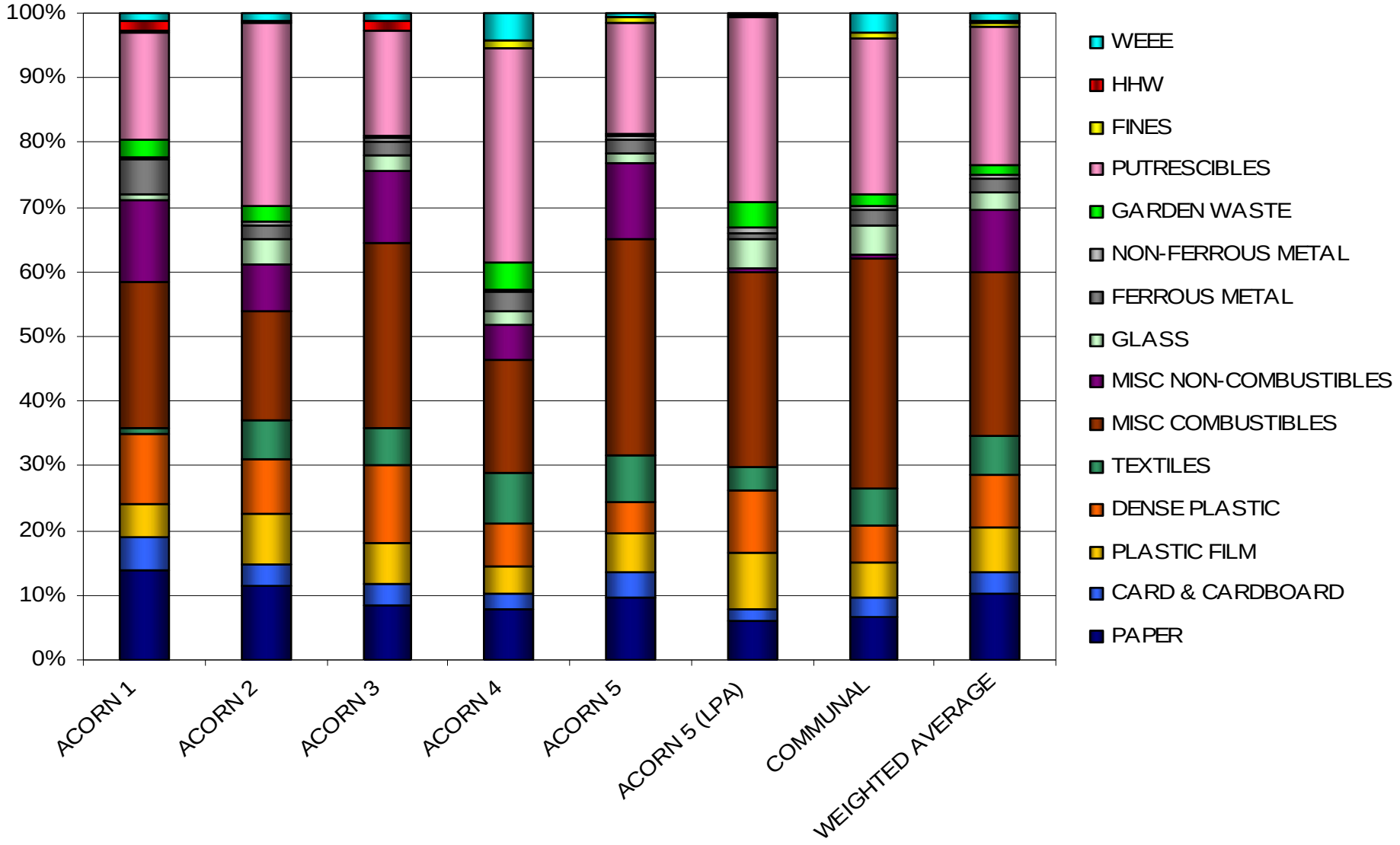
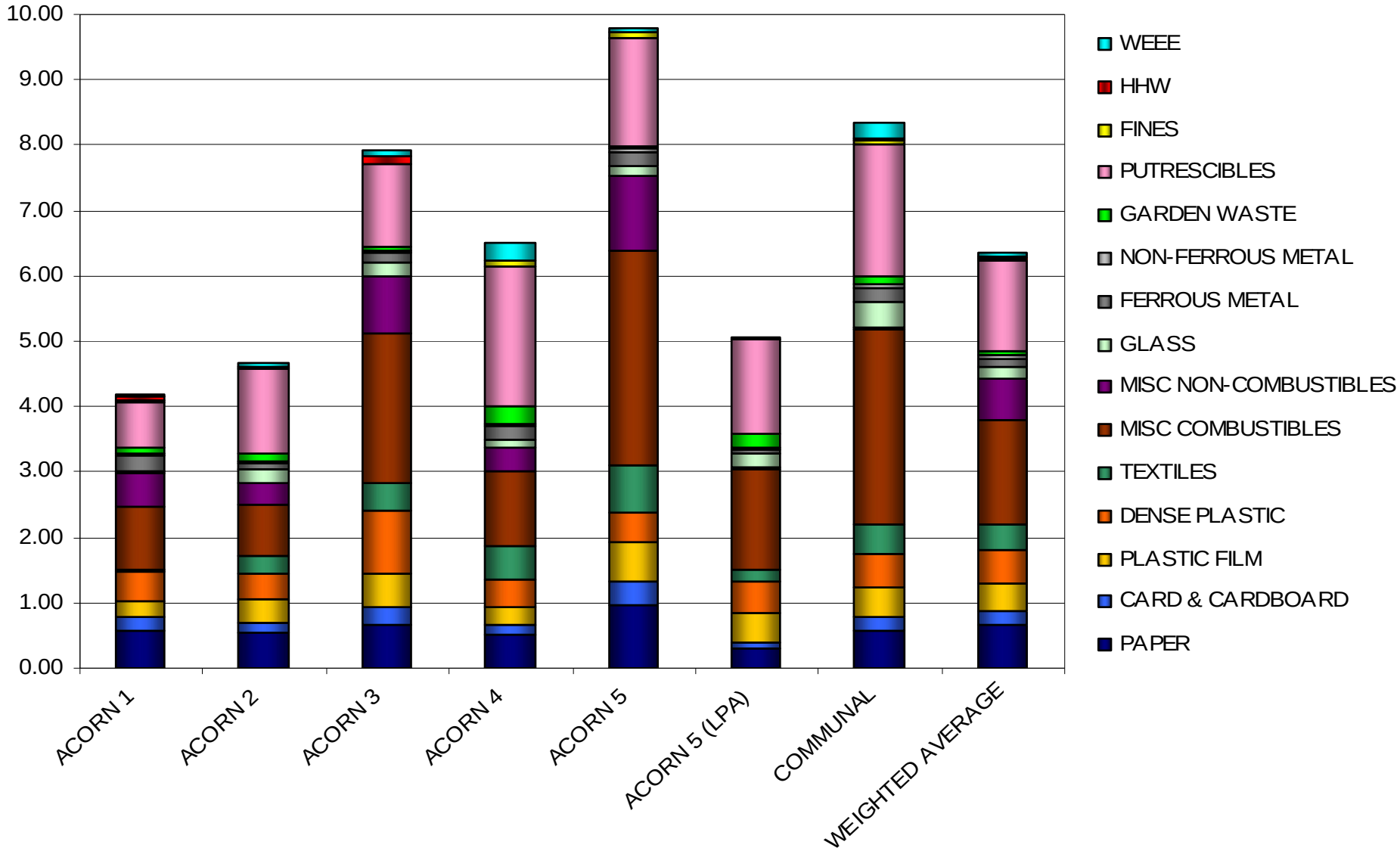


Figure 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)



4.2.1 Organic Waste

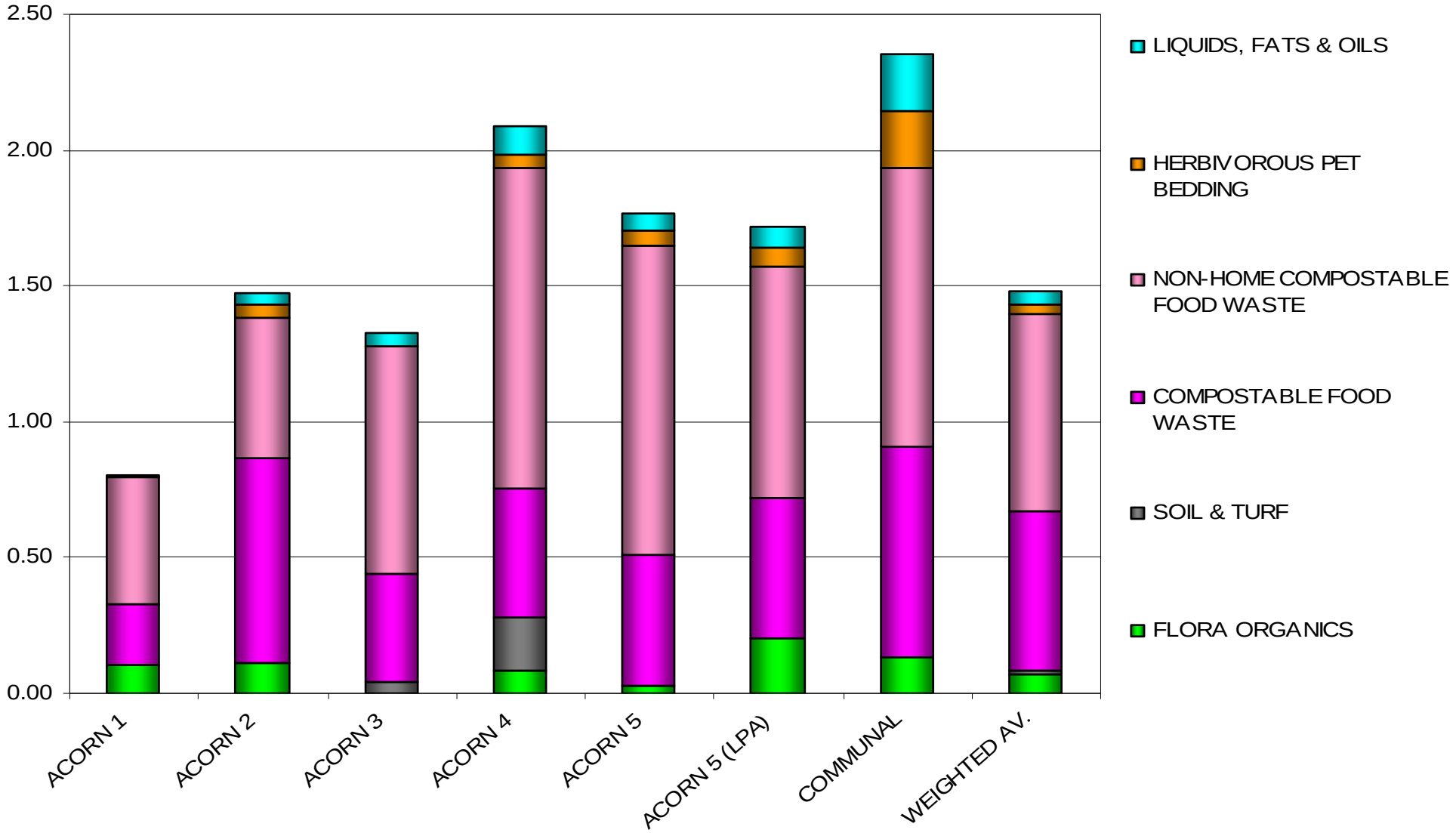
Organic waste, which includes garden and food waste (putrescibles), formed the greatest weight concentration of the primary waste categories for all Acorns. Ranges seen were from 16.7% from Acorn 3 households to 33.9% in Acorn 5 (LPA) households. Across the City as a whole around 23.3% of all residual waste (1.48kg/hh/wk) is classified as organic waste. Food waste accounted for between 15.6% (Acorn 3) and 27.4% (Acorn 2) of residual waste. Across the City as a whole around 20.6% of all residual waste (1.31kg/hh/wk) is classified as food waste. Currently Cambridge residents are able to recycle food waste at the kerbside using their green bin collection. Residents from Acorn 3 placed the most recyclable food into their residual bins at 2.81kg/hh/wk. Overall approximately 45% of this food waste (0.58kg/hh/wk) is potentially compostable in a general garden compost bin.

Residents throughout Cambridge can also utilise their green bins for the collection of general garden waste. In Acorns 3 and 5 levels of garden waste in residual bins were very low at 0.5% and 0.3% respectively. This equated to less than 0.05kg/hh/wk in total. In contrast the residual waste from Acorn 4 and Acorn 5(LPA) was over 4% garden waste; the equivalent of 0.28kg/hh/wk and 0.20kg/hh/wk respectively. Averaged for Cambridge it is seen that 17% of this garden waste consisted of soil and turf which is discouraged from the recycling collection. Across the City, recyclable forms of garden waste (i.e. garden clippings but not soil and turf) are responsible for an average of just 1.1%, or 0.07kg/hh/wk of residual waste. Table 4.2.1.1 and Figure 4.2.1.1 show the amounts of the different forms of organic waste found within the samples from each sample.

Table 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL ORGANICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
FLORA ORGANICS	0.10	0.11	0.00	0.08	0.03	0.20	0.13	0.07
SOIL & TURF	0.00	0.00	0.04	0.19	0.00	0.00	0.00	0.01
COMPOSTABLE FOOD WASTE	0.22	0.75	0.40	0.47	0.48	0.52	0.78	0.58
NON-HOME COMPOSTABLE FOOD WASTE	0.47	0.52	0.84	1.19	1.14	0.85	1.02	0.73
HERBIVOROUS PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	0.21	0.04
LIQUIDS, FATS & OILS	0.00	0.05	0.05	0.10	0.06	0.07	0.21	0.05
KG/HH/WK ORGANICS	0.80	1.48	1.33	2.09	1.77	1.72	2.35	1.48
% ORGANICS	19.08%	31.71%	16.71%	32.09%	18.06%	33.92%	28.22%	23.31%
KG/HH/WK FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	1.80	1.31
% FOOD WASTE	16.45%	27.37%	15.57%	25.53%	16.47%	27.00%	21.61%	20.59%

Figure 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)



4.2.2 Paper

On average, Acorn 1 residents had the highest concentrations of this type of waste (13.8%), with Acorn 5 disposing of the most at 0.96kg/hh/wk. In comparison just 5.9% (0.30kg/hh/wk) of residual waste from Acorn 5(LPA) was due to paper based materials. Across the City it was seen that around 10.2% or 0.65kg/hh/wk of residual waste consisted of discarded paper.

A proportion of this paper is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling higher grade white paper such as newspapers, junk mail, envelopes and directories. In addition to this higher grade paper, Cambridge residents are able to place shredded paper into their green organics bin. It was found that between 50.5% (Acorn 3 and Acorn 5(LPA) and 74.8% (Acorn 1) of paper could have been placed in either the blue or green bins as opposed to the residual bin.

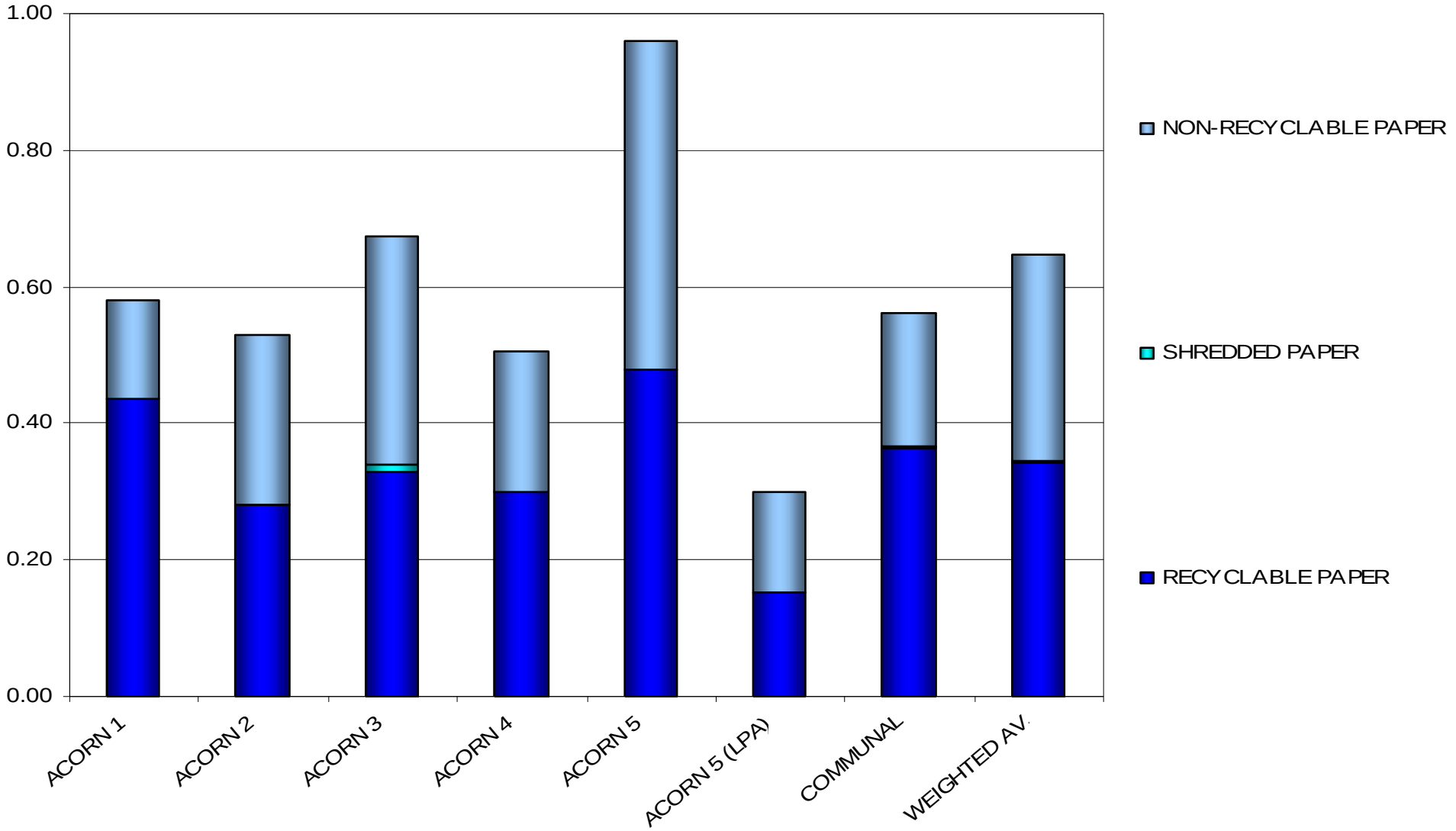
When accounting for all of the various types of paper within the residual waste, it is seen that 53.3% of residual paper was recyclable which accounted for 5.4% of all the residual waste or 0.35kg/hh/wk.

Table 4.2.2.1 and Figure 4.2.2.1 show the amounts of the different forms of paper waste for each Acorn.

Table 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PAPER	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.33	0.30	0.48	0.15	0.36	0.34
SHREDDED PAPER	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER	0.15	0.25	0.33	0.21	0.48	0.15	0.20	0.30
KG/HH/WK TOTAL PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
KG/HH/WK RECYCLABLE PAPER	0.43	0.28	0.34	0.30	0.48	0.15	0.37	0.35
% PAPER RECYCLABLE	74.77%	53.37%	50.52%	59.17%	49.83%	50.52%	65.29%	53.27%

Figure 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)



4.2.3 Card & Cardboard

On average, Acorn 1 residents had the highest concentrations of this type of waste (5%), with Acorn 5 disposing of the most at 0.36kg/hh/wk. In comparison just 1.9% (0.10kg/hh/wk) of residual waste from Acorn 5(LPA) was due to card and cardboard based materials. Across the City it was seen that around 3.5% or 0.22kg/hh/wk of residual waste consisted of discarded card and cardboard.

A proportion of this card & cardboard is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling thin card, corrugated cardboard and drinks cartons. It was found that between 65% (Acorn 1) and 94% (Acorn 5-LPA) of card and cardboard could have been placed in the blue bin as opposed to the residual bin. Across Cambridge, 84% of residual card and cardboard was compatible with recycling collections which accounted for 2.9% of all the residual waste or 0.18kg/hh/wk.

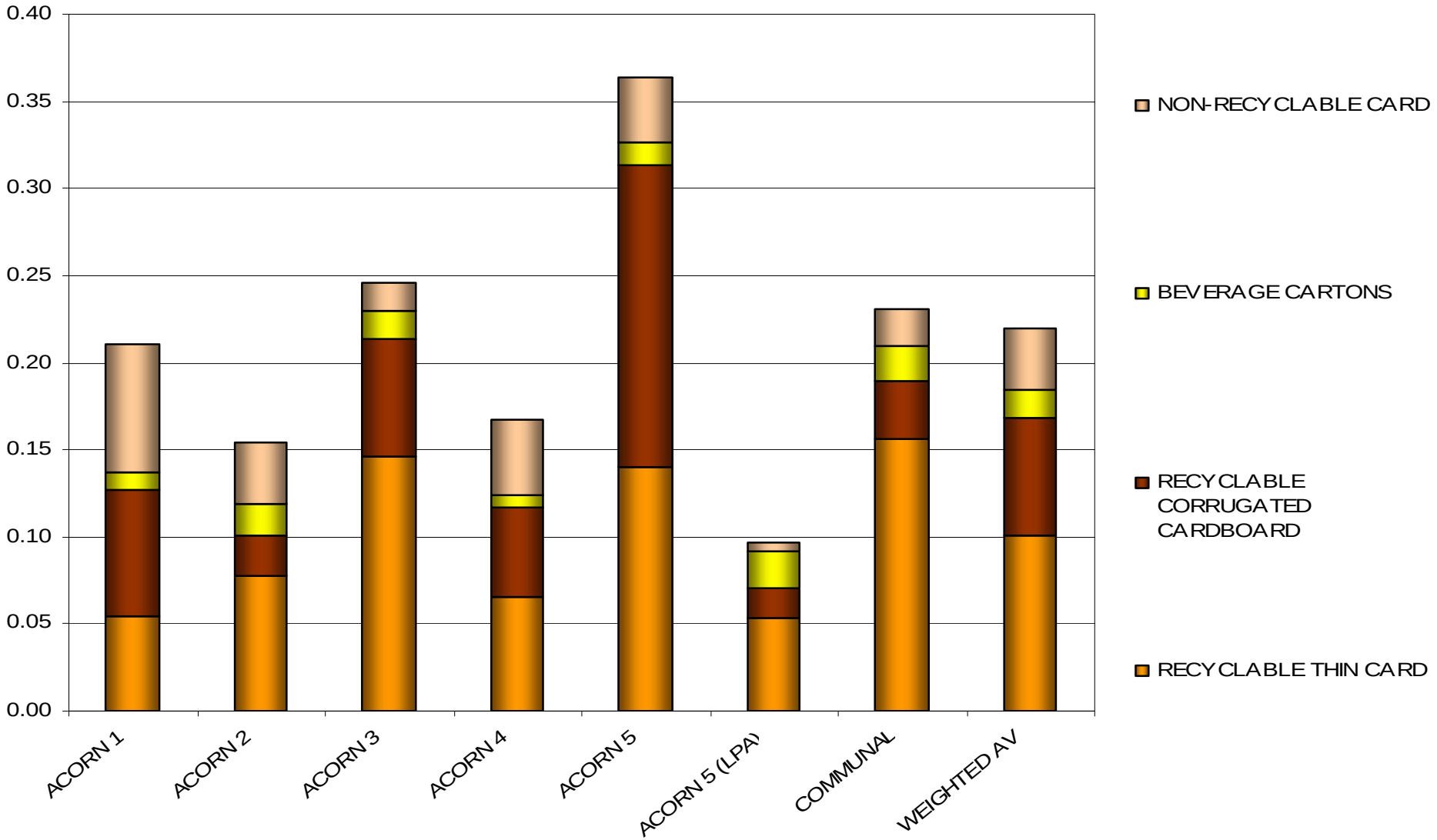
Table 4.2.3.1 and Figure 4.2.3.1 show the amounts of the different forms of card and cardboard waste for each Acorn.

When combining paper and card together it is estimated that 61% of that present in residual bins could have been recycled via kerbside recycling collections. This amounts to 8.3% of all the residual waste being collected – a total of 0.53kg/hh/wk.

Table 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL CARD	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE THIN CARD	0.05	0.08	0.15	0.07	0.14	0.05	0.16	0.10
RECYCLABLE CORRUGATED CARDBOARD	0.07	0.02	0.07	0.05	0.17	0.02	0.03	0.07
BEVERAGE CARTONS	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE CARD	0.07	0.04	0.02	0.04	0.04	0.01	0.02	0.04
KG/HH/WK TOTAL CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
KG/HH/WK RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	0.33	0.09	0.21	0.18
% CARD KERBSIDE RECYCLABLE	65.22%	77.15%	93.19%	74.50%	89.79%	94.04%	90.71%	83.93%

Figure 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)



4.2.4 Plastics

As a UK average approximately 12% of the waste disposed of by households is plastic. In this sampling campaign average ranges seen were 10.7% total plastic by weight from Acorn 4 households to 18.6% in the waste from Acorn 3 households. Cambridge residents currently recycle plastic bottles as part of their blue bin collections. Across the City as a whole, 14.9% of residual waste was classified as plastic which equates to 0.94kg/hh/wk. On the whole plastic waste, although not heavy in itself, can produce large volumes of waste.

Figure 4.2.4.1 clearly shows the levels of recyclable plastic bottles within the plastic portion of the residual waste. On average, around 46% of this plastic waste present in the residual was due to plastic film with the remainder being dense plastic. Up to 9.9% of residual dense plastic consisted of plastic bottles meaning that just 0.8% of residual waste (0.05kg/hh/wk) collected throughout Cambridge was made up of plastic bottles that could have been recycled. Up to 0.13kg/hh/wk of plastic bottles were seen in communal bins representing over a quarter of all the dense plastic present.

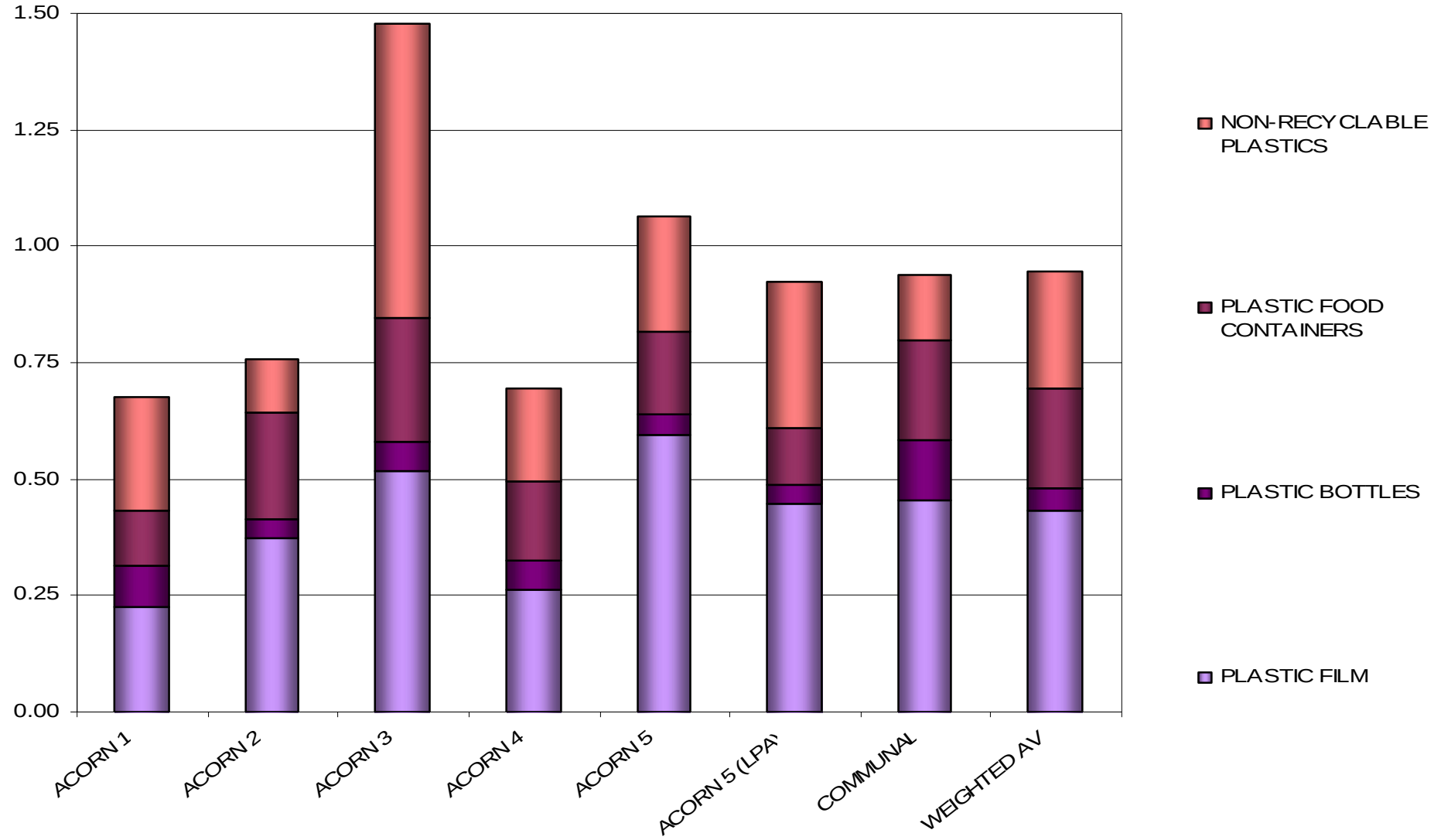
From July 2012 Cambridge households will be able to recycle plastic food containers in addition to plastic bottles. On average these formed 3.4% of the total residual waste equating to 0.21kg/hh/wk. This means that 0.27kg/hh/wk or 4.2% of the residual waste is due to recyclable plastic bottles and containers.

Table 4.2.4.1 and Figure 4.2.4.1 show the amounts of the different forms of plastic waste found within the residual samples from each Acorn.

Table 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PLASTICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	0.13	0.05
PLASTIC FOOD CONTAINERS	0.12	0.23	0.27	0.17	0.18	0.12	0.22	0.21
NON-RECYCLABLE PLASTICS	0.25	0.11	0.63	0.20	0.24	0.31	0.14	0.25
KG/HH/WK TOTAL PLASTIC	0.68	0.76	1.48	0.70	1.06	0.92	0.94	0.94
% DENSE PLASTIC RECYCLABLE	19.39%	11.04%	6.41%	14.22%	9.84%	9.18%	26.63%	9.85%

Figure 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)



4.2.5 Metals

In this sampling campaign average concentrations of residual metals were seen to be 1.9% total metal by weight from Acorn 5(LPA) households to 5.8% in the waste from Acorn 1 households, averaging 2.8% overall. Cambridge residents have access to a recycling collection of food and drink cans as well as empty aerosols and clean foil via their blue bin service. The average weight of metals in the residual waste from Acorn 5(LPA) was 0.09kg/hh/wk rising to 0.27kg/hh/wk in communal bins.

A proportion of this metal waste is available for recycling at the kerbside relative to the blue bin collection. It was found that just 13% of Acorn 1 metals were recyclable rising to 77% for the metals in Acorn 5(LPA) residual waste. Across the City an average of 52.5% or 0.09kg/hh/wk of residual metal is classified as recyclable, this equates to 1.5% of all collected residual waste.

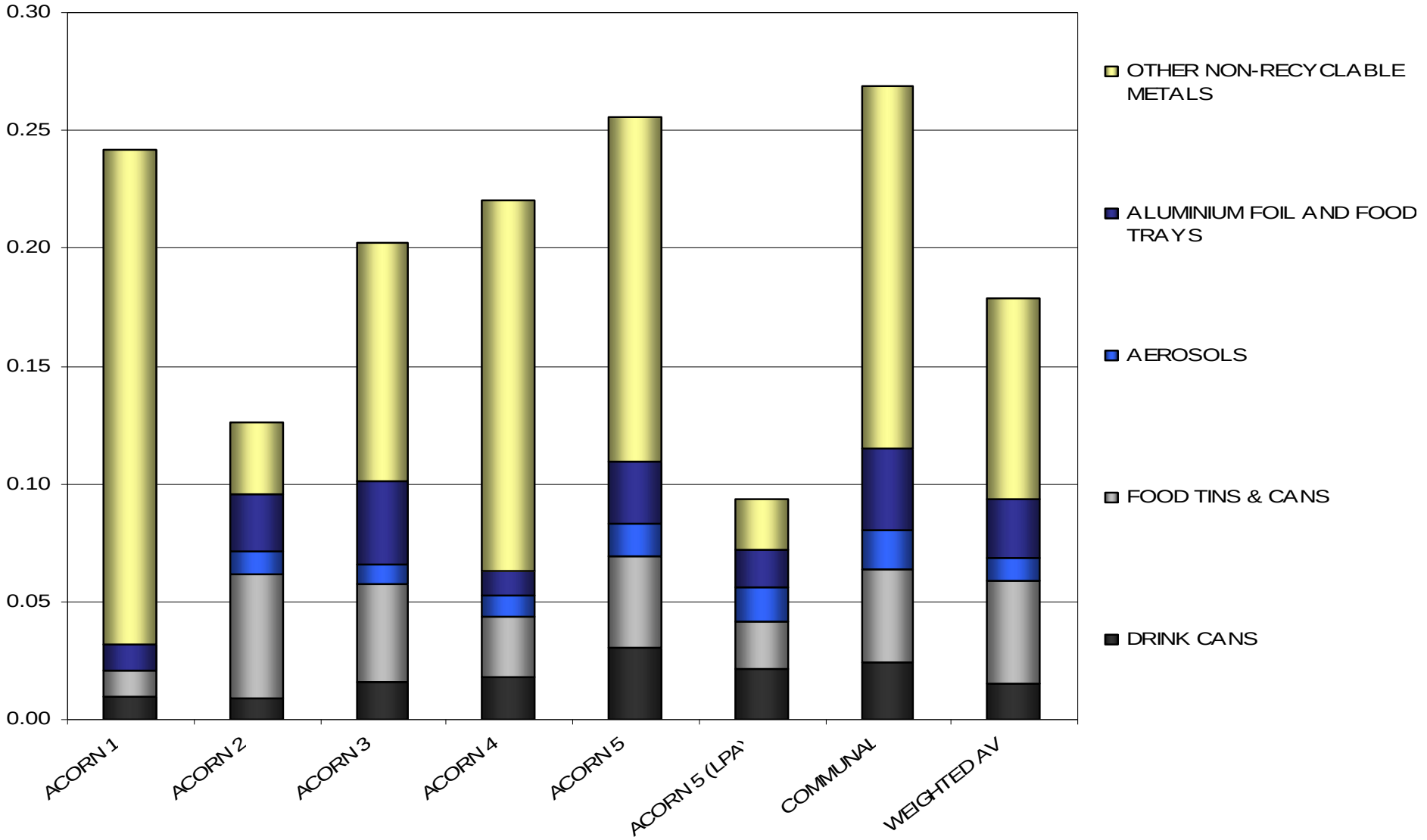
On the whole 78% of metals were ferrous accounting for 0.14kg/hh/wk with non-ferrous metals contributing 0.04kg/hh/wk. The majority of metallic waste present in all samples was seen to be ferrous.

Table 4.2.5.1 and Figure 4.2.5.1 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 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)

RESIDUAL METALS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
DRINK CANS	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01
FOOD TINS & CANS	0.01	0.05	0.04	0.03	0.04	0.02	0.04	0.04
AEROSOLS	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01
ALUMINIUM FOIL AND FOOD TRAYS	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.03
OTHER NON-RECYCLABLE METALS	0.21	0.03	0.10	0.16	0.15	0.02	0.15	0.08
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	0.12	0.09
TOTAL METALS	0.24	0.13	0.20	0.22	0.26	0.09	0.27	0.18
% FERROUS	90.16%	71.00%	79.19%	87.30%	78.93%	55.42%	77.02%	77.64%
% RECYCLABLE	13.31%	76.02%	49.78%	28.45%	42.69%	77.11%	42.82%	52.46%

Figure 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)



4.2.6 Glass

In this sampling campaign the average concentration of residual glass was seen to be 1% total glass by weight from Acorn 1 households rising to 4.6% in the waste from communal bins. Cambridge residents are able to recycle glass bottles and jars at the kerbside using their blue bin service. The weight of glass in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.38kg/hh/wk in communal bins. This represented a City wide average of 2.8% or 0.18kg/hh/wk.

A proportion of this glass consists of bottles and jars which could have been recycled at the kerbside. It was found that across Cambridge an average of 94% or 0.16kg/hh/wk of residual glass is classified as recyclable, this equates to 2.6% of all collected residual waste.

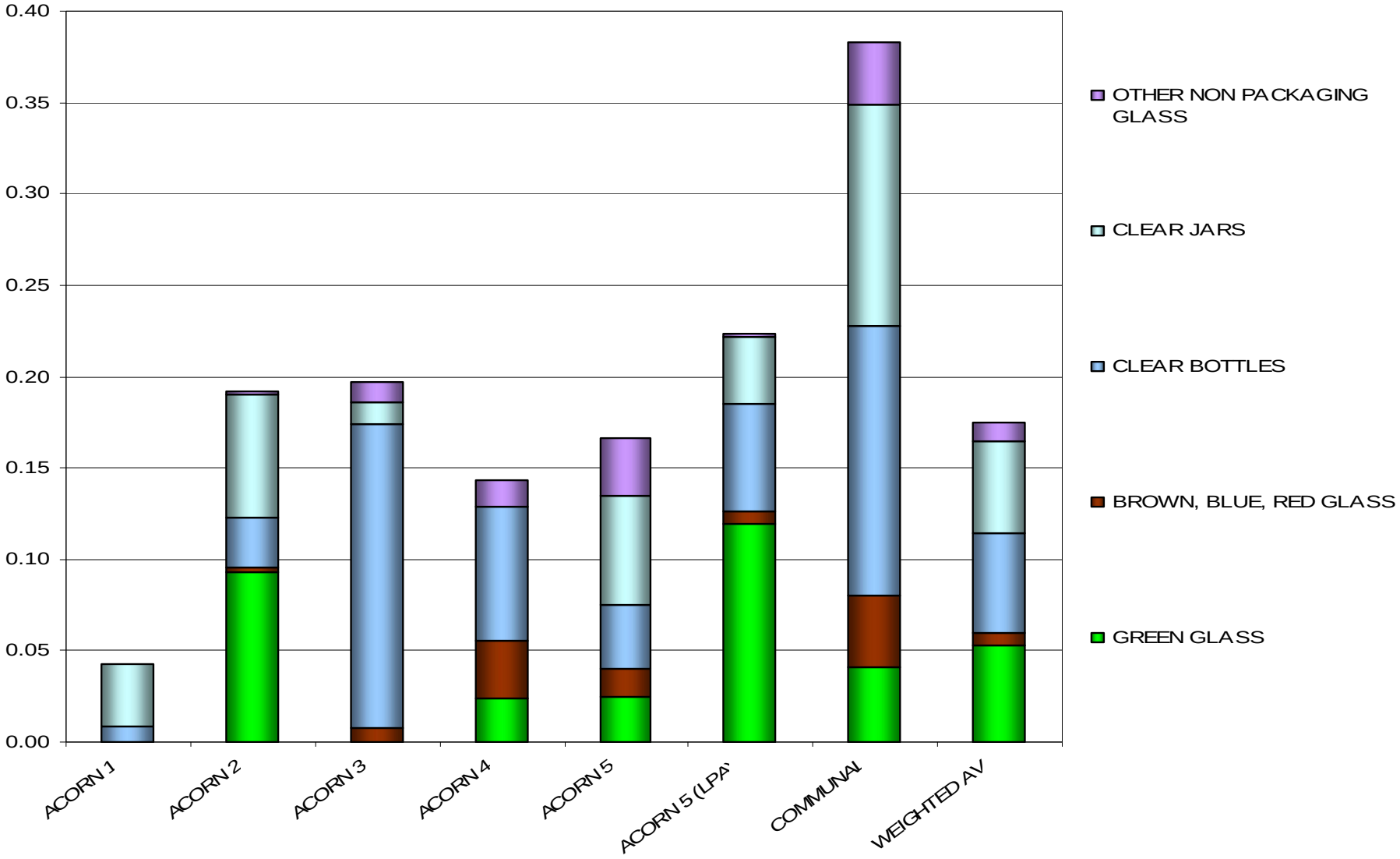
In most samples the majority of recyclable glass was seen to be higher grade clear glass, across Cambridge 64% of recyclable glass was clear, accounting for 0.11kg/hh/wk of residual waste. Around 52% of the clear glass was due to jars as opposed to bottles.

Table 4.2.6.1 and Figure 4.2.6.1 show the amounts of the different forms of glass waste found within the samples from each Acorn.

Table 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)

RESIDUAL GLASS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
GREEN GLASS	0.00	0.09	0.00	0.02	0.02	0.12	0.04	0.05
BROWN, BLUE, RED GLASS	0.00	0.00	0.01	0.03	0.02	0.01	0.04	0.01
CLEAR BOTTLES	0.01	0.03	0.17	0.07	0.03	0.06	0.15	0.05
CLEAR JARS	0.03	0.07	0.01	0.00	0.06	0.04	0.12	0.05
OTHER NON PACKAGING GLASS	0.00	0.00	0.01	0.01	0.03	0.00	0.03	0.01
KG/HH/WK TOTAL GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
KG/HH/WK RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	0.35	0.16
% RECYCLABLE	100%	98.99%	94.36%	89.99%	80.74%	99.24%	91.15%	94.17%
% OF RECYCLABLE GLASS - CLEAR	100%	49.56%	95.85%	57.08%	70.33%	42.98%	76.93%	63.76%

Figure 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)



4.2.7 Textiles

The concentration of residual textile waste was seen to be 1% textiles from Acorn 1 households to 7.7% in the waste from Acorn 4 households. Cambridge residents are currently not able to recycle textiles at the kerbside. The average weight of textile waste in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.71kg/hh/wk in Acorn 5. On average 6.2% or 0.39kg/hh/wk of residual waste is classified as textile waste.

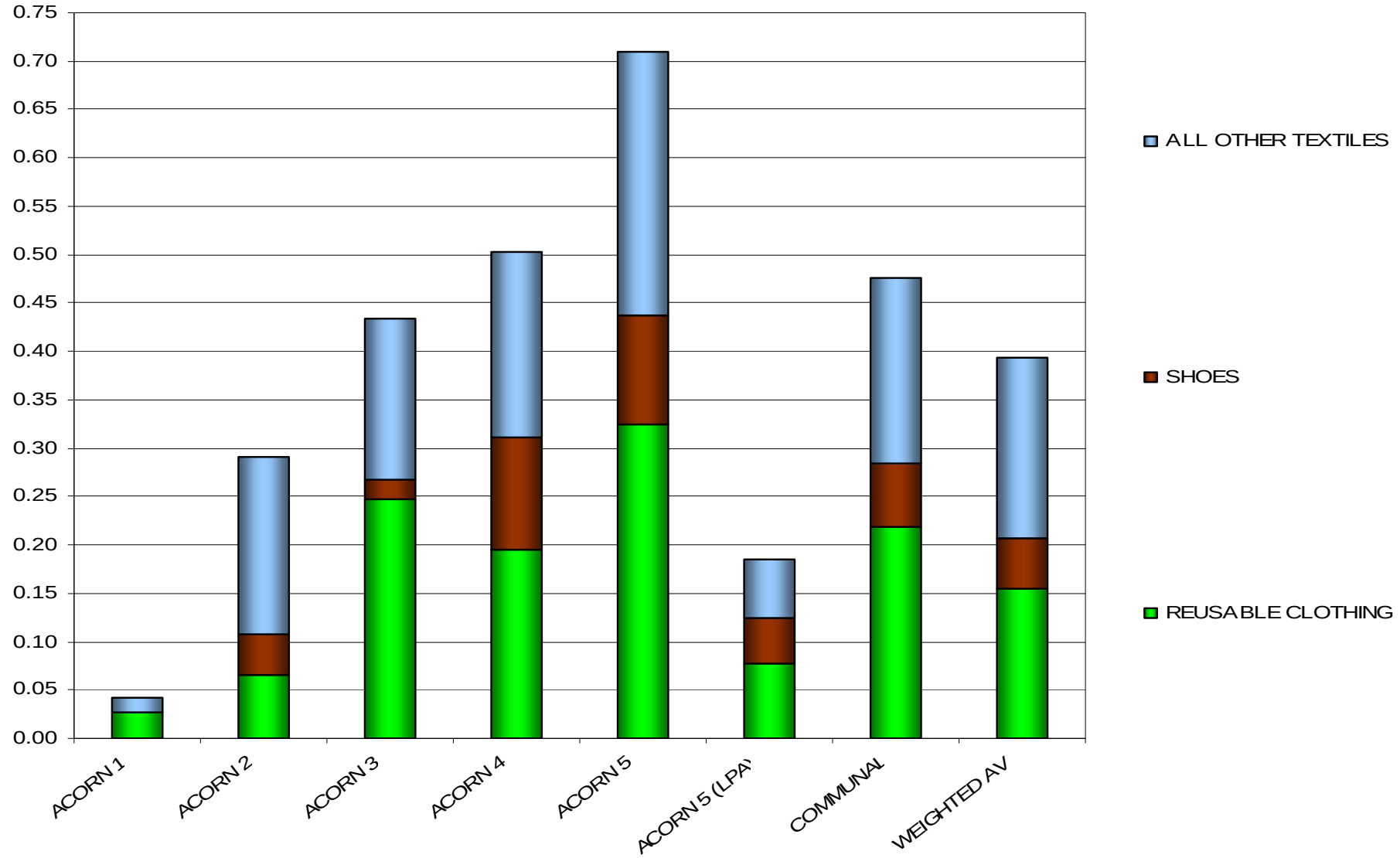
A proportion of this textile waste is available for recycling either at bring banks or charity outlets in the form of reusable clothes and shoes. It was found that between 37% (Acorn 2) and 67% of Acorn 5(LPA) of textile waste was of this potentially recyclable type. Up to 0.44kg/hh/wk (Acorn 5) of recyclable textiles are being placed into the residual waste by Cambridge householders. Across Cambridge an average of 52.5% or 0.21kg/hh/wk of residual textiles is classified as reusable, this equates to 3.3% of all collected residual waste.

Table 4.2.7.1 and Figure 4.2.7.1 show the amounts of the different forms of textile waste found within the samples from each Acorn.

Table 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)

RESIDUAL TEXTILES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
REUSABLE CLOTHING	0.03	0.07	0.25	0.20	0.33	0.08	0.22	0.15
SHOES	0.00	0.04	0.02	0.12	0.11	0.05	0.07	0.05
ALL OTHER TEXTILES	0.01	0.18	0.17	0.19	0.27	0.06	0.19	0.19
KG/HH/WK TOTAL TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
KG/HH/WK REUSABLE TEXTILES	0.03	0.11	0.27	0.31	0.44	0.12	0.28	0.21
% REUSABLE TEXTILES	66.10%	36.88%	61.45%	61.89%	61.69%	67.35%	59.77%	52.51%

Figure 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)



4.2.8 Hazardous Items (HHW) & WEEE

In this sampling campaign the average overall concentration of hazardous and WEEE waste was seen to be 1.6% which equates to around 0.10kg/hh/wk. Acorn 4 households disposed of the most HHW and WEEE waste, where it was responsible for 4.3% of collected waste or 0.28kg/hh/wk. Table 4.2.8.1 shows the amounts of HHW and WEEE within the samples from each Acorn.

Table 4.2.8.1: Levels of HHW and WEEE within each Acorn (kg/hh/wk)

RESIDUAL HHW & WEEE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	0.11	0.06	0.21	0.28	0.07	0.02	0.25	0.10
% HHW & WEEE	2.64%	1.40%	2.65%	4.27%	0.67%	0.44%	3.00%	1.61%

HHW	WEEE
PAINT	CHARGERS
HALOGEN BULB	GAME REMOTE
BATTERIES	XMAS LIGHTS
MEDICINES	THERMOSTAT
WEED KILLER	MOBILE PHONE
	TORCHES
	SMOKE ALARM
	SWITCH
	MODEM
	LAMPS
	KETTLES
	STEREO & SPEAKERS
	MOTOR
	TELEPHONE
	HAIR STRAIGHTENERS
	CABLES & LEADS
	SOCKERS
	DEEP FAT FRYER
	FAN
	BLENDER
	CALCULATOR

4.2.9 Disposable Nappies

The profile of this type of waste has increased in recent years. Levels of this waste within the residual bins of households with babies can be extremely high. In this survey the concentrations of disposable nappies ranged between 1.3% in Acorn 3 up to 33.5% in communal bins. Communal bins were seen to contain around 2.79kg/hh/wk of disposable nappies. Throughout Cambridge as a whole around 17% of collected residual waste consists of disposable nappies, which equates to 1.08kg/hh/wk.

4.3 Potential recyclability of the residual waste

The overall recyclability of the residual waste relates to all the items present that could have been accepted into the kerbside recycling schemes currently running in Cambridge. Results from the survey showed that the overall recyclability of the residual waste was highest in Acorn 2 households at 45.4%, and lowest in Acorn 3 at 27.2%. Across Cambridge it is expected that 35.1% of all residual waste being disposed of is recyclable at the kerbside.

The majority of the recyclable materials present within the residual waste were compatible with the green organics bin. On average 22% of residual waste could have been recycled in the green bin ranging from 15.7% of Acorn 3 waste up to 32.6% of Acorn 4 waste.

On average just over 13% of the residual waste throughout Cambridge was recyclable via the blue bin collection. Around 10 4% of the residual waste from Acorn 4 was compatible with blue bins compared with 17.5% of that from Acorn 1.

Table 4.3.1.1: Proportion of residual waste currently recyclable relative to current schemes (%)

% RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	17.47%	15.67%	11.43%	10.41%	11.16%	11.48%	14.01%	13.15%
GREEN BIN RECYCLABLE	18.94%	29.72%	15.72%	32.64%	16.78%	31.01%	23.21%	21.95%
TOTAL RECYCLABLE	36.41%	45.39%	27.15%	43.05%	27.94%	42.50%	37.21%	35.11%

In terms of the amount of recyclables disposed of it is seen that Acorn 1 householders place around 1.53kg/hh/wk of materials in residual bins that could either be placed into their blue or green recycling bins. For communal bins this amount was 3.1kg/hh/wk. Across Cambridge around 2.23kg/hh/wk of recyclable material is being disposed of in the residual waste.

Table 4.3.1.2: Kg/hh/wk of residual waste currently and potentially recyclable relative to current schemes

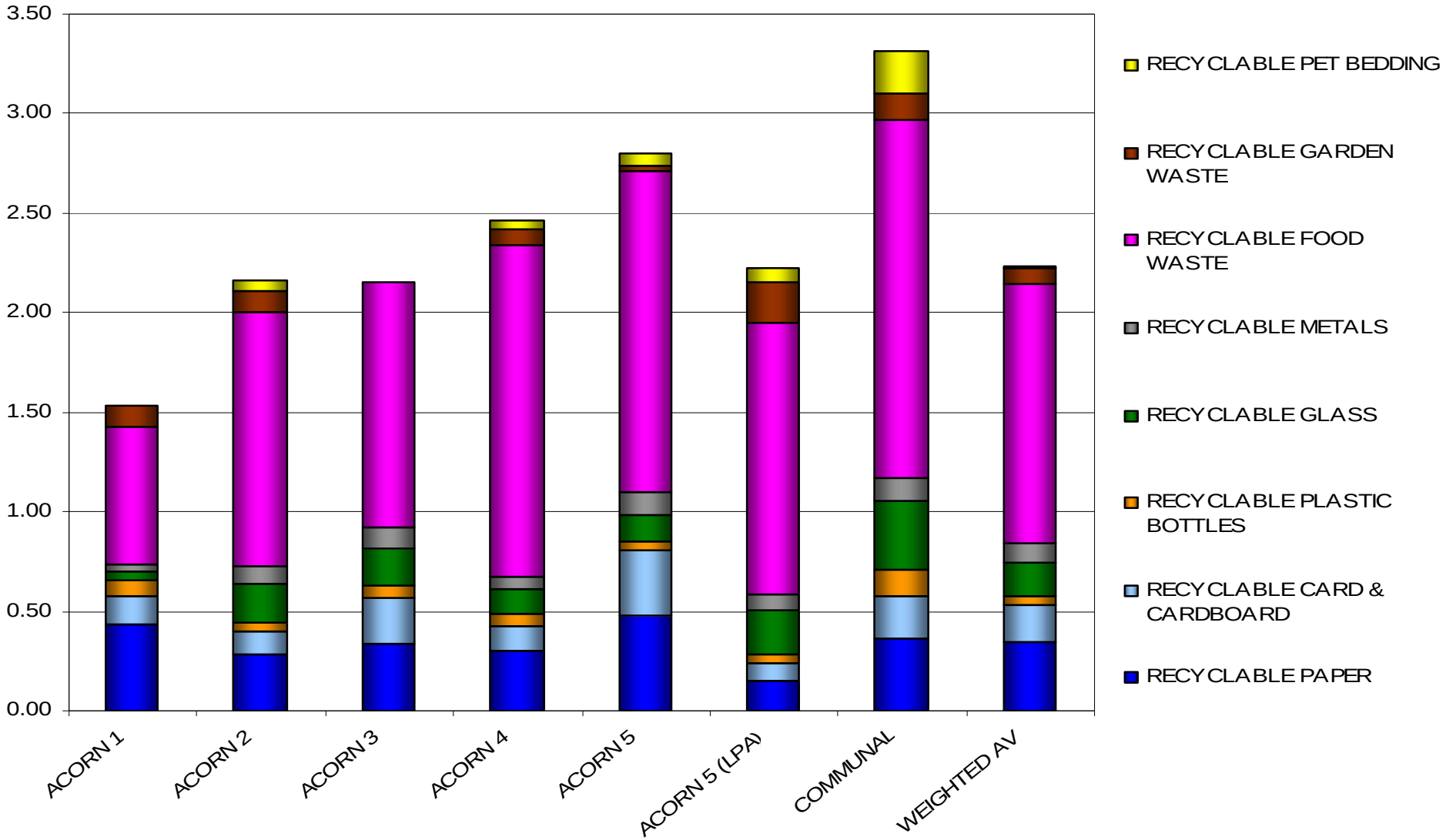
KG/HH/WK RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	0.73	0.73	0.91	0.68	1.09	0.58	1.17	0.84
GREEN BIN RECYCLABLE	0.80	1.38	1.25	2.12	1.64	1.57	1.93	1.40
TOTAL RECYCLABLE	1.53	2.11	2.15	2.80	2.74	2.15	3.10	2.23

Figure 4.3.1.1 clearly shows the levels of residual materials currently collectable in the recycling collections available in Cambridge. Different households were seen to dispose of differing levels of recyclable materials, both in terms of volume and composition (Table 4.3.1.3). Without exception it is seen that the two Acorn 5 samples and the waste from the communal bins contained the highest levels of each material compatible with kerbside recycling.

Table 4.3.1.3: Kg/hh/wk of residual waste potentially 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	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.34	0.30	**0.48**	0.15	0.37	0.35
RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	**0.33**	0.09	0.21	0.18
RECYCLABLE PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	**0.13**	0.05
RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	**0.35**	0.16
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	**0.12**	0.09
RECYCLABLE FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	**1.80**	1.31
RECYCLABLE GARDEN WASTE	0.10	0.11	0.00	0.08	0.03	**0.20**	0.13	0.07
RECYCLABLE PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	**0.21**	0.01
TOTAL RECYCLABLE	1.53	2.16	2.15	2.47	2.80	2.22	3.31	2.23

Figure 4.3.1.1: Kg/hh/wk of residual waste potentially recyclable relative to Acorn (Kg/hh/wk)



4.4 Biodegradable waste

These figures are useful when considering the proportion of biodegradable waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using the compositional data in accordance with the percentages outlined in previous reports. For example, only 50% of miscellaneous combustible materials are considered to be biodegradable whereas 100% of paper and card is considered to be biodegradable.

National average figures are around 68%; in this survey the biodegradability of residual waste weighted across Cambridge was well below this level at 50.7%. Acorn 4 residual waste displayed the highest concentration of biodegradable items at 59.4%, with Acorn 3 residual waste being just 44.4% biodegradable. On average, around 3.22kg/hh/wk of biodegradable material was being placed into residual containers by Cambridge residents.

Table 4.4.1: Percentage composition of residual waste per Acorn – biodegradable materials

BIODEGRADABLE CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	17.19%	12.94%	10.94%	9.61%	11.96%	7.39%	8.80%	12.25%
TEXTILES	0.50%	3.12%	2.74%	3.87%	3.62%	1.83%	2.85%	3.10%
MISC. COMBUSTIBLE*	11.26%	8.35%	14.36%	8.84%	16.80%	15.07%	17.84%	12.60%
	7.94%	5.73%	8.53%	4.78%	12.16%	12.51%	16.76%	8.51%
PUTRESCIBLES	18.98%	30.22%	16.40%	36.43%	17.10%	31.74%	24.44%	22.53%
FINES	0.26%	0.00%	0.00%	0.61%	0.46%	0.10%	0.49%	0.18%
TOTAL BIODEGRADABLE	48.18%	54.63%	44.44%	59.36%	49.94%	56.13%	54.42%	50.66%

* Disposable nappies are part of the miscellaneous combustible section. Their contribution to this section of biodegradable waste is highlighted in red.

4.5 Packaging Waste

These figures are useful when considering the proportion of packaging waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using a similar method to that used to calculate biodegradability.

Levels of packaging in the residual waste ranged from 12.3% in Acorn 5 residual waste to 22.1% in Acorn 2 residual waste. On average, around 1.08kg/hh/wk of packaging materials were being placed into residual containers by Cambridge residents, 17% of the total waste being disposed of.

Table 4.5.1: Percentage composition of residual waste per Acorn – packaging materials

PACKAGING CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	4.62%	4.43%	3.32%	2.98%	4.28%	2.41%	3.88%	4.09%
PLASTIC FILM	3.69%	5.06%	4.61%	2.62%	2.89%	5.53%	3.40%	4.11%
DENSE PLASTIC	7.36%	6.70%	4.88%	3.90%	2.81%	4.28%	4.41%	4.96%
GLASS	1.01%	4.08%	2.34%	1.99%	1.37%	4.39%	4.18%	2.59%
METALS	0.63%	1.79%	1.05%	0.89%	0.98%	1.27%	1.17%	1.27%
TOTAL PACKAGING	17.31%	22.06%	16.20%	12.37%	12.34%	17.87%	17.05%	17.02%

5) Mixed dry recycling waste

5.1 Set out rates and waste generation

Table 5.1.1 and Figure 5.1.1 highlight the set out rates for blue recycling bins observed at the time waste was collected for compositional analysis. Table 5.1.2 and Figure 5.1.2 show the amount of mixed recycling waste generated in kg/hh/wk. The same houses were visited that had their residual waste surveyed. It was possible to calculate the set out relating to the proportion of these households actively placing out their waste. The 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. Set out rates for mixed recycling waste ranged between 66% for Acorn 4 and 84% for Acorn 3. Across Cambridge it is estimated that around 78% of residents are placing out their blue bins for collection.

Table 5.1.1: Average Set Out for mixed recycling waste (%)

ACORN	% SET OUT
1	74%
2	75%
3	84%
4	66%
5	82%
5 (LPA)	78%
COMMUNAL	N/A
WEIGHTED AVERAGE	78%

In this survey the average amount of mixed recycling generated in blue bins ranged between 2.36kg/hh/wk from Acorn 1 to 3.83kg/hh/wk from Acorn 3. Across Cambridge around 3.16kg/hh/wk of blue bin recycling waste is being placed out for collection at the kerbside.

Table 5.1.2: Average Mixed Recycling waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	2.36
2	3.07
3	3.83
4	2.95
5	3.09
5 (LPA)	2.52
COMMUNAL	3.80
WEIGHTED AVERAGE	3.16

Figure 5.1.1: Average Set Out for mixed recycling waste (%)

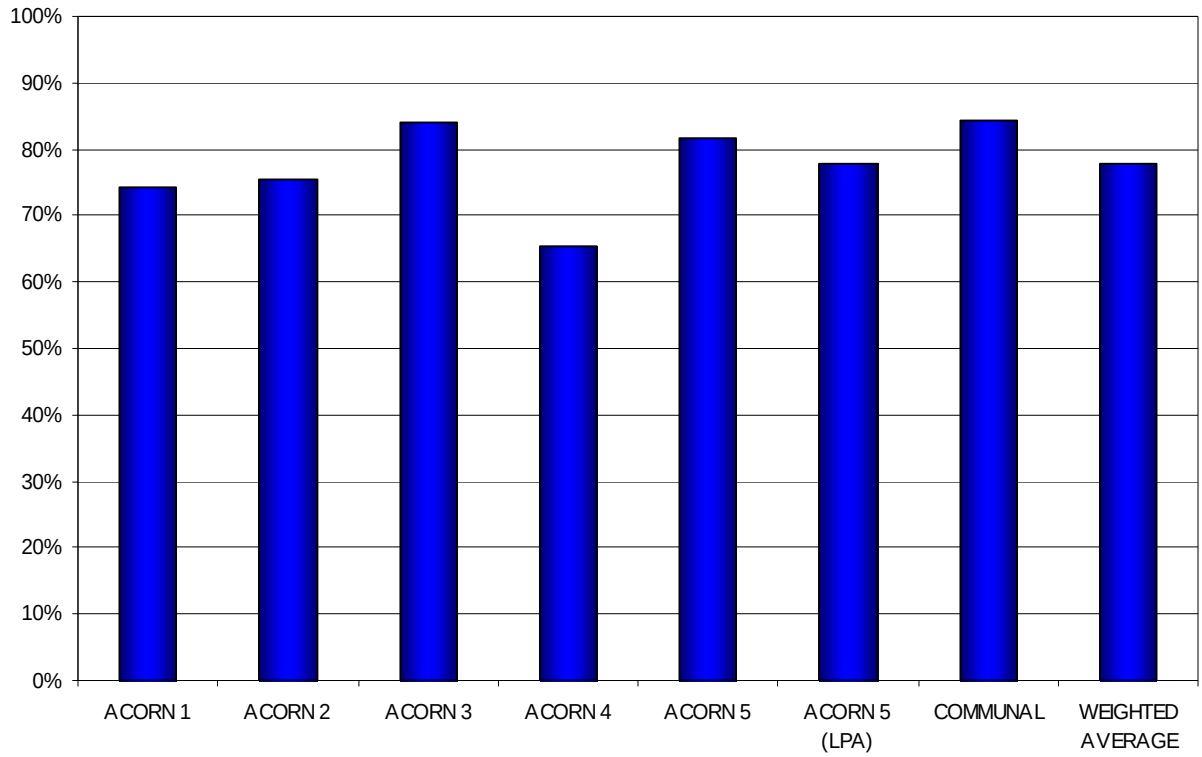
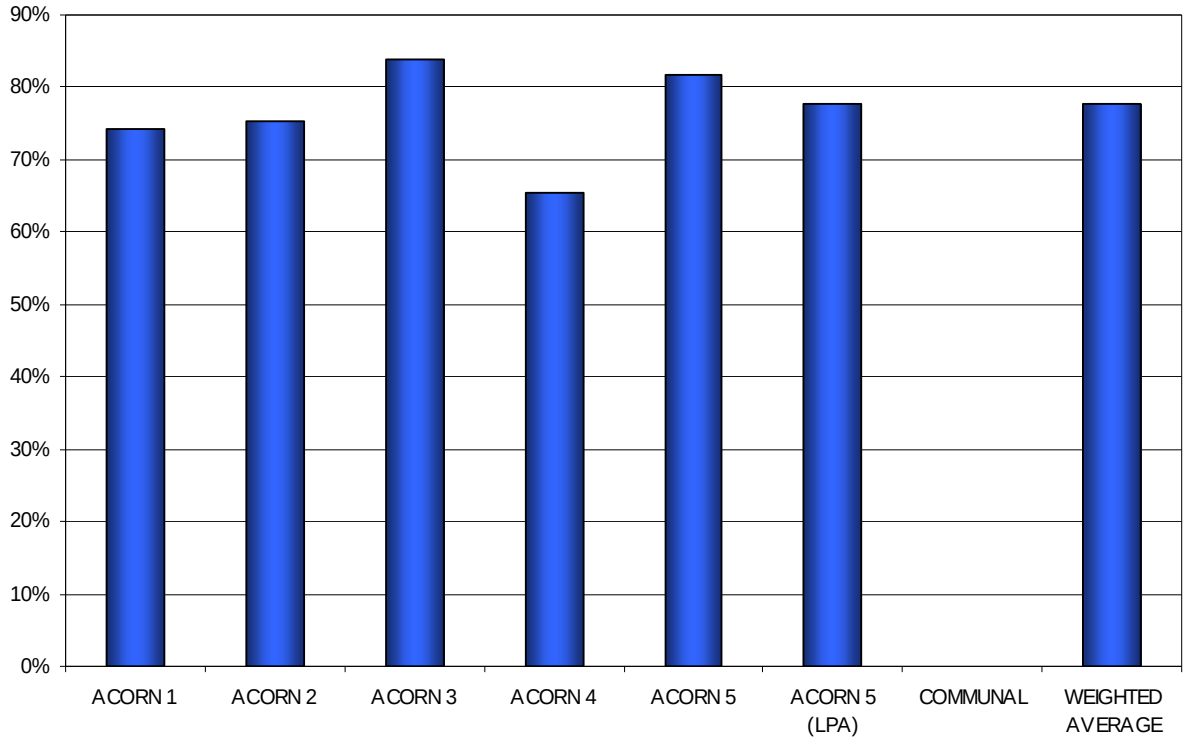


Figure 5.1.2: Average Mixed recycling waste generation rates (kg/hh/wk)



5.2 Compositional analysis of mixed recycling waste

This section looks at the average amount and composition of the mixed recycling waste presented by households sampled throughout Cambridge. 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 5.2.1 and Figure 5.2.1 show mixed recycling data in terms of percentage composition with Table 5.2.2 and Figure 5.2.2 showing generation rates for major materials in terms of kg/hh/wk for each sample taken from the blue recycling bins.

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

Table 5.2.1: Composition of mixed recycling (% concentration) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	50.89%	46.17%	23.96%	25.91%	23.28%	31.61%	32.48%	36.16%
RECYCLABLE CARD & CARDBOARD	12.80%	12.42%	14.12%	13.13%	17.38%	13.94%	14.95%	13.85%
RECYCLABLE PLASTIC BOTTLES	4.33%	4.28%	7.60%	5.74%	7.68%	8.58%	7.17%	5.76%
RECYCLABLE GLASS	18.59%	30.83%	41.13%	36.02%	35.39%	32.94%	25.61%	33.55%
RECYCLABLE METALS	5.08%	2.87%	6.02%	5.95%	5.12%	4.86%	5.56%	4.25%
CONTAMINATION MATERIALS	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%
TOTAL RECYCLING	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	1.20	1.42	0.92	0.76	0.72	0.80	1.24	1.14
RECYCLABLE CARD & CARDBOARD	0.30	0.38	0.54	0.39	0.54	0.35	0.57	0.44
RECYCLABLE PLASTIC BOTTLES	0.10	0.13	0.29	0.17	0.24	0.22	0.27	0.18
RECYCLABLE GLASS	0.44	0.95	1.58	1.06	1.09	0.83	0.97	1.06
RECYCLABLE METALS	0.12	0.09	0.23	0.18	0.16	0.12	0.21	0.13
CONTAMINATION MATERIALS	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20
TOTAL RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16

Figure 5.2.1: Composition of mixed recycling (%) by Acorn

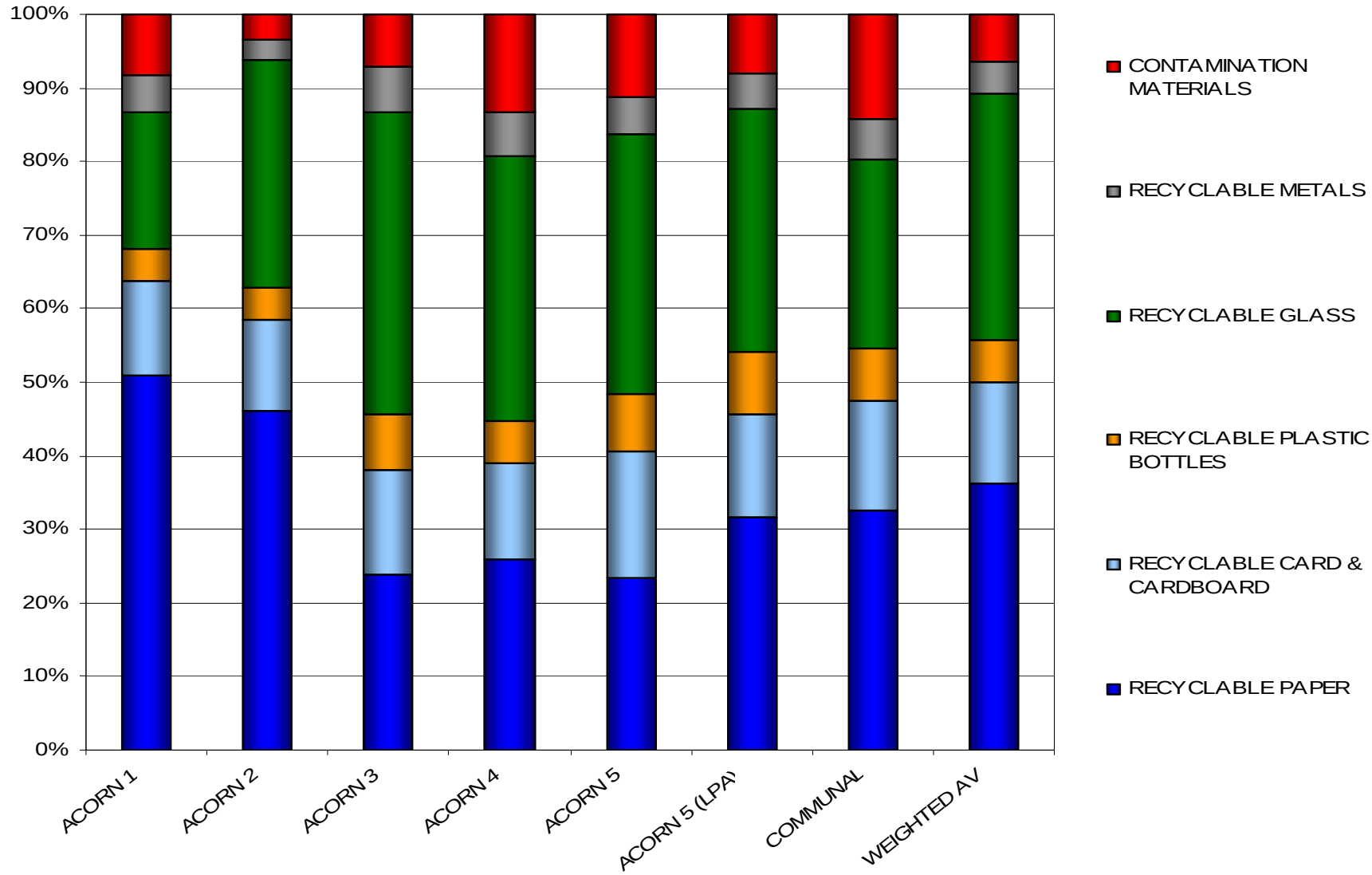
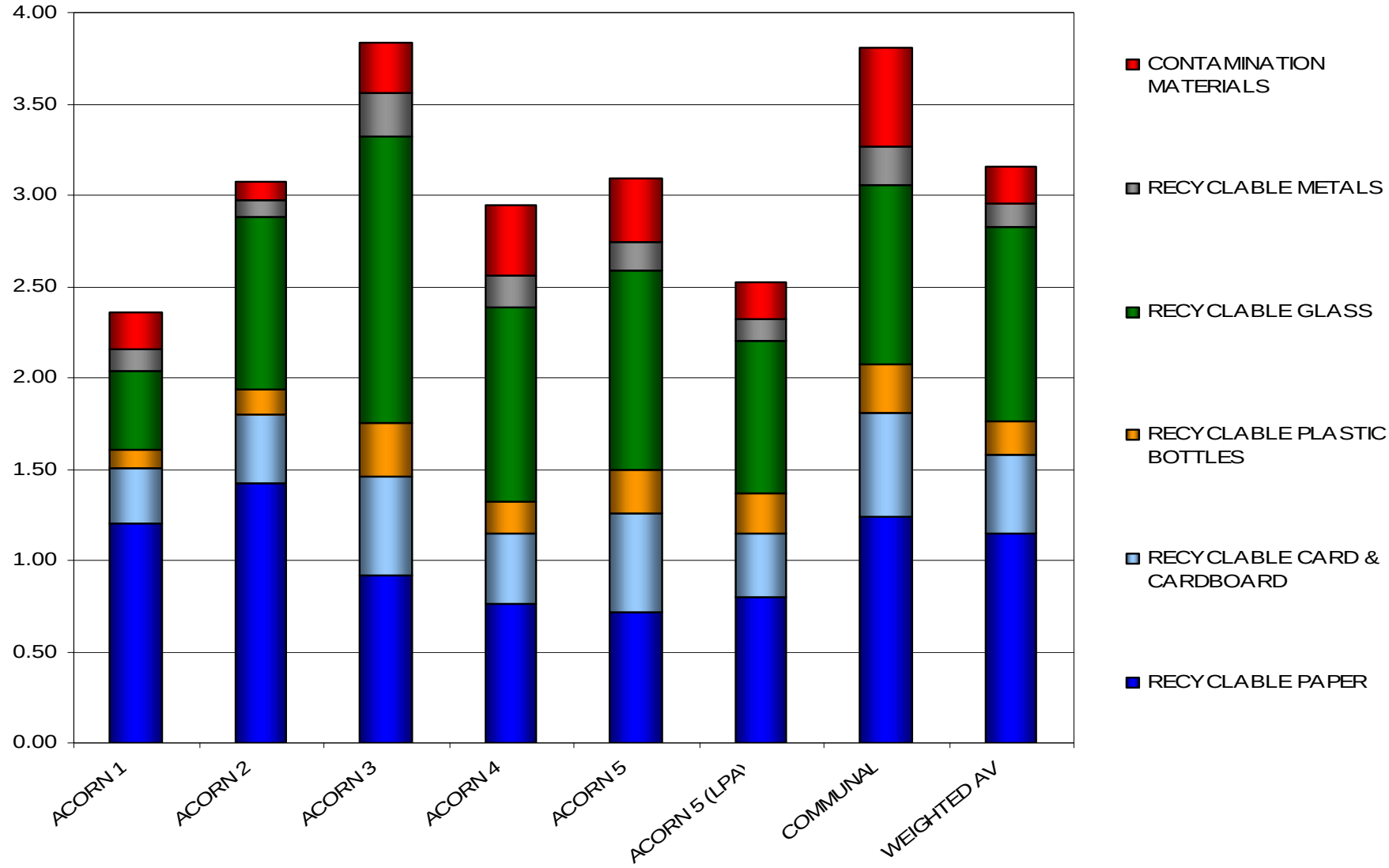


Figure 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn



5.3 Materials placed out for mixed recycling collections

This chapter looks in more detail at the individual materials placed out for blue bin recycling collections and highlights the effectiveness with which the mixed recycling scheme is capturing these items. Looking at the relationship between the residual and recycling waste streams presented will additionally give indications as to the overall diversion being achieved in the Cambridge samples.

Table 5.3.1 summarises the capture and diversion rates seen for the range of materials collected in the dry recycling collections. Recyclable paper, card & cardboard, plastics, glass and metals are collected in the blue bin.

Across Cambridge around 75.6% of all the materials currently collected in blue bins are being correctly recycled at the kerbside. Acorns 1 – 4 all recycled between 73% and 79% of their blue bin materials. In comparison Acorn 5 households recycled 69% whilst those using communal bins recycled just 58%. Overall it is estimated that 23.7% of kerbside waste throughout Cambridge is diverted through blue bin collections.

Table 5.3.1: Summary table for material capture and diversion rates (%) for mixed recycling

% CAPTURE RATES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	73.72%	83.14%	72.96%	72.49%	59.96%	84.58%	83.29%	76.73%
RECYCLABLE CARD & CARDBOARD	72.89%	77.28%	72.19%	77.83%	66.54%	82.21%	81.76%	72.67%
PLASTIC BOTTLES	53.80%	75.57%	82.58%	73.38%	83.76%	83.16%	62.63%	78.24%
COLOURED GLASS BOTTLES & JARS	100.00%	87.60%	99.09%	88.53%	93.66%	72.18%	80.07%	91.55%
CLEAR GLASS BOTTLES	91.08%	86.29%	70.26%	89.58%	90.54%	81.91%	74.03%	82.40%
CLEAR GLASS JARS	79.37%	60.32%	96.72%	N/A	74.00%	86.58%	65.68%	75.68%
ALL RECYCLABLE GLASS	91.20%	83.29%	89.45%	89.15%	89.05%	78.94%	73.64%	86.53%
DRINK CANS	67.43%	75.29%	75.31%	82.71%	63.14%	64.51%	68.55%	71.54%
FOOD TINS	88.57%	51.11%	78.10%	73.66%	70.06%	75.17%	65.10%	65.51%
AEROSOLS	100.00%	35.30%	71.44%	61.23%	46.61%	52.05%	43.96%	51.30%
OTHER RECYCLABLE METALS	19.96%	7.86%	25.61%	26.29%	12.14%	29.91%	63.26%	14.45%
ALL RECYCLABLE METALS	78.80%	47.98%	69.56%	73.66%	59.18%	62.96%	63.49%	58.87%
ALL BLUE BIN MATERIALS	72.69%	79.14%	78.60%	77.33%	69.48%	77.35%	58.45%	76.55%
% DIVERSION	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%

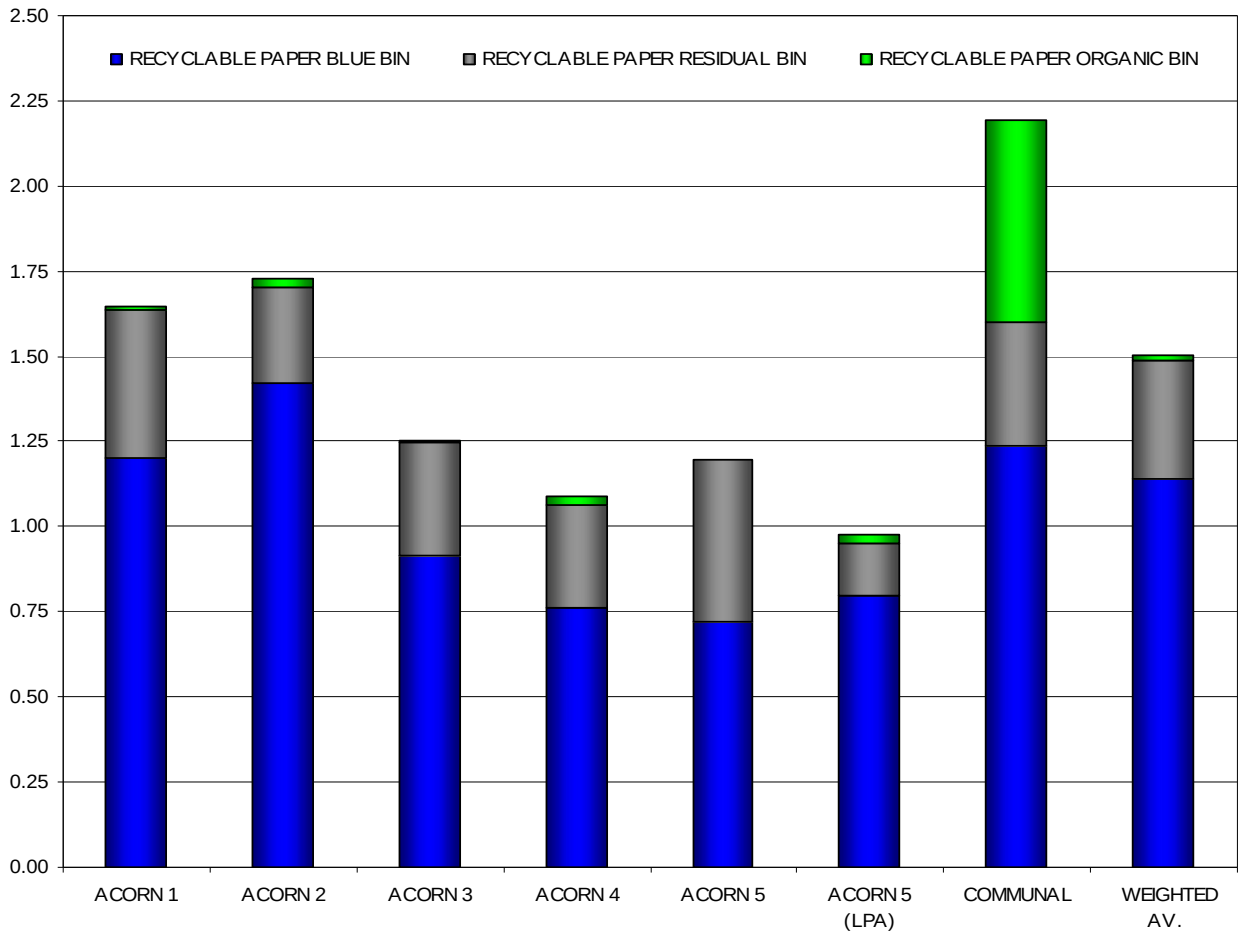
5.3.1 Paper Capture

Acorn 2 residents captured the highest proportion of their recyclable paper with 82% correctly being recycled; they generated 1.73kg/hh/wk of this material. Residents in communal bin areas captured the least recyclable paper at 56% additionally they also generated the most of this recyclable paper at 2.19kg/hh/wk.

Across Cambridge it is estimated that 1.50kg/hh/wk of recyclable paper is generated with around 76% being correctly placed into the blue bin*.

There are many different forms of paper and decisions have to be made by residents as to whether a particular piece of paper is to go into the recycling or residual waste. On average, the majority of all recyclable forms of paper are being correctly diverted by all the residents sampled although there is around 0.36kg/hh/wk of potentially recyclable paper not being placed into blue bins. On average 23% of recyclable paper is in the residual bin with 1% in the organic bin. Figure 5.3.2.1 shows the distribution of recyclable paper throughout the residual and recycling waste by Acorn category.

Figure 5.3.1.1: Distribution of recyclable paper within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes the paper disposed of in the organics bin. Although it is preferential that recyclable paper is put into the blue bin it is acceptable for the green bin. Shredded paper is only acceptable in green bins.

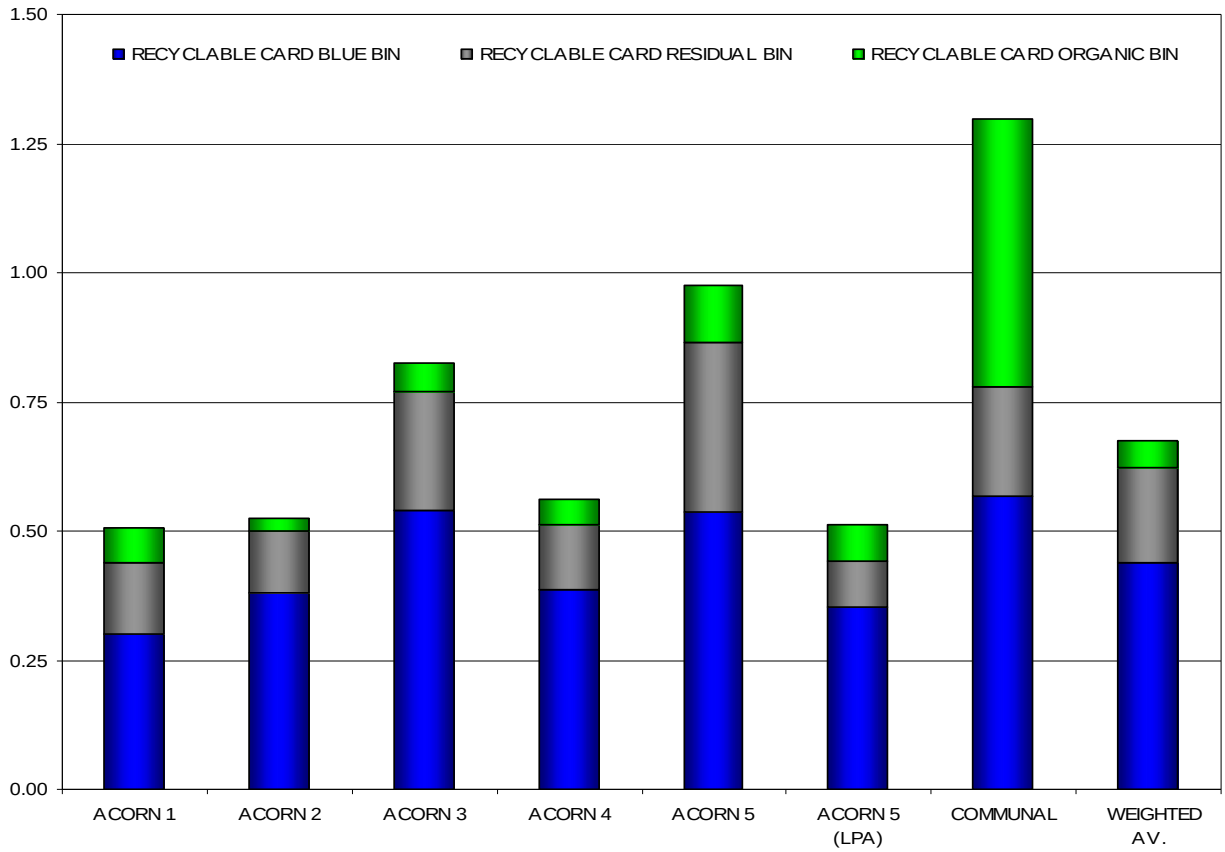
5.3.2 Card & Cardboard Capture

Acorn 2 residents captured the highest proportion of their recyclable card & cardboard with 73% correctly being recycled; they generated 0.52kg/hh/wk of this material. Residents in communal bin areas captured the least at less than 44% additionally they also generated the most of this recyclable card & cardboard at 1.30kg/hh/wk.

Across Cambridge it is estimated that 0.67kg/hh/wk of recyclable paper is generated with around 65% being correctly placed into the blue bin*.

As for paper, are many different forms of card & cardboard and decisions have to be made by residents as to whether a particular piece is to go into the recycling or residual waste. With the exception of residents in the communal bin sample, the majority of all recyclable forms of card & cardboard are being correctly diverted by all the residents surveyed although there is around 0.24kg/hh/wk of potentially recyclable card & cardboard not being placed into blue bins. On average 27% of recyclable card & cardboard is in the residual bin with 8% in the organic bin. Figure 5.3.3.1 shows the distribution of recyclable card & cardboard throughout the residual and recycling waste by Acorn category.

Figure 5.3.2.1: Distribution of recyclable card within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes certain card disposed of in the organics bin. Although it is preferential that recyclable card & cardboard is put into the blue bin it is acceptable for the green bin. Tetrapaks are only acceptable in blue bins.

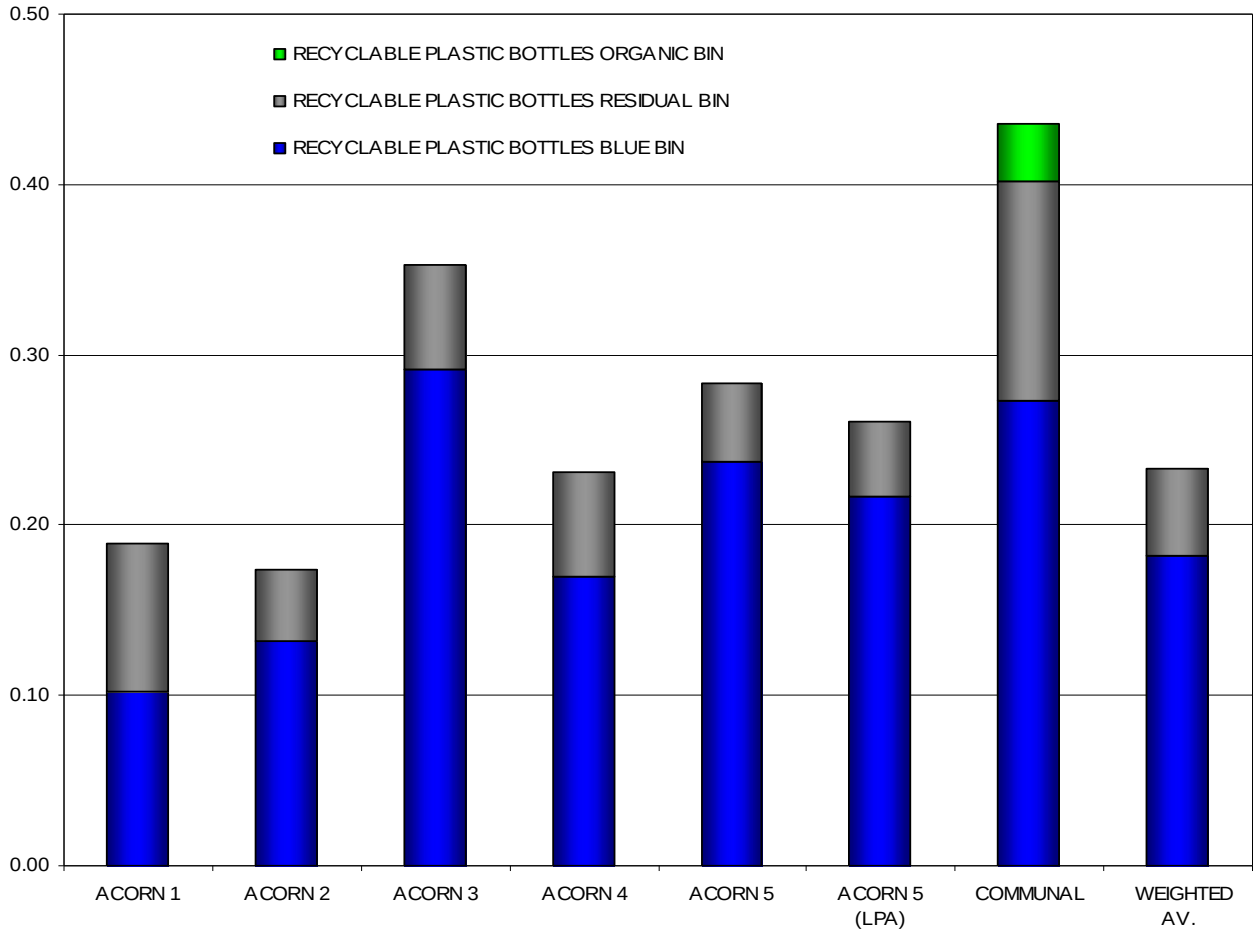
5.3.3 Plastic Bottles Capture

Acorn 5 residents captured the highest proportion of their recyclable plastic bottles with 84% correctly being recycled; they generated 0.26kg/hh/wk of this material. Residents in Acorn 1 areas captured the least recyclable paper at 54% additionally they generated 0.19kg/hh/wk.

Across Cambridge it is estimated that 0.23kg/hh/wk of recyclable plastic bottles are generated with around 78% being correctly placed into the blue bin.

Plastic bottles are easily identifiable when compared with other non-recyclable plastics. The majority of all recyclable plastic bottles are being correctly diverted by all the residents surveyed and there is just 0.05kg/hh/wk of these bottles not being placed into blue bins. On average 22% of recyclable plastic bottles are in the residual bin. Figure 5.3.3.1 shows the distribution of recyclable plastic bottles throughout the residual and recycling waste by Acorn category.

Figure 5.3.3.1: Distribution of recyclable plastic bottles within residual and mixed recycling samples (kg/hh/wk)

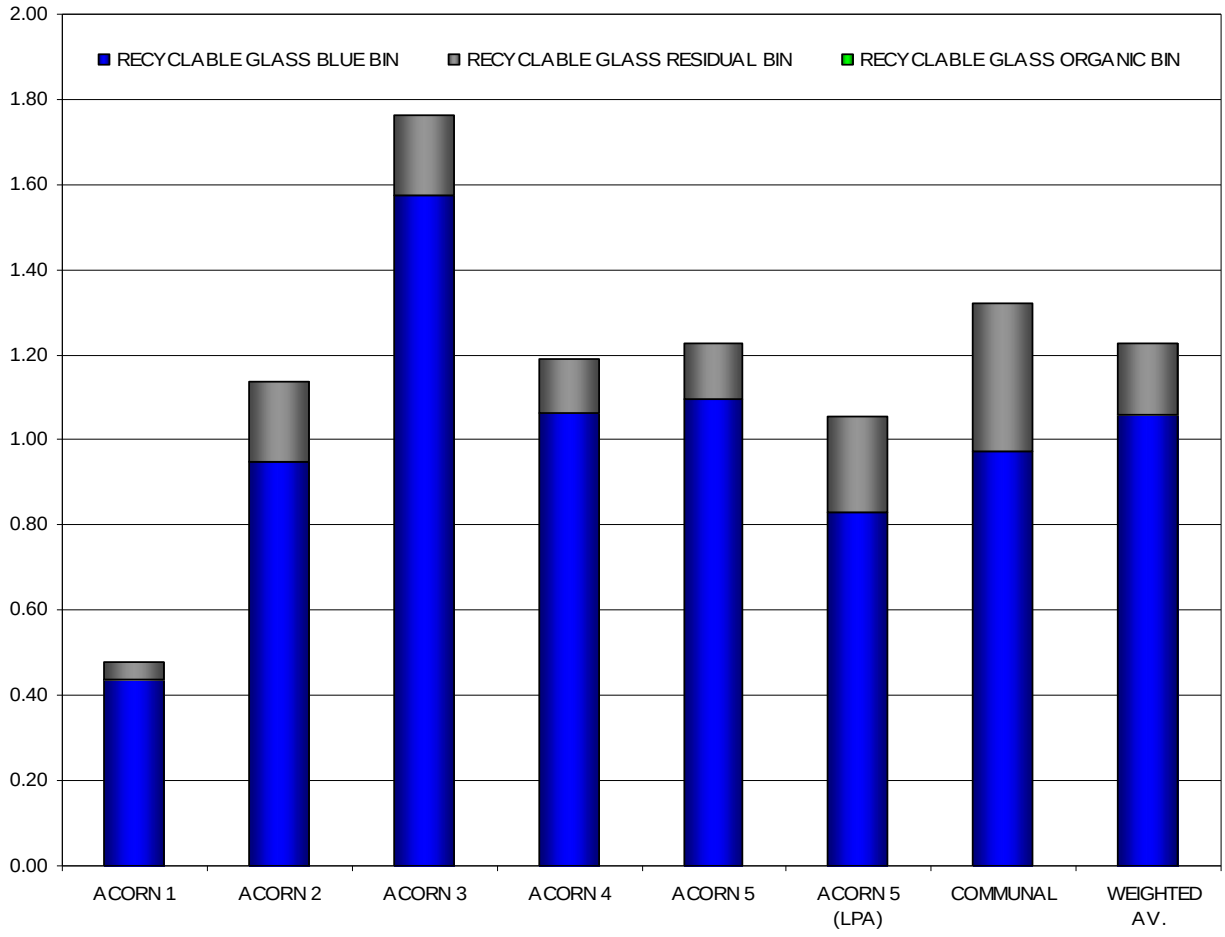


5.3.4 Glass Capture

Acorn 1 residents captured the highest proportion of their recyclable glass with 91% correctly being recycled, while residents from communal bin areas captured 74%. Acorn 3 residents produced the most recyclable glass in their combined kerbside waste at 1.76kg/hh/wk compared with 0.48kg/hh/wk from Acorn 1. On average, 87% of all recyclable glass is being correctly diverted by the Cambridge residents sampled with around 1.23kg/hh/wk being sampled.

Overall capture rates for coloured glass bottles were 92% with 82% of clear glass bottles similarly captured. Clear glass is generally considered to be more highly valued as a recyclate and it was seen that just 76% of glass jars were captured. It is often seen to be the case that empty jars are more messy than empty bottles and residents may not clean them for recycling, thus choosing to place them in the residual bins. On average, the vast majority of all recyclable forms of glass are being correctly diverted by the residents sampled although there is around 13% or 0.16kg/hh/wk of potentially recyclable glass not being placed into blue bins. Figure 5.3.4.1 shows the distribution of recyclable glass throughout the residual and mixed recycling waste.

Figure 5.3.4.1: Distribution of recyclable glass within residual and mixed recycling samples (kg/hh/wk)



5.3.5 Metals Capture

Acorn 1 residents captured the highest proportion of their recyclable metals with 79% correctly being recycled, while residents from Acorn 2 captured just 48%. Acorn 3 and communal bin users produced the most recyclable metals in their combined kerbside waste at 0.33kg/hh/wk compared with 0.15kg/hh/wk from Acorn 1. On average, 59% of all recyclable metals are being correctly diverted by Cambridge residents sampled with around 0.23kg/hh/wk being generated.

Overall capture rates for drinks cans were 72%, with 66% of food tins recycled. It is often seen to be the case that residents are unwilling to clean out food tins before recycling and this can lead to low capture rates when compared with cleaner drinks cans. Capture rates for empty aerosols were seen to be lower with just 51% of those available being placed into recycling containers. With the exception of Acorn 2 residents, the majority of all recyclable forms of metals are being correctly diverted, although there is around 0.09kg/hh/wk of potentially recyclable metal not being placed into blue bins. On average 41% of recyclable metal are in the residual bin. Figure 5.3.5.1 shows the distribution of recyclable metals throughout the residual and mixed recycling waste.

Figure 5.3.5.1: Distribution of recyclable metals within residual and mixed recycling samples (kg/hh/wk)

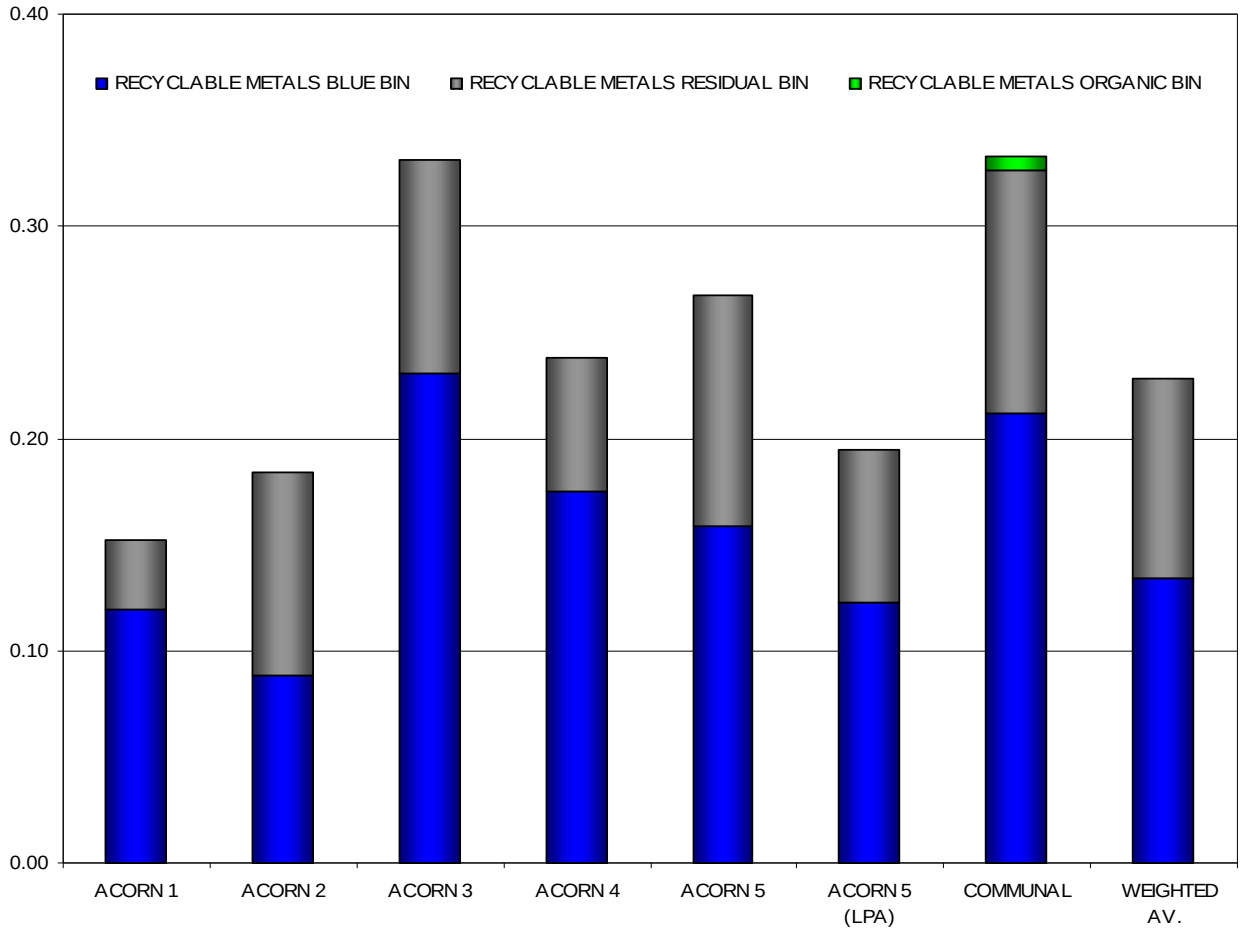
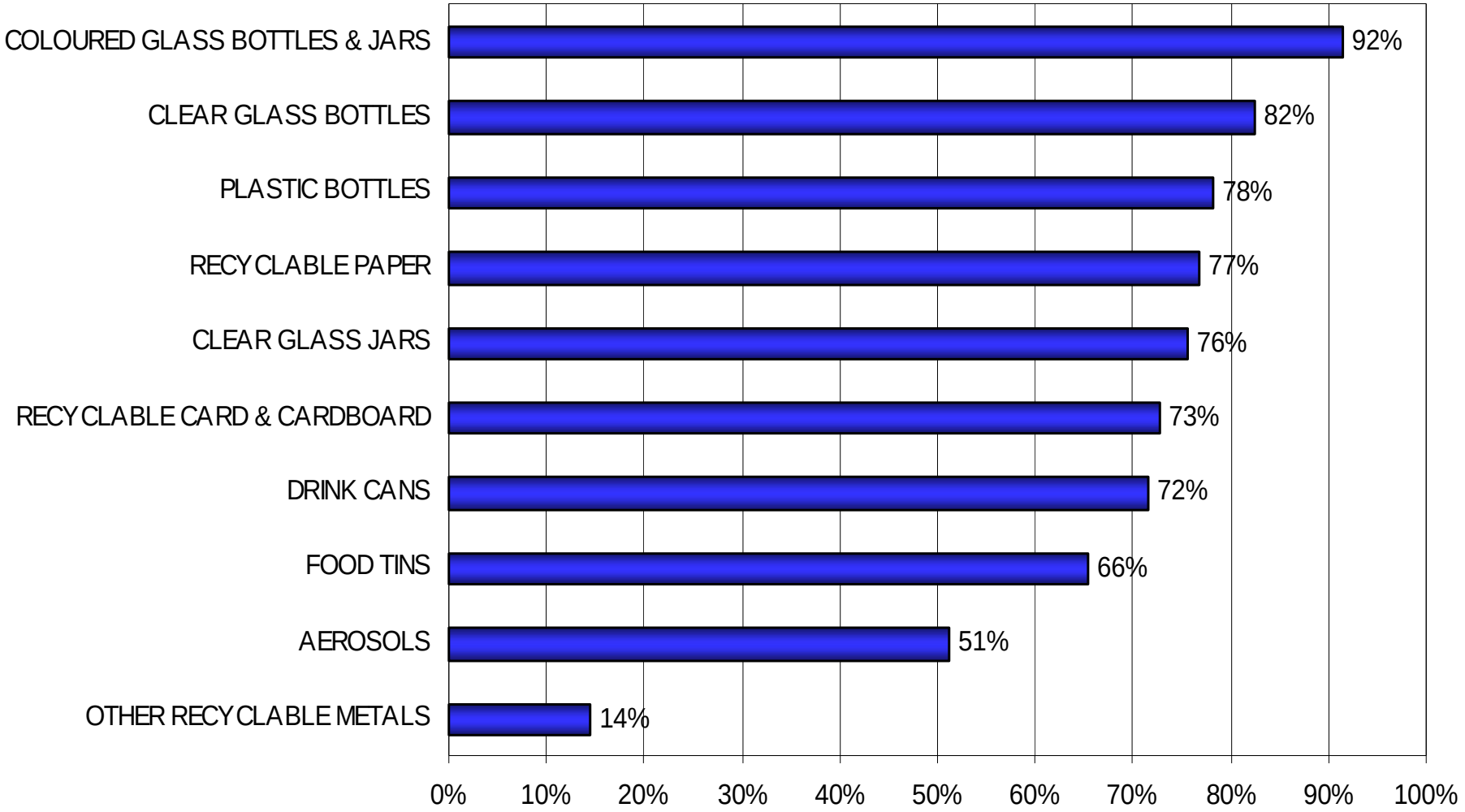


Figure 5.3.5.2: Summary chart of capture rates for blue bin recyclables.



5.4 Blue Bin Recycling Contamination

From Table 5.2.1 it has been shown that on average 6.4% of blue bin recycling is made up of contamination. This equates to around 0.20kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the recycling waste in Cambridge.

Some forms of contamination may be due to residents' lack of knowledge in relation to the recycling scheme. For example a householder may believe all plastic containers are accepted alongside recyclable plastic bottles. Other contamination will be formed from waste that is totally unrelated to the materials collected (i.e. disposable nappies, wood or bagged kitchen waste). Table 5.4.1 and Figure 5.4.1 show the amounts of contamination materials recovered from the blue bin.

The blue bin contained between 0.11kg/hh/wk (Acorn 2) and 0.54kg/hh/wk (communal bin households) of contamination.

Table 5.4.1: Breakdown of contamination materials in the blue bin recycling waste (kg/hh/wk)

BLUE BIN CONTAMINATION KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	0.04	0.03	0.06	0.04	0.13	0.04	0.06	0.06
PLASTIC FILM	0.01	0.01	0.04	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE PLASTICS	0.09	0.04	0.07	0.14	0.08	0.11	0.19	0.06
TEXTILES	0.00	0.01	0.03	0.06	0.00	0.00	0.00	0.01
NON-RECYCLABLE GLASS	0.00	0.01	0.00	0.00	0.00	0.01	0.00	<0.01
NON-RECYCLABLE METALS	0.04	0.00	0.00	0.00	0.00	0.01	0.01	<0.01
FOOD WASTE	0.00	0.01	0.02	0.10	0.08	0.01	0.07	0.03
LIQUIDS	0.01	0.00	0.01	0.04	0.00	0.00	0.02	<0.01
ALL OTHER CONTAMINATION	0.01	0.00	0.04	0.00	0.04	0.01	0.17	0.02
TOTAL CONTAMINATION	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20

Figure 5.4.1: Breakdown of contamination materials present within blue bin recycling containers (kg/hh/wk).

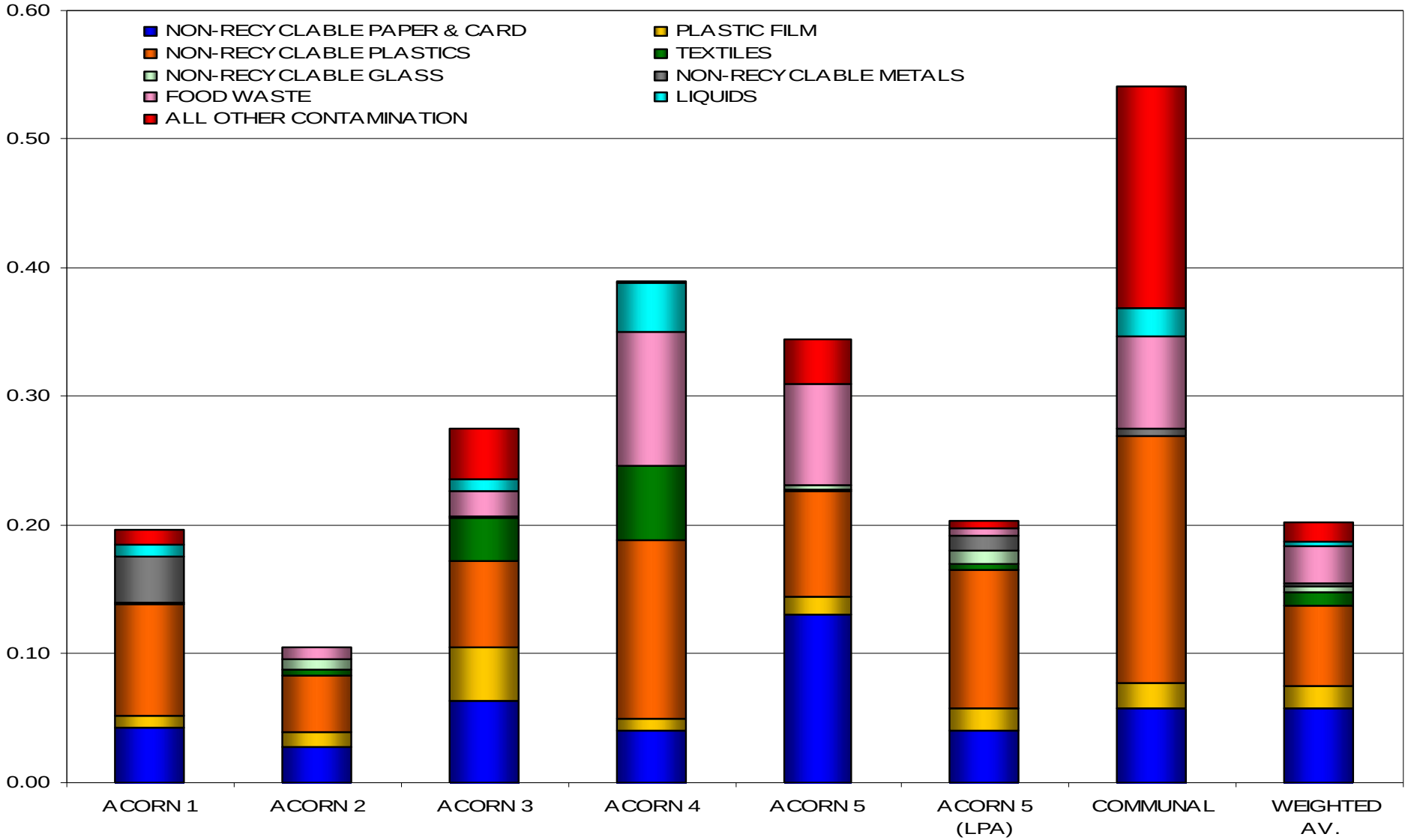


Table 5.4.2 shows the levels of contamination materials recovered from the blue bin as a percentage of the total. On average 6.4% of blue bin recycling is deemed to be contamination. Almost 4% of contamination is due to non-recyclable plastic containers, paper and card. Just over 3% of Acorn 2 recycling was classed as contamination compared with over 14% of that from households on communal bins.

Table 5.4.2: Levels of contamination within the blue bin recycling waste (% of total)

BLUE BIN CONTAMINATION %	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	1.84%	0.90%	1.67%	1.35%	4.23%	1.61%	1.52%	1.82%
PLASTIC FILM	0.39%	0.39%	1.07%	0.33%	0.43%	0.70%	0.53%	0.54%
NON-RECYCLABLE PLASTICS	3.65%	1.42%	1.75%	4.71%	2.68%	4.25%	5.04%	1.98%
TEXTILES	0.00%	0.17%	0.88%	1.96%	0.02%	0.17%	0.00%	0.35%
NON-RECYCLABLE GLASS	0.05%	0.25%	0.04%	0.00%	0.10%	0.40%	0.00%	0.16%
NON-RECYCLABLE METALS	1.52%	0.00%	0.00%	0.00%	0.00%	0.50%	0.13%	0.08%
FOOD WASTE	0.00%	0.31%	0.49%	3.54%	2.54%	0.23%	1.90%	0.89%
LIQUIDS	0.42%	0.00%	0.26%	1.27%	0.00%	0.00%	0.57%	0.12%
ALL OTHER CONTAMINATION	0.44%	0.00%	1.01%	0.07%	1.14%	0.21%	4.53%	0.48%
TOTAL CONTAMINATION	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%

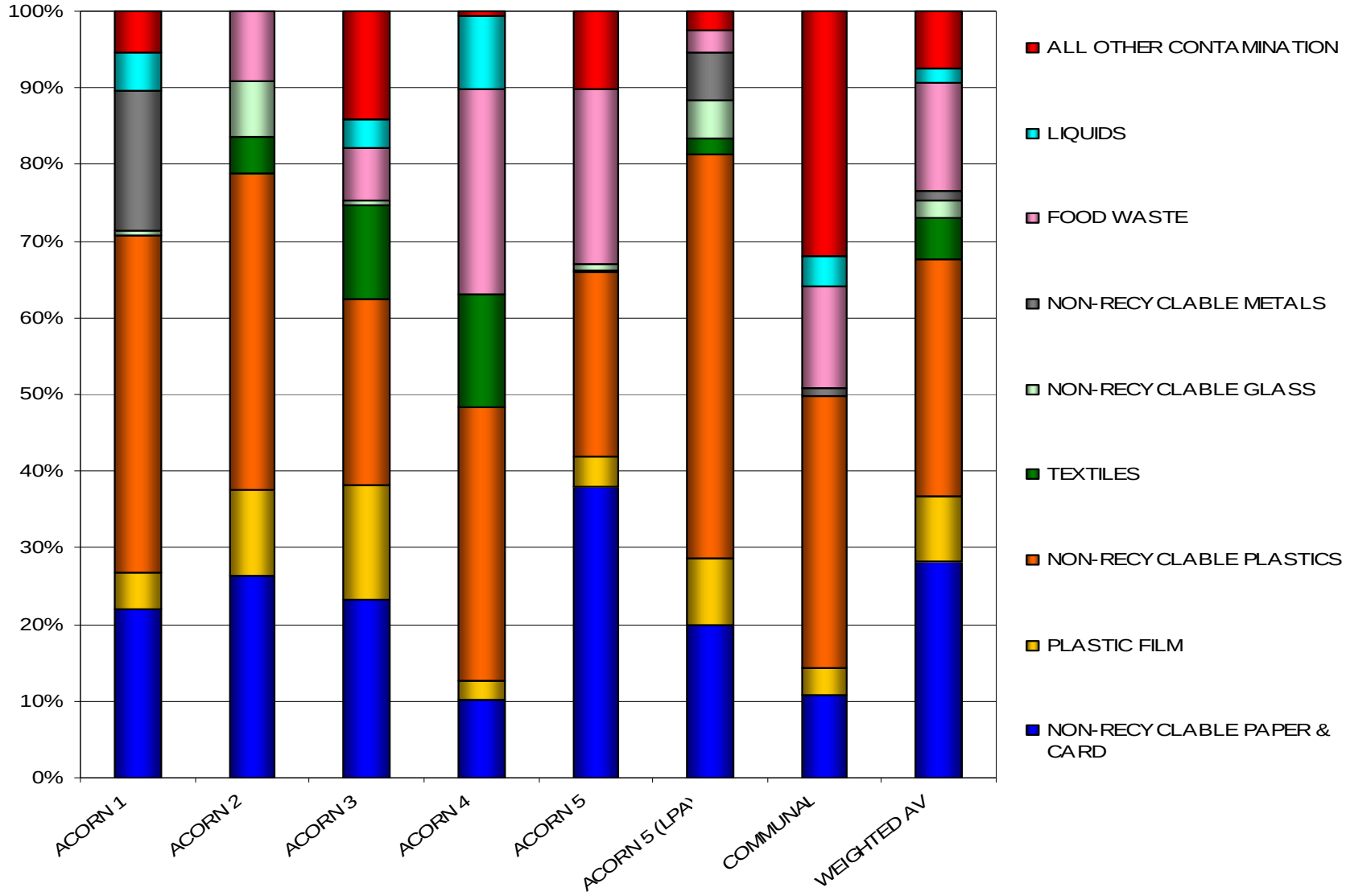
Table 5.4.3 and Figure 5.4.2 show a breakdown of the contaminants to highlight materials causing the greatest contribution to the overall contamination levels within blue bins. Around 31% of the contamination was due to non-recyclable dense plastics, these formed over half of the contamination from Acorn 5(LPA) households. Over 28% of contamination was due to non-recyclable paper and card; this formed almost 40% of Acorn 5 contamination. Up to 14% of contamination was formed from food waste and this material represented a quarter of the overall contamination from Acorn 4 and 5 households.

Blue bins from communal households had very high levels of miscellaneous contamination at 32% of the total. These items are typical of general residual waste being placed into recycling bins.

Table 5.4.3: Proportional breakdown of blue bin contaminants (% of contamination).

% OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	22.09%	26.25%	23.24%	10.23%	37.98%	19.92%	10.70%	28.31%
PLASTIC FILM	4.74%	11.25%	14.85%	2.49%	3.87%	8.66%	3.70%	8.48%
NON-RECYCLABLE PLASTICS	43.90%	41.25%	24.42%	35.58%	24.04%	52.71%	35.46%	30.78%
TEXTILES	0.00%	4.86%	12.28%	14.84%	0.21%	2.16%	0.00%	5.38%
NON-RECYCLABLE GLASS	0.64%	7.36%	0.62%	0.00%	0.88%	4.96%	0.00%	2.43%
NON-RECYCLABLE METALS	18.22%	0.00%	0.00%	0.00%	0.00%	6.17%	0.92%	1.27%
FOOD WASTE	0.00%	9.03%	6.80%	26.73%	22.82%	2.86%	13.33%	13.94%
LIQUIDS	5.09%	0.00%	3.68%	9.59%	0.00%	0.00%	4.04%	1.91%
ALL OTHER CONTAMINATION	5.32%	0.00%	14.12%	0.55%	10.19%	2.55%	31.86%	7.52%
TOTAL CONTAMINATION	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5.4.2: Proportional breakdown of blue bin contaminants (% of contamination).



6) Green Bin Organic Recycling Waste

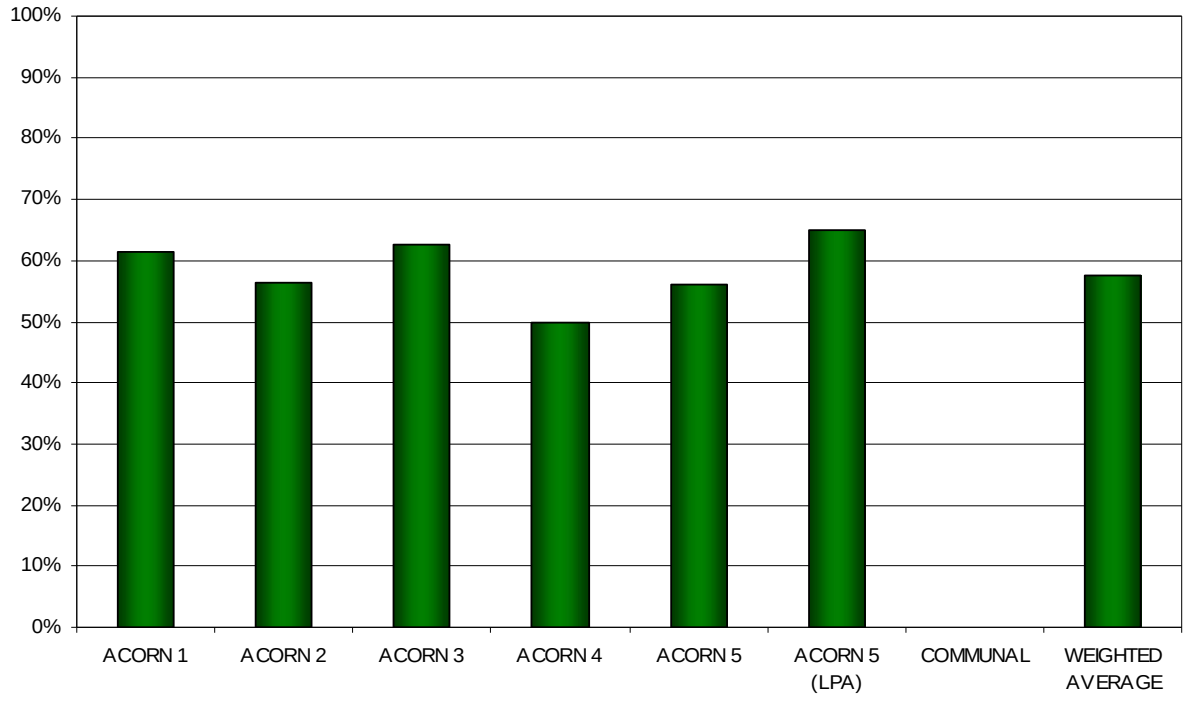
6.1 Set out rates and waste generation

Table 6.1.1 and Figure 6.1.1 highlight the average set out rates for green bin organic recycling waste observed during the compositional analysis. Table 6.1.2 and Figure 6.1.2 show the average amounts of this recycling waste generated in kg/hh/wk. Set out rates ranged between 50% for Acorn 4 and 65% for Acorn 5(LPA) were observed. Across Cambridge around 58% of residents are opting to place out organic waste containers for collection.

Table 6.1.1: Average Set Out For Green Bin Waste (%)

ACORN	% SET OUT
1	61%
2	57%
3	63%
4	50%
5	56%
5 (LPA)	65%
COMMUNAL	N/A
WEIGHTED AVERAGE	58%

Figure 6.1.1: Average Set Out For Green Bin Waste (%)

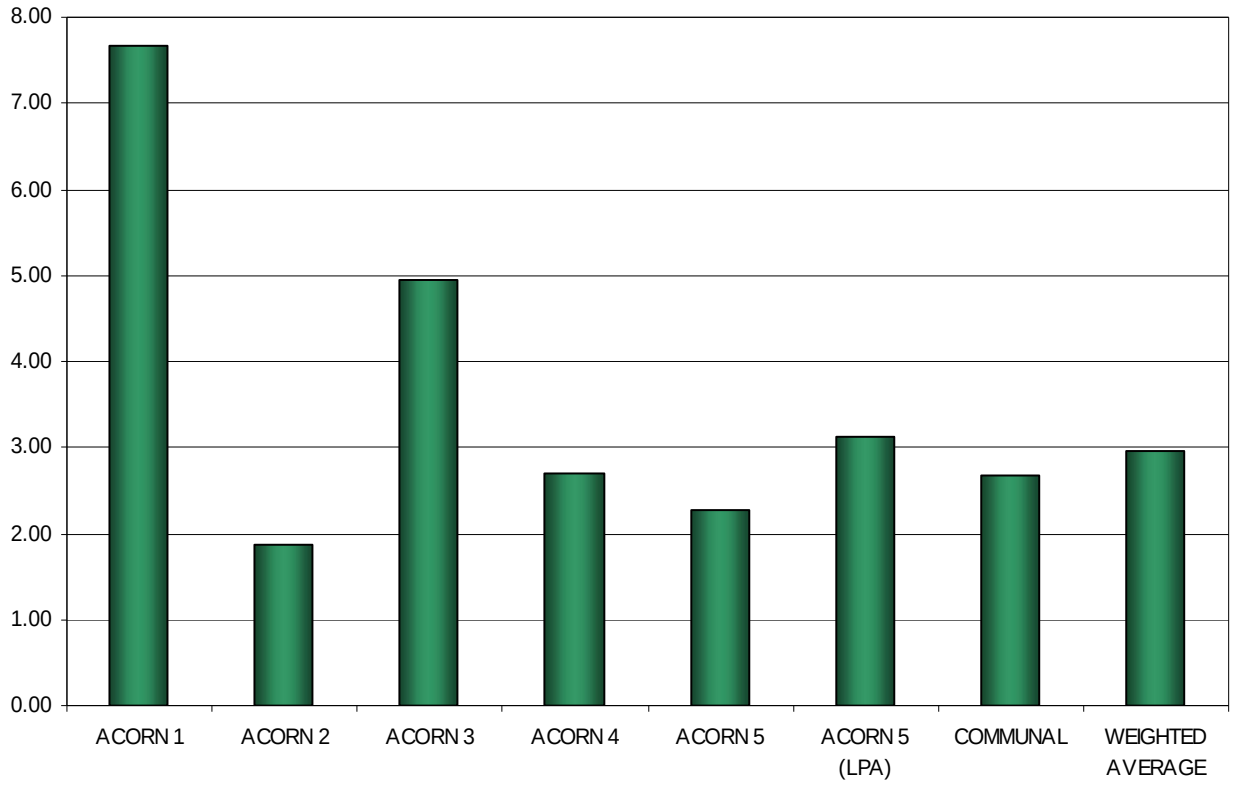


In this survey the amount of green bin recycling generated ranged between 1.86kg/hh/wk from Acorn 2 to 7.66kg/hh/wk from Acorn 1. Across Cambridge around 2.96kg/hh/wk organically recycled waste is being collected from the kerbside.

Table 6.1.2: Average green bin waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	7.66
2	1.86
3	4.95
4	2.71
5	2.27
5 (LPA)	3.13
COMMUNAL	2.69
WEIGHTED AVERAGE	2.96

Figure 6.1.2: Average green bin waste generation rates (kg/hh/wk)



6.2 Compositional analysis of green recycling bins

This section looks at the average amount and composition of the green bin organic recycling waste presented by participating households sampled throughout Cambridge. Results can again be expressed in terms of percentage concentration and kg/hh/wk for individual samples and in relation to the household Acorn surveyed.

Table 6.2.1 and Figure 6.2.1 show green bin recycling data in terms of percentage composition with Table 6.2.2 and Figure 6.2.2 showing average generation rates for major materials in terms of kg/hh/wk. As residual waste will contain a proportion that is classified as potentially recyclable; then recycling waste will contain a faction that is deemed to be contamination. That is to say that it is not compatible with the materials currently acceptable to the green bin recycling scheme.

Table 6.2.1: Average Composition of organic recycling (% concentration) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	2.50%	1.99%	11.17%	10.82%	6.71%	2.90%	25.30%	5.93%
NON-HOME COMPOSTABLE FOODS	0.66%	15.64%	3.09%	7.53%	0.88%	9.13%	1.41%	6.38%
FLORA ORGANICS	92.93%	79.43%	81.99%	74.25%	77.77%	72.68%	0.39%	82.30%
OTHER ACCEPTABLE ORGANICS	3.67%	2.83%	1.24%	2.73%	4.95%	13.64%	41.62%	2.84%
SOIL & TURF	0.00%	0.00%	0.00%	4.22%	0.00%	0.00%	0.00%	0.13%
NON-RECYCLABLE PAPER & CARD	0.00%	0.11%	0.02%	0.08%	0.13%	1.01%	8.60%	0.06%
PLASTICS	0.00%	0.00%	0.02%	0.00%	0.07%	0.00%	6.17%	0.02%
TEXTILES	0.24%	0.00%	0.00%	0.00%	3.37%	0.00%	2.21%	0.59%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.00%
ALL OTHER WASTE	0.00%	0.00%	2.47%	0.36%	6.13%	0.64%	13.52%	1.75%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6.2.2: Average Composition of organic recycling (kg/hh/wk) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	0.19	0.04	0.55	0.29	0.15	0.09	0.68	0.18
NON-HOME COMPOSTABLE FOODS	0.05	0.29	0.15	0.20	0.02	0.29	0.04	0.19
FLORA ORGANICS	7.12	1.48	4.06	2.01	1.77	2.28	0.01	2.43
OTHER ACCEPTABLE ORGANICS	0.28	0.05	0.06	0.07	0.11	0.43	1.12	0.08
SOIL & TURF	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER & CARD	0.00	0.00	0.00	0.00	0.00	0.03	0.23	0.00
PLASTICS	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00
TEXTILES	0.02	0.00	0.00	0.00	0.08	0.00	0.06	0.02
GLASS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
ALL OTHER WASTE	0.00	0.00	0.12	0.01	0.14	0.02	0.36	0.05
TOTAL	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96

Figure 6.2.1: Average Composition of organic recycling (% by weight) by Acorn

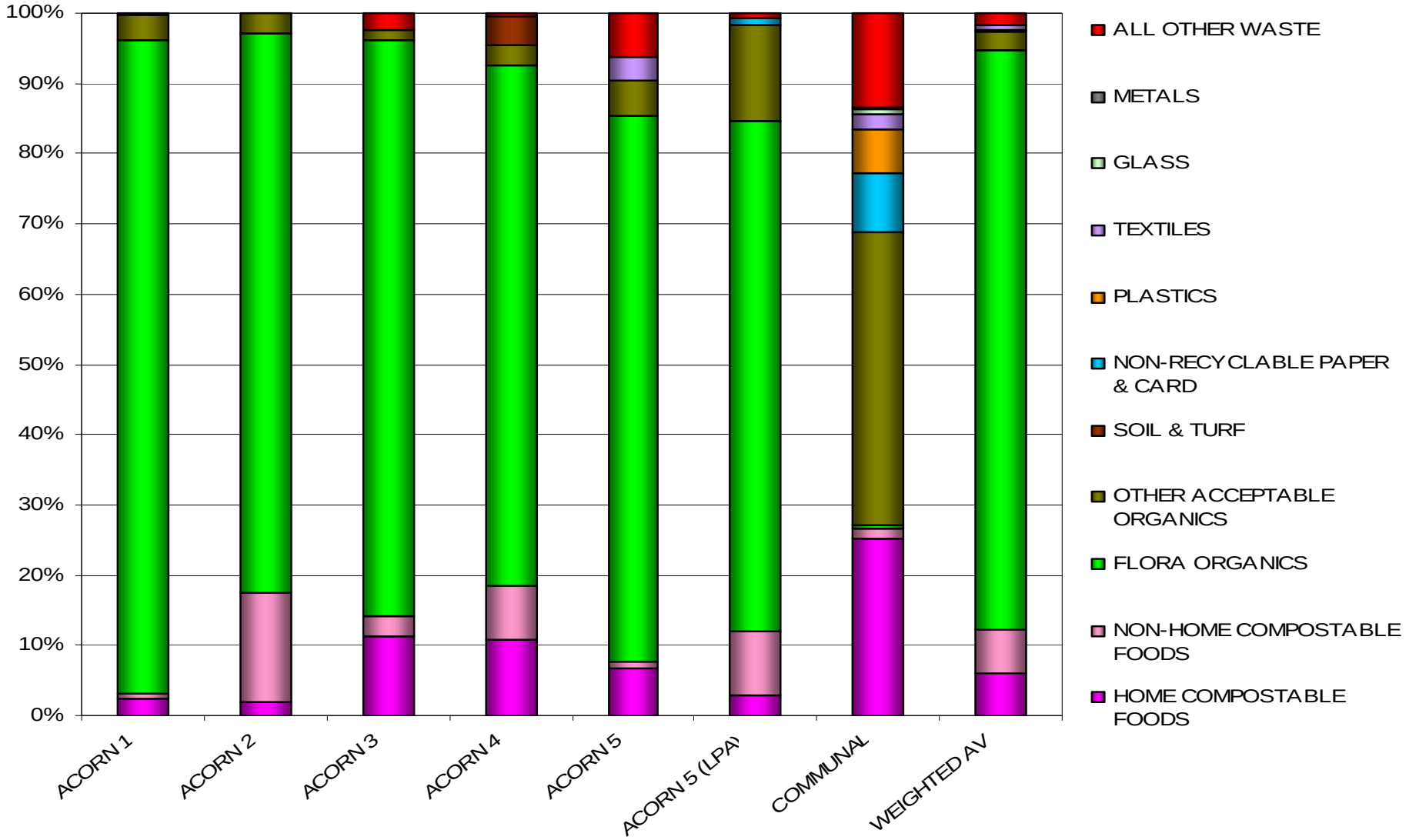
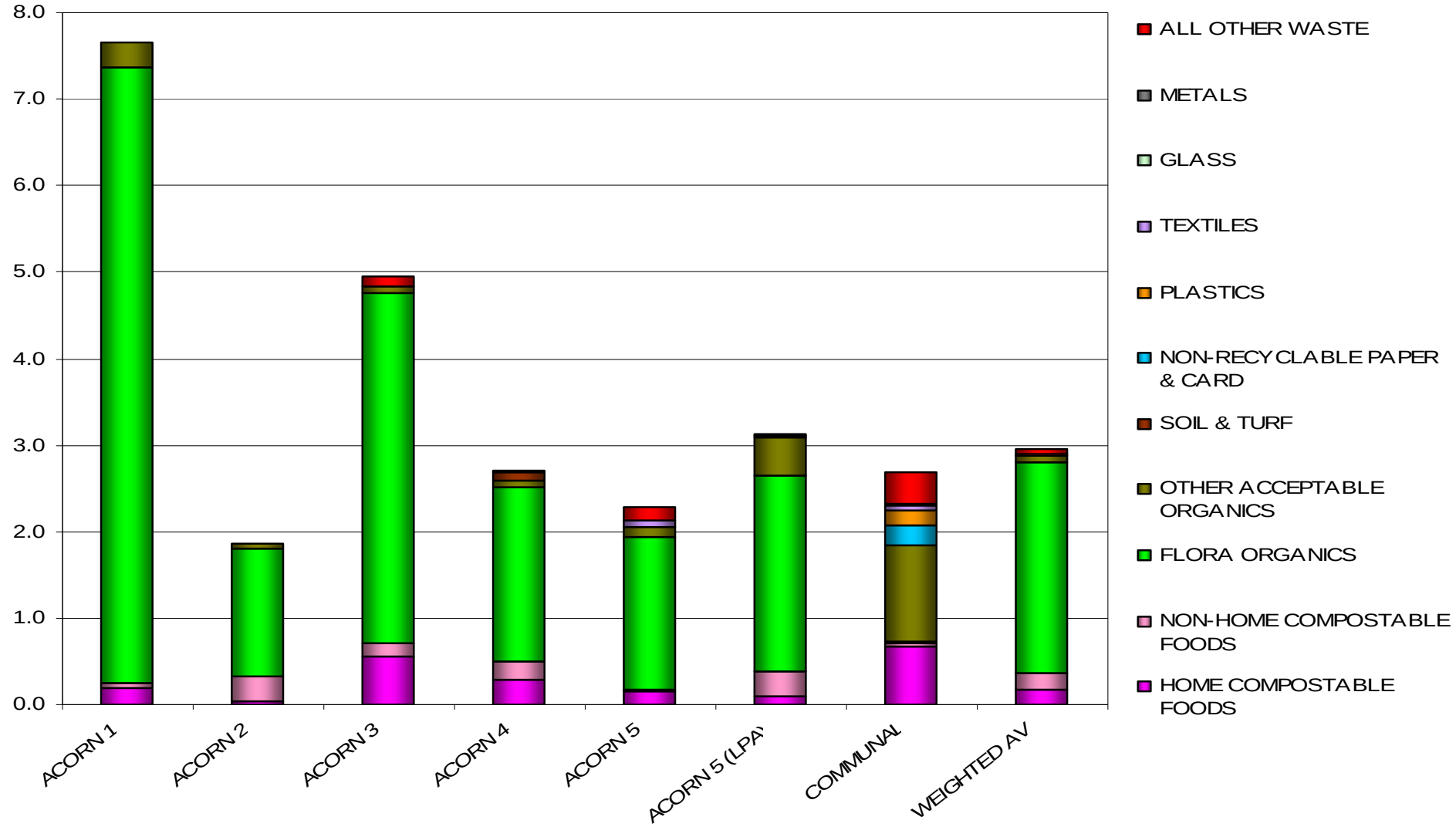


Figure 6.2.2: Composition of organic recycling (kg/hh/wk) by Acorn



6.3 Materials placed out for green bin recycling collections

This chapter looks in more detail at the individual materials placed out for green bin recycling collections and highlights the effectiveness with which this scheme is capturing these items. Looking at the relationship between the residual, dry recycling and green bin recycling waste presented will additionally give indications as to the overall diversion being achieved throughout Cambridge.

Table 6.3.1: Summary table for material capture and diversion rates (%) for green bin recycling

CAPTURE & DIVERSION RATES (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	46.37%	4.67%	58.24%	38.15%	24.18%	14.92%	46.36%	23.12%
NON-HOME COMPOSTABLE FOODS*	9.71%	35.45%	15.16%	13.65%	1.61%	25.11%	3.37%	20.00%
ALL FOOD WASTE	25.96%	20.33%	36.04%	21.97%	9.25%	21.56%	27.69%	21.39%
FLORA ORGANICS	98.55%	93.12%	100.00%	96.06%	98.29%	91.73%	7.40%	97.15%
PET BEDDING & UNTREATED WOOD	100.00%	N/A	N/A	0.00%	N/A	100.00%	100.00%	75.69%
ACCEPTABLE PAPER & CARD	4.14%	2.37%	3.07%	4.56%	5.27%	7.22%	32.03%	3.28%
ALL ORGANICS	90.49%	56.22%	79.01%	52.97%	52.93%	65.41%	27.50%	66.27%
% DIVERSION	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%

* Contains all unidentifiable and unsortable composite food waste. Some of this will be home compostable fragments, however, due to a significant proportion being non fruit and vegetable waste; this faction is deemed non-home compostable.

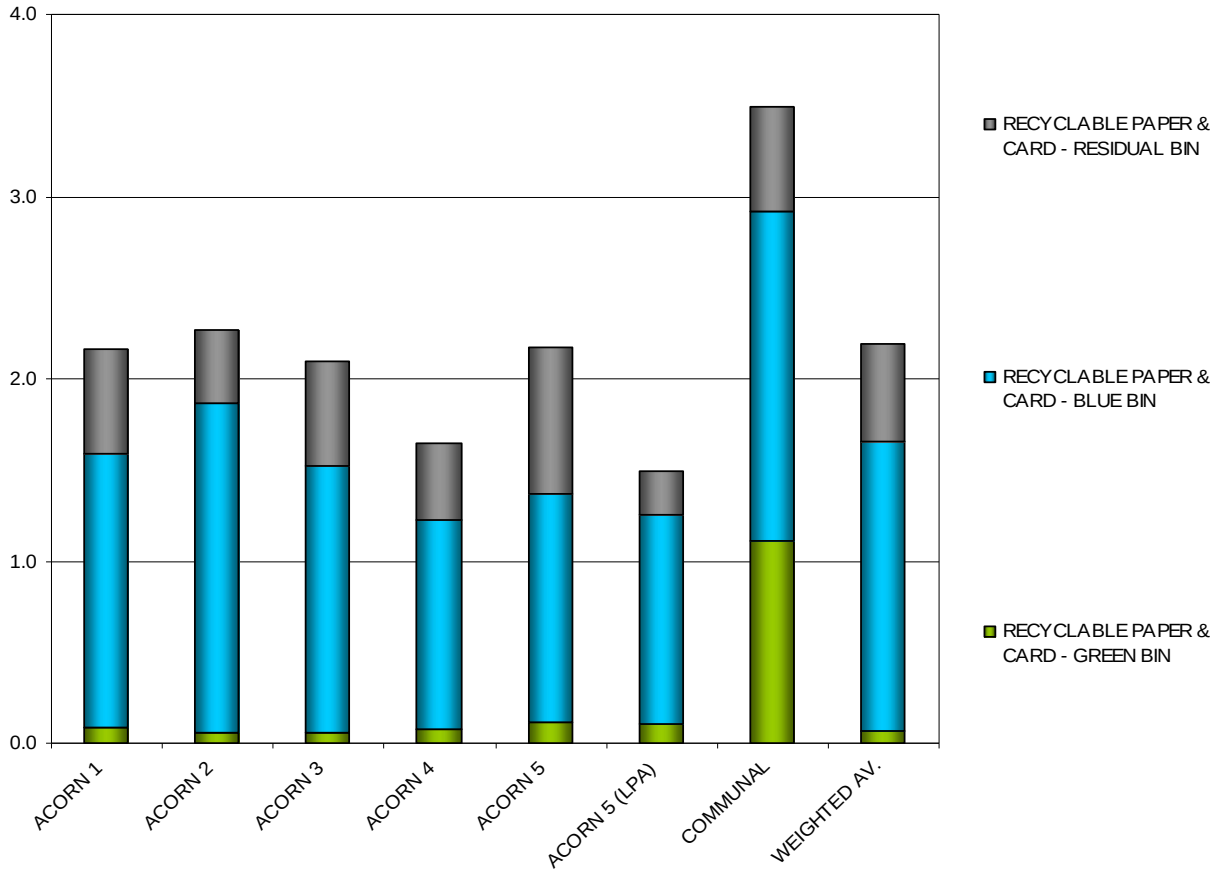
Table 6.3.1 summarises the average capture and diversion rates seen for materials achieved for the green bin organic recycling collections. By far the most efficient recyclers of organic waste were Acorn 1 households who recycled over 90% of that being generated. Acorn 3 households captured over 79% of their organics whilst the rate for Acorns 2, 4 and 5 was between 53% and 56%. IN contrast it was seen that residents in communal bin areas only managed to capture 27.5% of the organic waste that they were disposing of. Across Cambridge, 66.3% of the organics available for green bin recycling were correctly captured by participating households.

6.3.1 Paper & Card Capture

Residents are able to recycle paper, thin card and corrugated cardboard in their green bins. It is however the case that with the exception of shredded paper, it is preferable for these recyclables to be placed into blue recycling bins.

Figure 6.3.1.1. shows the distribution of recyclable paper, card and cardboard throughout the three kerbside schemes by Acorn category. It is clear that residents using communal bins not only generate the most recyclable paper and card; they also place by far the highest proportion in their green bins at 32%. Typically between 2% and 5% of all recyclable paper and card was present in green bins for Acorns 1 – 5 with just over 7% seen for the Acorn 5(LPA) sample.

Figure 6.3.1.1 Distribution of recyclable paper & card within residual and recycling samples (kg/hh/wk)



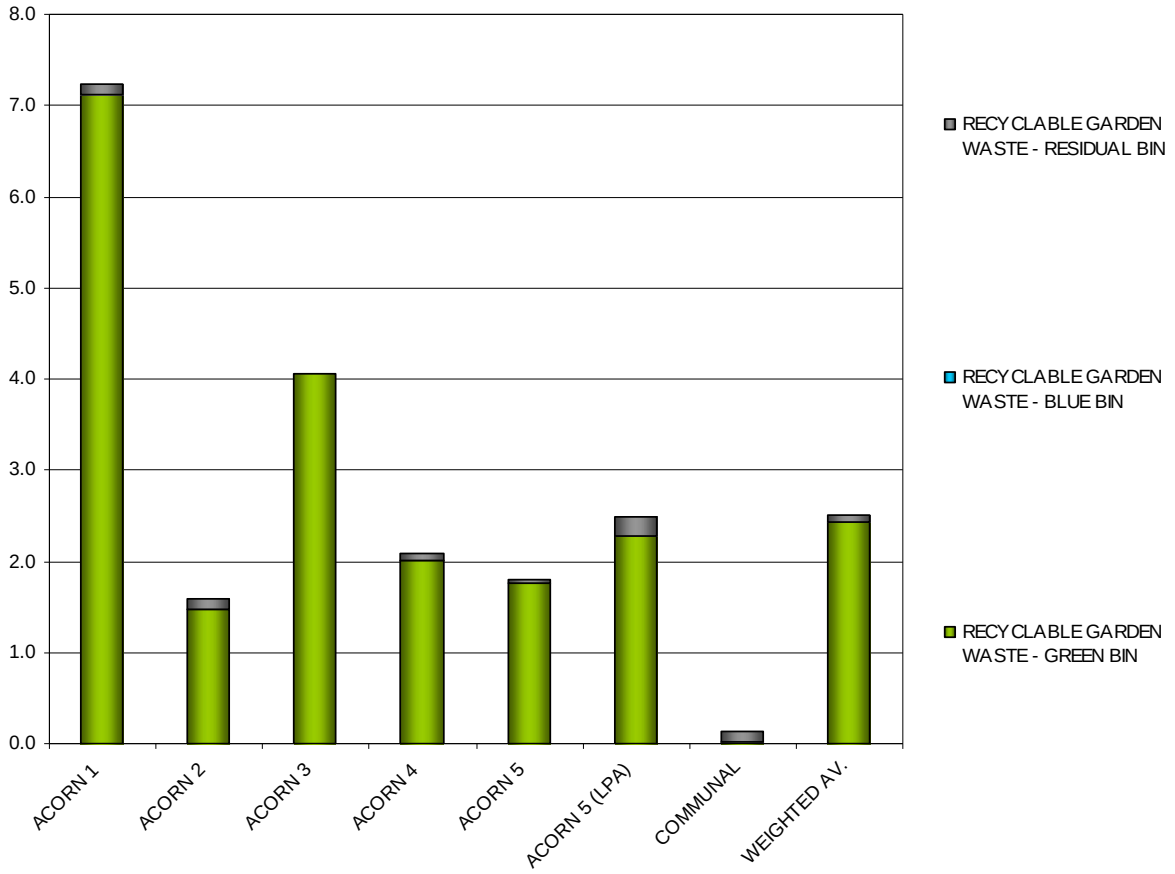
6.3.2 Garden Waste Capture

Residents are able to recycle garden clippings in their green bins. With the exception of the communal bin residents it was seen that garden waste was by far the greatest constituent of the presented organic recycling. Just 7% of garden waste was captured in communal bins areas although very little of this type of waste is actually generated. On average it is seen that over 97% of the available garden waste is recycled by Cambridge residents. All Acorns recorded capture rates of between 92% and 100%.

It is seen that communal bin households generated just 0.13kg/hh/wk of recyclable garden waste compared with 7.23kg/hh/wk from Acorn 1 households. On average residents throughout Cambridge create 2.51kg/hh/wk of recyclable garden waste.

Soil and turf are also classed as garden waste but are not allowable in green bins. This waste was only generated in low amounts across Cambridge (0.02kg/hh/wk) with around 22% ending up in green bins.

Figure 6.3.2.1. Distribution of garden waste within residual and recycling samples (kg/hh/wk)



6.3.3 Food Waste Capture

Residents are able to all forms of food waste in their green bins. Capture rates were seen to vary greatly across the samples taken. Food waste can broadly be divided into two types. Firstly 'home-compostable' which covers things like raw fruit and vegetable waste, egg shells, tea bags etc which could potentially be composted in standard compost bins. Non-home compostable food are generally cooked and prepared foods and plate scrapings which residents would not normally compost with their garden, fruit and vegetable wastes.

Overall capture rates for all food waste varied at between 9.3% in Acorn 5 up to 36% in Acorn 3. This represented an average figure of 21.4% for Cambridge. Acorn 1 households produced just 0.93kg/hh/wk of total food waste compared with 2.59kg/hh/wk from communal bin households. On average Cambridge residents are producing of 1.70kg/hh/wk of food waste.

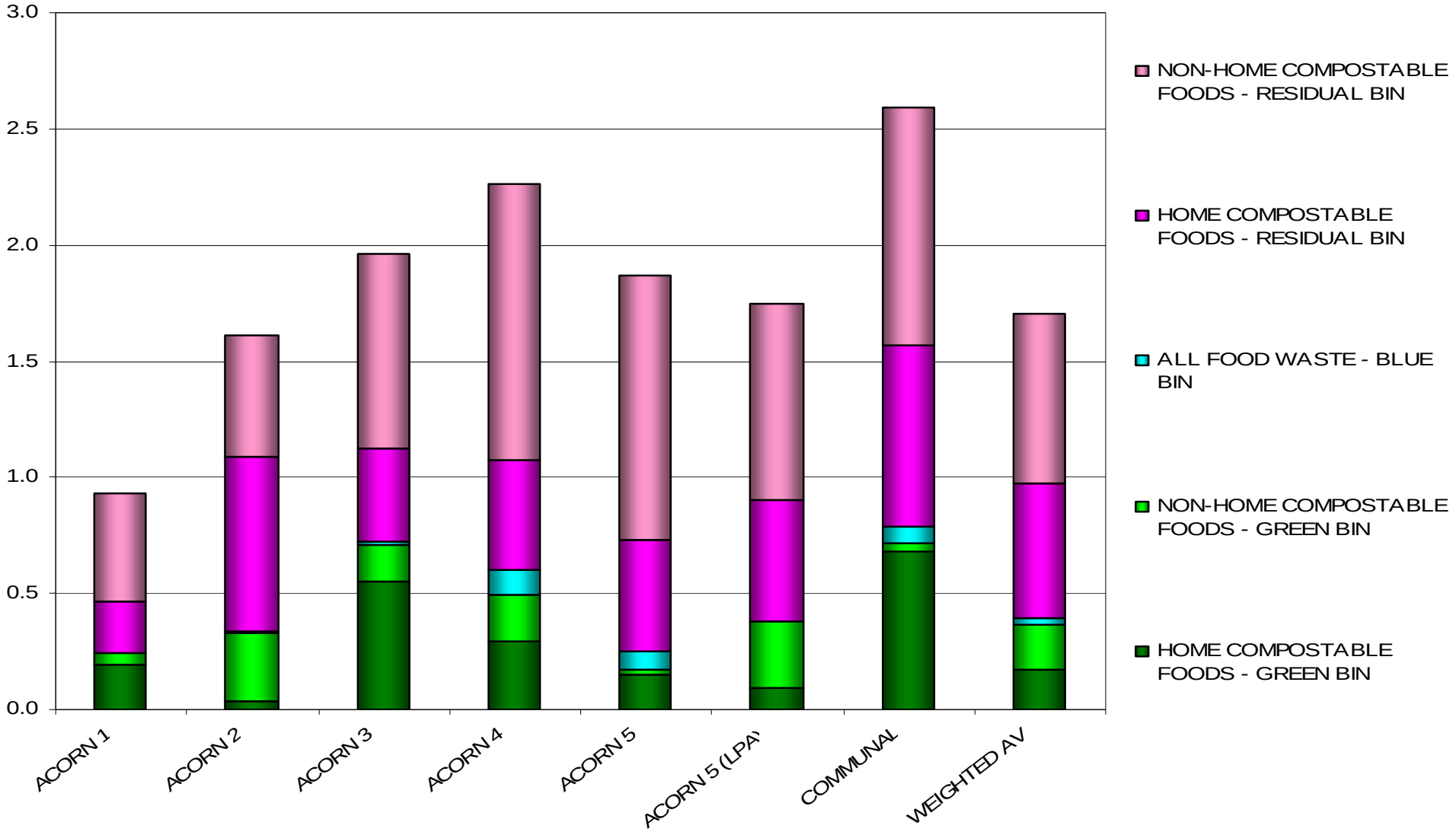
As well as differences in the levels and capture rates for food waste between the Acorn samples, there was a significant difference between the types of food being recycled. Home compostable food waste is generally less 'messy' than non-home compostable food waste and was seen to have capture rates of between 4.7% (Acorn 2) and 58.2% (Acorn 3) at an average of 23.1%. Conversely capture rates for non-home compostable food waste were lower at between 1.6% (Acorn 5) and 35.5% (Acorn 2); an average of 20%.

In terms of diversion solely through the green bin recycling it is seen that just 12.5% diversion is achieved by communal bin users compared with almost 54% for Acorn 1. Overall this is an average diversion of 23.1% which is very similar to that recorded for blue bins. Total diversion rates for the combined recycling collections are shown in section 7.

With the exception of communal bin users, all sample areas were seen to generate more non-home compostable food waste than home compostable food waste at average figures of 0.94kg/hh/wk and 0.76kg/hh/wk respectively. During the sorting of the waste it is the method to class some of the food waste as unidentifiable or unsortable. This is basically a degraded mixture of foods which are recyclable and are classified as non-compostable as will contain waste other than fruit and vegetable matter.

Figure 6.3.3.1 shows the distribution and levels of food waste throughout the residual and green bin containers. Overall, 0.58kg/hh/wk of home compostable and 0.75kg/hh/wk of non-home composable food waste is not being recycled in the green bins. This represents a total of 1.34kg/hh/wk of potentially recyclable material.

Figure 6.3.2.1. Distribution of food waste within residual and recycling samples (kg/hh/wk)



6.4 Green Bin Recycling Contamination

From Table 6.2.1 it has been shown that between 0.1% (Acorn 2) and 31.3% (communal bin users) of collected green bin recycling is due to contamination. Across Cambridge approximately 2.6% of green bin recycling waste was not compatible with the accepted materials, equating to 0.08kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the green bin recycling waste in Cambridge.

Table 6.4.1 and Figures 6.4.1 and 6.4.2 show the proportions of contamination materials in each area.

Table 6.4.1: Percentage breakdown of contamination in green bin waste

% BREAKDOWN OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
SOIL & TURF	0.00%	0.00%	0.00%	90.45%	0.00%	0.00%	0.00%	5.28%
NON-RECYCLABLE PAPER & CARD	0.00%	100.00%	0.65%	1.77%	1.31%	61.27%	27.50%	2.47%
PLASTICS	0.00%	0.00%	0.65%	0.00%	0.76%	0.00%	19.71%	0.66%
TEXTILES	100.00%	0.00%	0.00%	0.00%	34.71%	0.00%	7.07%	22.96%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.70%	<0.01%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.79%	<0.01%
ALL OTHER WASTE	0.00%	0.00%	98.70%	7.78%	63.22%	38.73%	43.22%	68.63%
TOTAL CONTAMINATION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
CONTAMINATION KG/HH/WK	0.02	0.00	0.12	0.13	0.22	0.05	0.84	0.08
% CONTAMINATION	0.24%	0.11%	2.50%	4.67%	9.70%	1.64%	31.28%	2.55%

Figure 6.4.1: Contamination materials in green bin recycling

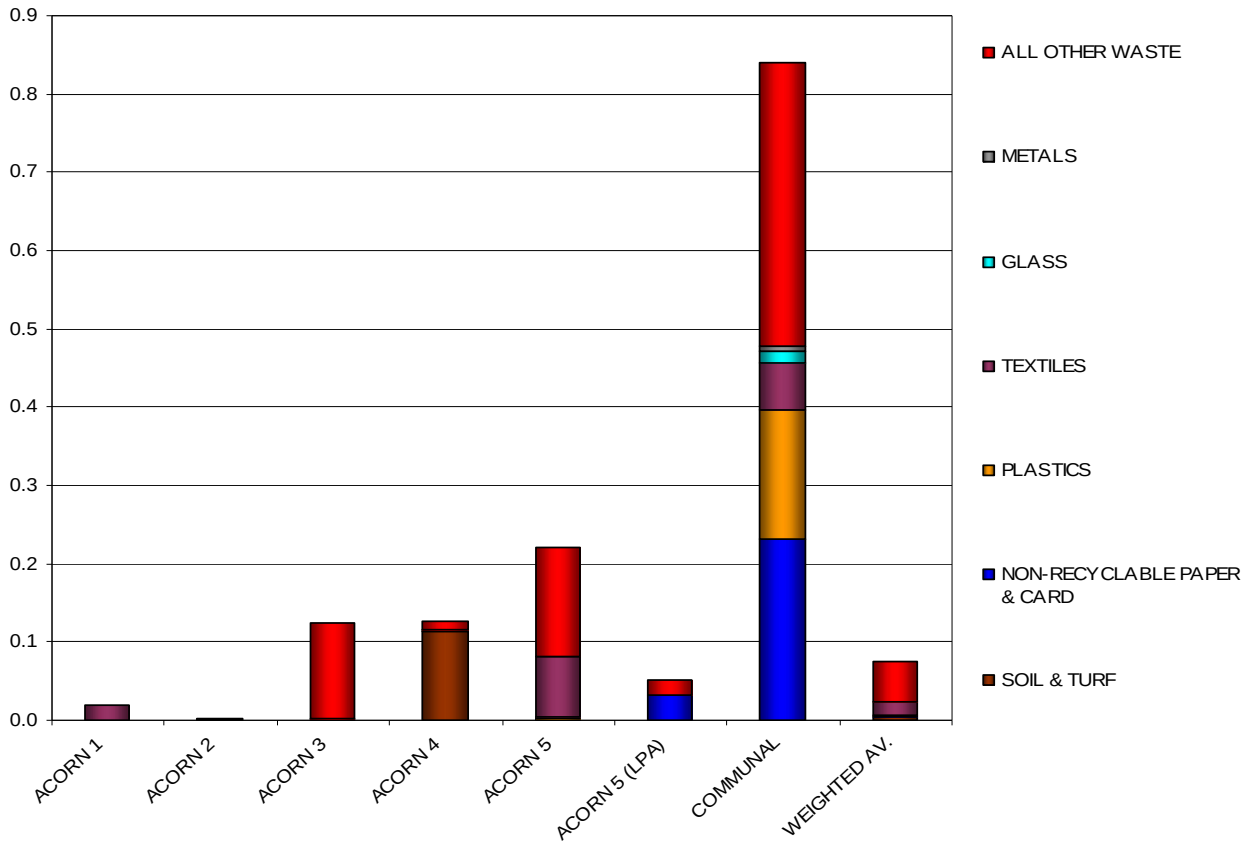
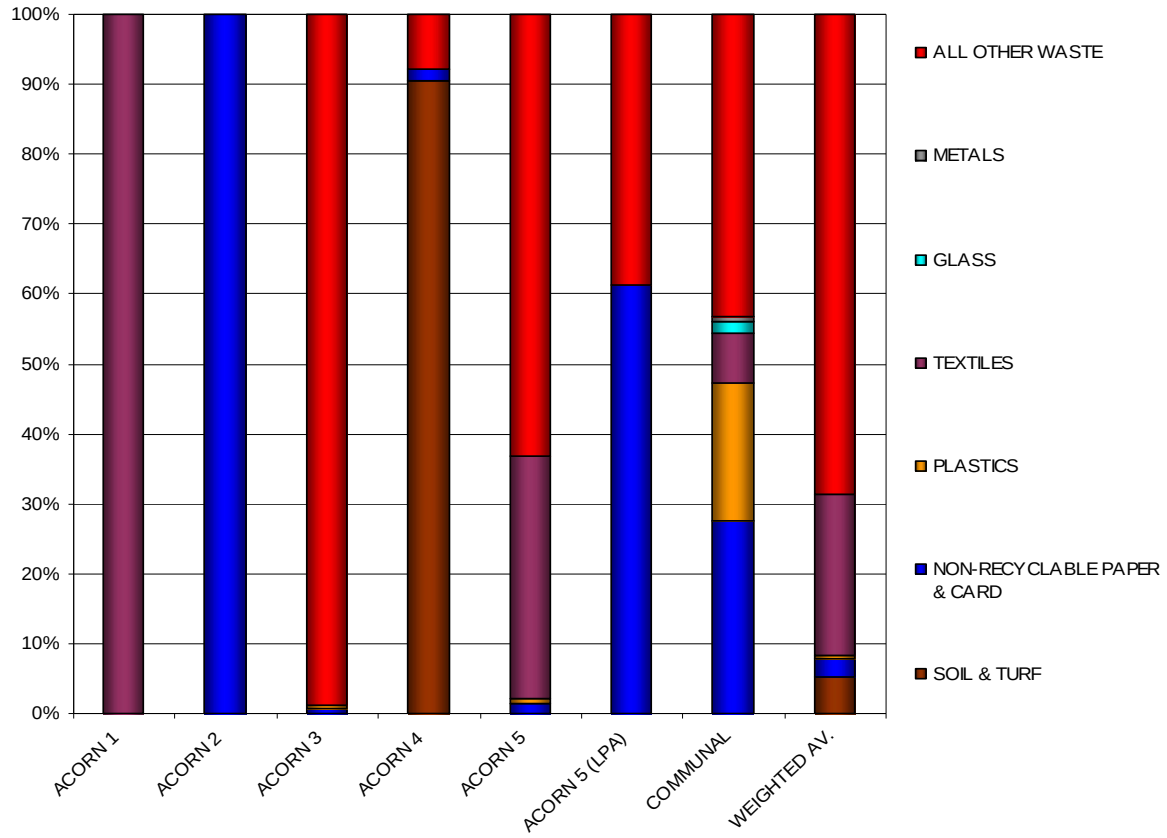


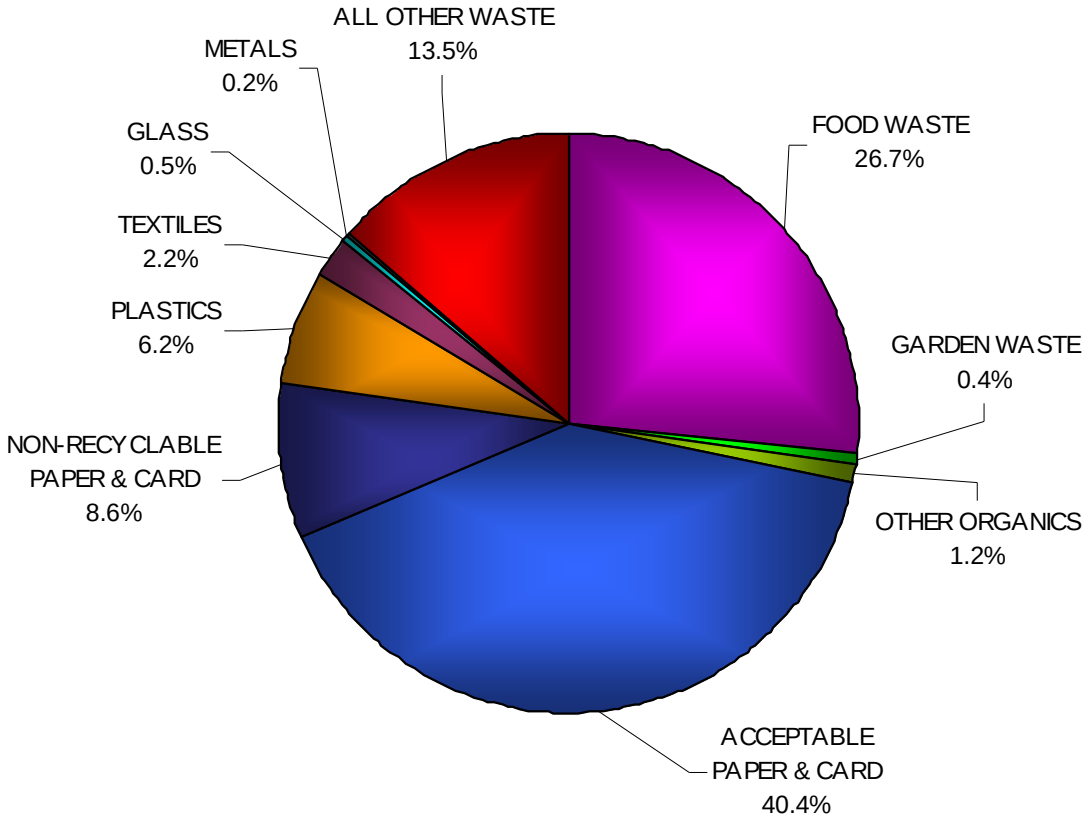
Figure 6.4.2: % breakdown of contaminants within green recycling bins



Overall it was seen that 68.8% of the contamination was due to miscellaneous other waste. This would be a mixture of general waste that can generally be considered to be residual waste. This material formed up to 99% of the contamination seen in Acorn 3 green bins. Up to 23% of contamination was due to textile waste. Around 35% of Acorn 5 green bin contamination was due to waste textiles. All of the contamination in Acorn 2 green bins was due to non-recyclable paper and card and over 90% of the contamination in Acorn 4 was due to soil and turf. Combined these wastes formed just under 8% of the contamination.

The composition of the organic recycling collected from households using communal bins was markedly different from all of the other samples. Of the 2.69kg/hh/wk presented up to 0.84kg/hh/wk or 31.3% was due to contaminants; this was far greater than any of the other samples. A wide range of contaminants including general residual waste, glass, metal and plastic were seen in these recycling bins and they appear to be used by residents as general waste disposal containers. These bins also contain significantly more paper and cardboard waste than other sample surveyed.

Figure 6.4.3 % breakdown of contaminants within green recycling bins from communal users



7) Overall Diversion through Recycling Collections

7.1 Total waste generation levels & diversion

Capture rates determine how much of a material that should be recycled actually is being recycled. Diversion rates show the percentage of total generated waste produced from an area that is being 'Diverted' via the available recycling stream(s).

Table 7.1.1 and Figure 7.1.1 show the total waste generation (residual, blue bin and green bin recycling) for each of areas sampled. Acorn 2 produced the lowest levels of total waste at 9.59kg/hh/wk with the households from Acorn 3 generating the most at 16.71kg/hh/wk. Across Cambridge it is estimated that the weekly output of kerbside waste is 12.48kg/hh/wk.

Table 7.1.2 and Figure 7.1.2 show the proportion of this total waste that is being diverted through the various kerbside recycling collections. Using the blue and green recycling bins, Cambridge residents are diverting an average of 46.8% of all waste generated at the kerbside. Residents from Acorn 1 were managing to divert almost 69% of their waste compared with 50% for Acorns 2 and 3, 42% for Acorn 4 and 32% for Acorn 5. The low performing Acorn 5 area residents also diverted around 50% of their waste with households using communal bins diverting around 34.5%.

Table 7.1.1: Average annual waste generation levels by Acorn (kg/hh/wk)

TOTAL KERBSIDE WASTE (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RESIDUAL WASTE	4.20	4.66	7.93	6.50	9.80	5.06	8.33	6.36
BLUE BIN RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16
GREEN BIN RECYCLING	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96
TOTAL WASTE	14.22	9.59	16.71	12.16	15.17	10.71	14.82	12.48

Figure 7.1.1: Total waste generation levels by Acorn (kg/hh/wk)

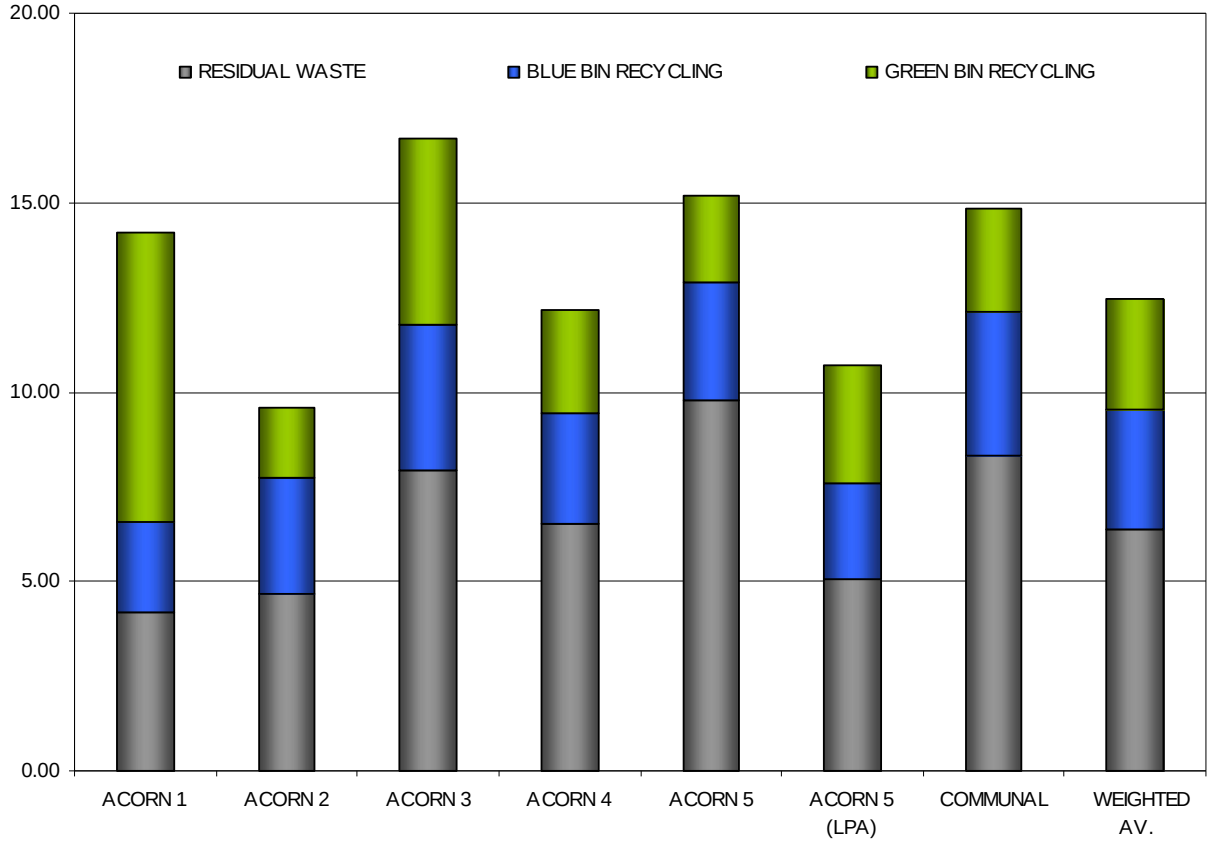
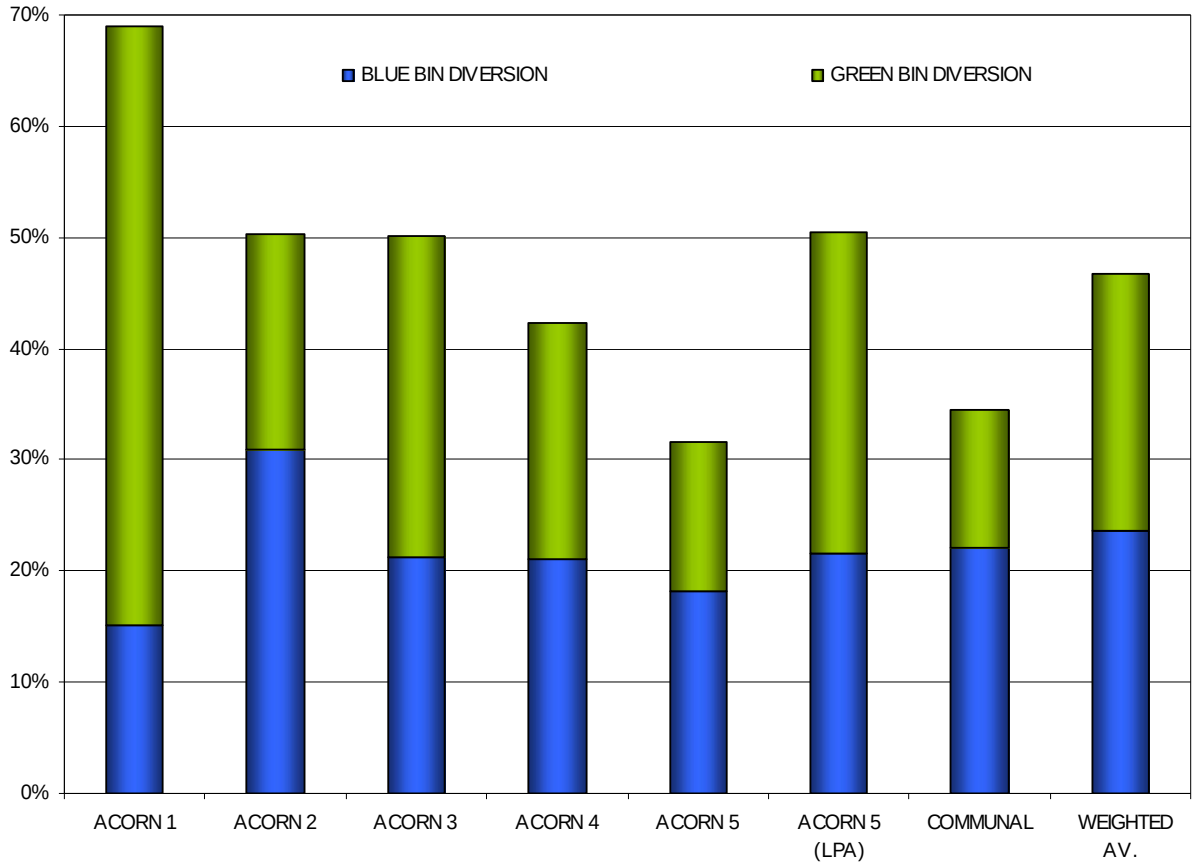


Table 7.1.2: Diversion rates (%) for individual recycling collections and overall

% DIVERSION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE RECYCLING BINS	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%
GREEN RECYCLING BINS	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%
TOTAL DIVERSION	68.96%	50.32%	50.16%	42.27%	31.65%	50.41%	34.46%	46.79%

Figure 7.1.2: Diversion rates (%) for individual recycling collections and overall



Current recycling figures for Cambridge suggest a waste diversion rate of 43.7%. Therefore weighted figures for the City during this survey show a level of around 3% above this rate and 1.8% above the aspirational target of 45% for 2012.

Data from this survey suggests a level of 331.9kg/hh/yr for residual waste and 651.1kg/hh/yr for total kerbside waste.

Were all of the currently recyclable materials being disposed of at the kerbside placed into the correct recycling bin then the maximum achievable diversion rate for Cambridge would be 65%.

Appendix 1: ACORN Category Classification[1].

ACORN 1 – WEALTHY ACHIEVERS – U.K. AVERAGE 23.3%
These are some of the most successful and affluent people in the UK. They live in wealthy, high status rural, semi-rural and suburban areas of the country. Middle-aged or older people predominate, with many empty nesters and wealthy retired. Some neighbourhoods contain large numbers of well-off families with school age children, particularly in the more suburban locations. These people live in large houses, which are usually detached with four or more bedrooms. Almost 90% are owner occupiers, with half of those owning their home outright. They are very well educated and most are employed in managerial and professional occupations. Many own their own business. Car ownership is high, with many households running two or more cars. Incomes are high, as are levels of savings and investments. These people are well established at the top of the social ladder. They enjoy all the advantages of being healthy, wealthy and confident consumers.
ACORN 2 – URBAN PROSPERITY – U.K. AVERAGE 13.3%
These are well educated and mostly prosperous people living in our major towns and cities. They include both older wealthy people living in the most exclusive parts of London and other cities, and highly educated younger professionals moving up the corporate ladder. This category also includes some well educated but less affluent individuals, such as students and graduates in their first jobs. The wealthier people tend to be in senior managerial or professional careers, and often live in large terraced or detached houses with four or more bedrooms. Some of the younger professionals may be buying or renting flats. The less affluent will be privately renting. These people have a cosmopolitan outlook and enjoy their urban lifestyle. They like to eat out in restaurants, go to the theatre and cinema and make the most of the culture and nightlife of the big city.
ACORN 3 – COMFORTABLY OFF – U.K. AVERAGE 28.1%
This category contains much of 'middle-of-the-road' Britain. Most people are comfortably off. They may not be wealthy, but they have few major financial worries. All life stages are represented in this category. Younger singles and couples, just starting out on their careers, are the dominant group in some areas. Other areas have mostly stable families and empty nesters, especially in suburban or semi-rural locations. Comfortably off pensioners, living in retirement areas around the coast or in the countryside, form the other main group in this category. Most people own their own home, with owner occupation exceeding 80%. Most houses are semidetached or detached. Employment is in a mix of professional and managerial, clerical and skilled occupations. Educational qualifications tend to be in line with the national average. This category incorporates the home-owning, stable and fairly comfortable backbone of modern Britain.
ACORN 4 – MODERATE MEANS – U.K. AVERAGE 13.2%
This category contains much of what used to be the country's industrial heartlands. Many people are still employed in traditional, blue-collar occupations. Others have become employed in service and retail jobs as the employment landscape has changed. In the better off areas, incomes are in line with the national average and people have reasonable standards of living. However, in other areas, where levels of qualifications are low, incomes can fall below the national average. There are also some isolated pockets of unemployment and long-term illness. This category also includes some neighbourhoods with very high concentrations of Asian families on low incomes. Most housing is terraced, with two or three bedrooms, and largely owner occupied. It includes many former council houses, bought by their tenants in the 1980s. Overall, the people in this category have modest lifestyles, but are able to get by.
ACORN 5 – HARD PRESSED – U.K. AVERAGE 21.7%
This category contains the poorest areas of the UK. Unemployment is well above the national average. Levels of qualifications are low and those in work are likely to be employed in unskilled occupations. Household incomes are low and there are high levels of long-term illness in some areas. Housing is a mix of low-rise estates, with terraced or semi-detached houses, and purpose built flats, including high-rise blocks. Properties tend to be small and there is much overcrowding. Over 50% of the housing is rented from the local Council or a housing association. There are a large number of single adult households, including many single Pensioners and lone parents. In some neighbourhoods, there are high numbers of black and Asian residents. These people are experiencing the most difficult social and economic conditions in the whole country, and appear to have limited opportunity to improve their circumstances.

[1] http://www.caci.co.uk/download.aspx?path=/libraries/document/394.pdf

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Cambridge City Waste Composition Analysis

Cambridge Council

May / June 2012

FINAL REPORT

Measurement ◆ Evaluation ◆ Learning

Contents Page

1) Project details and acknowledgements

Title	Cambridge City Waste Composition Analysis.
Client	Cambridge City
Project number	12012
Client reference	Final Report_Version_1
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Measurement Evaluation Learning

2) Introduction

Background

Cambridge City Council currently has a combined recycling and composting rate of 43.7% (2010/11). The Authority now wishes to study the composition of domestic kerbside collected residual and recycling waste streams to provide current baseline data and to help inform future communication campaigns. As well as giving indications as to the current levels of waste and recycling being generated, observations will be made showing the levels of materials that are currently recyclable at the kerbside and those which could potentially be recyclable via future schemes. The Council hopes to achieve 45% by the end of 2012 with a future target for 2015-16 of 50-55%.

This report presents results from the analysis of kerbside collected residual and recycling waste collected during a two week period in May / June 2012. The survey focused on the levels and composition of all waste containers that are currently available for residents to place for collection at the kerbside. The sampling regime involved the direct collection and compositional analysis of residual waste from a target of 300 properties representing each of the five main socio-demographic categories (Acorns). Results could therefore be weighted to give an even better picture of the waste being collected by the authority as a whole. Additionally around 120 properties were highlighted from a low performing area and a group of properties using communal bins. Knowledge of the waste in these differing areas will help the City Council develop strategies to increase the efficiency with which its residents are recycling their waste. The overall findings of this project will highlight several factors important for improving the recycling rate and directing future strategy and communication campaigns:

Objectives

Specific aims of the work were to:

- Understand, using socio-demographic profiling which sectors of the community are producing which types of waste and which are using the recycling provision most effectively
- Detect capture rates for individual materials which are already collected separately for recycling
- Evaluate the amount of specific materials collected in the residual bin that could potentially be collected separately for recycling
- Evaluate the use of the receptacles used for collecting waste and recycling
- Detect the amount of packaging and biodegradable material present
- Assess the amount of contamination in receptacles meant for recycling material
- Assess the amount of recyclable material being placed in the residual bin

This report will highlight key results recorded for Cambridge City showing data for individual socio-demographics as well as weighted for the City as a whole.

Acknowledgements

M·E·L Research would like to thank the collection authority and their staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results, presents the results in tables and charts and discusses the findings. The views and opinions expressed in this report are those of M.E.L Research Ltd. and are not necessarily shared by officers from Cambridge City Council.

Accuracy Statement

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

3) Executive Summary

Key findings

Kerbside residual waste

- Weighted across all Acorn samples, 84% of households sampled throughout Cambridge presented residual waste bins for collection.
- In terms of waste generation, households were setting out an average of 6.36kg/hh/wk.
- Food waste was seen to be the major component of residual waste forming 20.6% of the total, equating to 1.31kg/hh/wk – 45% of this is potentially home compostable
- Paper items made up 10.2% of the residual waste; 53% of this (0.35kg/hh/wk) was alternatively recyclable at the kerbside.
- Card and cardboard made up around 3.5% of collected residual waste; 84% of this (0.18kg/hh/wk) was alternatively recyclable at the kerbside.
- Plastics formed 14.9% of the residual waste; 10% of dense plastic waste (0.05kg/hh/wk) was due to recyclable plastic bottles with a further 0.21kg/hh/wk formed from the types of plastic containers that will be recyclable from July 2012.
- Just under 3% of residual waste was metallic; 53% of this (0.09kg/hh/wk) was recyclable in blue bins.
- Around 3% of residual waste was seen to be glass; 94% of this (0.16kg/hh/wk) was recyclable in blue bins.
- Over 6% of residual waste was due to textiles; 53% of these items (0.21kg/hh/wk) were seen to consist of reusable clothing and shoes
- Just under 1.6% of residual waste was deemed to be either Hazardous or WEEE. An additional 17% consisted of disposable nappies
- Just over 1.3% of residual waste was found to be garden waste. Around 17% of this was non-recyclable soil and turf, with the remainder consisting of recyclable garden trimmings
- Overall just over 13% of collected residual waste could have been placed into the blue recycling containers available– the equivalent of 0.84kg/hh/wk.
- Just under 22% of collected residual waste could have been placed into the green recycling containers available– the equivalent of 1.40kg/hh/wk.
- In total over 35% of residual waste collected could have been recycled alternatively at the kerbside – 2.23kg/hh/wk.
- Around 59% of potentially recyclable materials consisted of food waste with 15% being paper and 8% being card and cardboard.
- Residual waste collected from Cambridge households was deemed to be around 51% biodegradable.
- Collected waste had a packaging content of 17%.

Mixed recycling – Blue bins

- Over the survey, 78% of households presented blue bins for collection
- In terms of waste generation, kerbside households were setting out an average of 3.16kg/hh/wk in their blue bins.
- Overall 6.4% of blue bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.20kg/hh/wk.
- Around 77% of paper, 87% of recyclable glass, 73% of card and cardboard, 78% of plastic bottles and 59% of the recyclable metals available for mixed recycling were correctly captured.
- Kerbside properties diverted around 23.7% of their waste through their blue bins.

Organic waste recycling – Green bins

- Over the survey, 58% of households opted to present their green organic recycling bins at the kerbside for collection.
- In terms of waste generation, households were setting out an average of 2.96kg/hh/wk at the kerbside.
- Overall 2.6% of green bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.08kg/hh/wk.
- Green bins collected from households on a communal service had very high contamination levels of 31.3%. Bins had significant levels of residual waste and also large amounts of paper and cardboard.
- The majority of contamination of green bin waste was due to general residual materials; forming 69% of the contamination. Up to 23% of contamination was due to textiles.
- 21% of food waste and 97% of garden waste was correctly captured by households using the scheme.
- Properties on the green bin collection scheme diverted an average of around 23.1% of their waste through these collections.
- When combined with the diversion through mixed recycling collections, Cambridge households are diverting around 46.8% (5.84kg/hh/wk) of their total waste (12.48kg/hh/wk) through recycling collections.

4) Compositional Analysis of Residual Waste

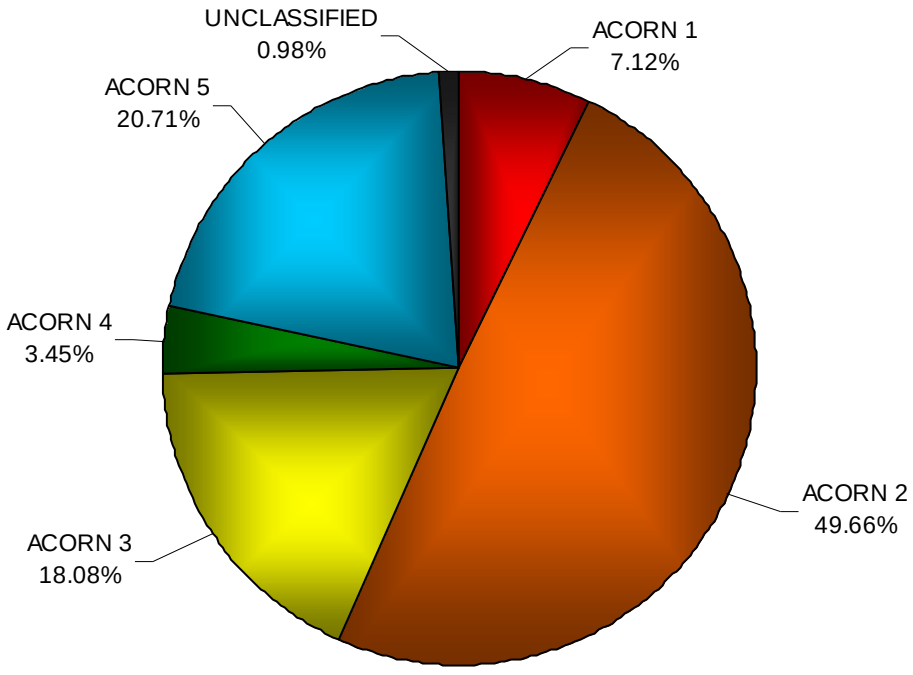
4.1 Set out rates and waste generation levels

Table 4.1.2 and Figure 4.1.2 highlight the average set out rates for residual waste observed at the time waste was collected for compositional analysis. Table 4.1.3 and Figure 4.1.3 show the average amount of residual waste generated in kg/hh/wk. Around 60 households were selected for each sample from each Acorn category with the set out relating to the proportion of these households actively placing out their waste. The amount of waste in kilograms per household per week is collected from each sample of 60 households, not just those that are participating. Results are shown by Acorn; as all five Acorn categories were sampled it was possible to weight the results according to the socio-demographic profile for Cambridge as per Table 4.1.1. A table giving a brief description of the types of households typical for each Acorn category is shown in the appendix section.

Table 4.1.1: Acorn profile for Cambridge

ACORN	% SET OUT
1	7.12%
2	49.66%
3	18.08%
4	3.45%
5	20.71%
UNCLASSIFIED	0.98%
TOTAL	100%

Figure 4.1.1: Acorn profile for Cambridge



Observed set out rates for residual waste ranged between 71% in the low performing Acorn 5 area (LPA) to 95% in Acorn 3. On average 84% of households in Cambridge are projected to be setting out their residual waste for collection.

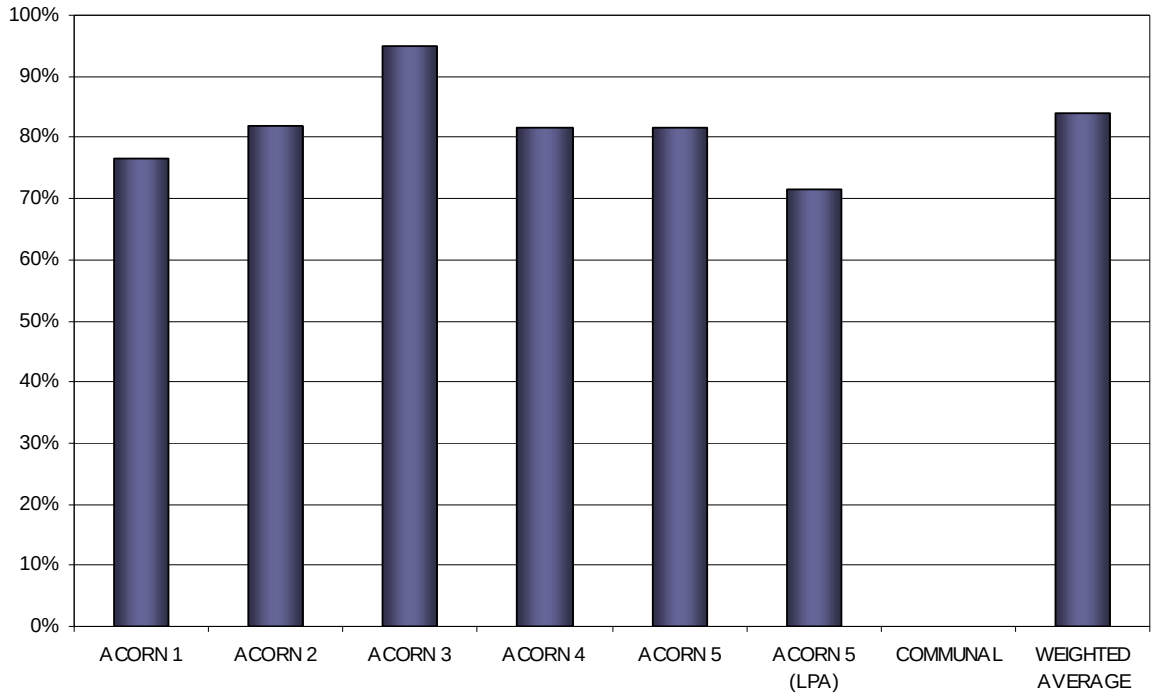
Table 4.1.2: Kerbside residual waste set out rates for each Acorn sample

ACORN	% SET OUT
1	77%
2	82%
3	95%
4	82%
5	82%
5 (LPA)*	71%
COMMUNAL	N/A**
WEIGHTED AVERAGE	84%

***Acorn 5 Low Performing Area**

**** Do not have their own bin so set out is not applicable**

Figure 4.1.2: Kerbside residual waste set out rates by Acorn (%)

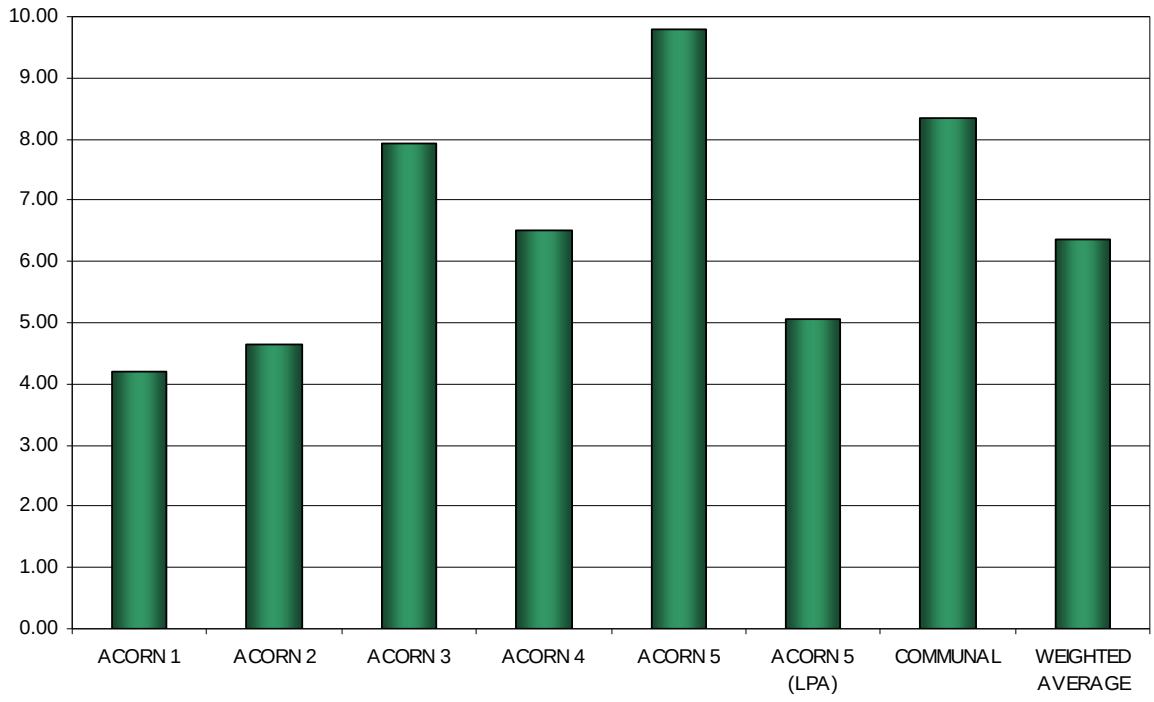


From observed results, the level of residual waste being disposed of at the kerbside ranged between 4.20kg/hh/wk in Acorn 1 to 9.80kg/hh/wk in Acorn 5. On average 6.36kg/hh/wk of residual waste is being disposed of by households throughout Cambridge.

Table 4.1.3: Kerbside residual waste generation rates for each Acorn sample (kg/hh/wk)

ACORN	KG/HH/WK
1	4.20
2	4.66
3	7.93
4	6.50
5	9.80
5 (LPA)	5.06
COMMUNAL	8.33
WEIGHTED AVERAGE	6.36

Figure 4.1.3: Average residual waste generation rates by Acorn (kg/hh/wk)



4.2 Compositional analysis of household residual waste

This section looks at the average amount and composition of the residual waste presented by various socio-demographic households sampled throughout the City. Hand sorting of the residual waste gave concentration by weight figures for the fifteen 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).

By knowing the composition of waste from the various Acorn samples it is possible to gain an insight into the make-up and volumes of the residual waste that can be expected from the City as a whole. Additional information on the selected lower performing and communal bins areas can also be gained. Detailed residual composition tables can be found in a separate data appendix.

Table 4.2.1 and Figure 4.2.1 show residual waste data in terms of percentage composition with Table 4.2.2 and Figure 4.2.2 showing generation rates for major materials in terms of kg/hh/wk. All residual waste will contain a proportion that is classified as potentially recyclable. That is to say that is should have been placed into one of the recycling receptacles supplied by the Council.

Table 4.2.1: Average residual waste composition weighted by Acorn (%)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	13.84%	11.35%	8.51%	7.78%	9.78%	5.93%	6.74%	10.19%
CARD & CARDBOARD	5.01%	3.32%	3.11%	2.57%	3.71%	1.92%	2.77%	3.45%
PLASTIC FILM	5.36%	7.98%	6.54%	4.06%	6.07%	8.81%	5.45%	6.77%
DENSE PLASTIC	10.76%	8.28%	12.09%	6.64%	4.78%	9.45%	5.83%	8.08%
TEXTILES	1.00%	6.24%	5.48%	7.74%	7.24%	3.66%	5.71%	6.19%
MISC COMBUSTIBLES	22.52%	16.70%	28.71%	17.69%	33.61%	30.14%	35.67%	25.19%
MISC NON-COMBUSTIBLES	12.58%	7.20%	11.17%	5.22%	11.50%	0.71%	0.34%	9.67%
GLASS	1.01%	4.13%	2.48%	2.21%	1.70%	4.42%	4.59%	2.75%
FERROUS METAL	5.19%	1.92%	2.02%	2.96%	2.06%	1.03%	2.48%	2.18%
NON-FERROUS METAL	0.57%	0.78%	0.53%	0.43%	0.55%	0.83%	0.74%	0.63%
GARDEN WASTE	2.49%	2.34%	0.52%	4.26%	0.31%	4.02%	1.57%	1.35%
PUTRESCIBLES	16.52%	28.37%	16.20%	32.97%	17.10%	28.45%	24.13%	21.57%
FINES	0.52%	0.00%	0.00%	1.22%	0.93%	0.20%	0.97%	0.37%
HHW	1.47%	0.30%	1.33%	0.00%	0.00%	0.03%	0.10%	0.48%
WEEE	1.17%	1.10%	1.32%	4.27%	0.67%	0.41%	2.91%	1.13%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
BLUE BIN RECYCLABLE	**17.47%**	**15.67%**	**11.43%**	**10.41%**	**11.16%**	**11.48%**	**14.01%**	**13.15%**
GREEN BIN RECYCLABLE	**18.94%**	**29.72%**	**15.72%**	**32.64%**	**16.78%**	**31.01%**	**23.21%**	**21.95%**
TOTAL RECYCLABLE	**36.41%**	**45.39%**	**27.15%**	**43.05%**	**27.94%**	**42.50%**	**37.21%**	**35.11%**

Table 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
DENSE PLASTIC	0.45	0.39	0.96	0.43	0.47	0.48	0.49	0.51
TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
MISC COMBUSTIBLES	0.95	0.78	2.28	1.15	3.29	1.52	2.97	1.60
MISC NON-COMBUSTIBLES	0.53	0.34	0.89	0.34	1.13	0.04	0.03	0.62
GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
FERROUS METAL	0.22	0.09	0.16	0.19	0.20	0.05	0.21	0.14
NON-FERROUS METAL	0.02	0.04	0.04	0.03	0.05	0.04	0.06	0.04
GARDEN WASTE	0.10	0.11	0.04	0.28	0.03	0.20	0.13	0.09
PUTRESCIBLES	0.69	1.32	1.28	2.14	1.68	1.44	2.01	1.37
FINES	0.02	0.00	0.00	0.08	0.09	0.01	0.08	0.02
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	**4.20**	**4.66**	**7.93**	**6.50**	**9.80**	**5.06**	**8.33**	**6.36**
BLUE BIN RECYCLABLE	**0.73**	**0.73**	**0.91**	**0.68**	**1.09**	**0.58**	**1.17**	**0.84**
GREEN BIN RECYCLABLE	**0.80**	**1.38**	**1.25**	**2.12**	**1.64**	**1.57**	**1.93**	**1.40**
TOTAL RECYCLABLE	**1.53**	**2.11**	**2.15**	**2.80**	**2.74**	**2.15**	**3.10**	**2.23**

Figure 4.2.1: Average residual waste composition weighted by Acorn (%)

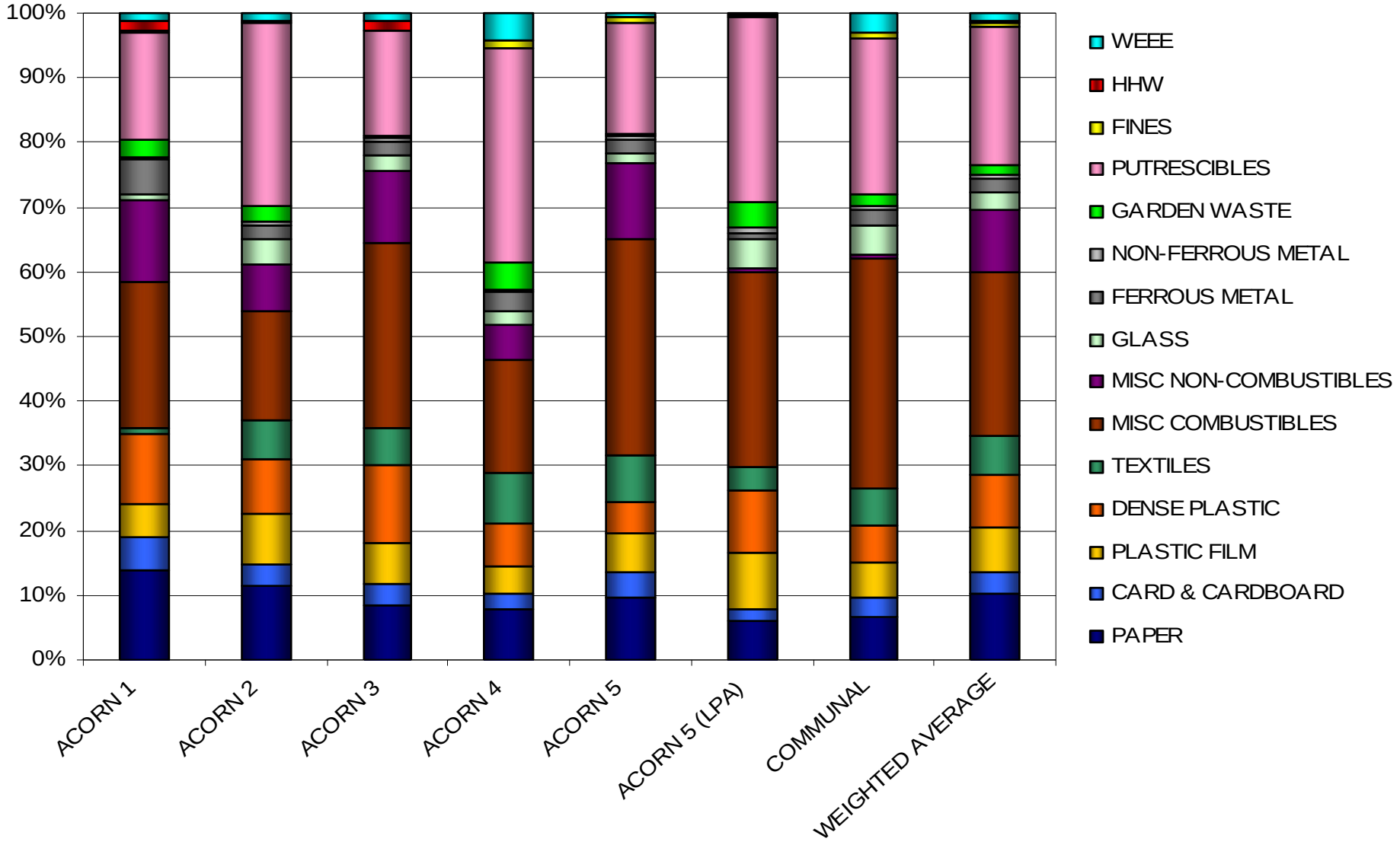
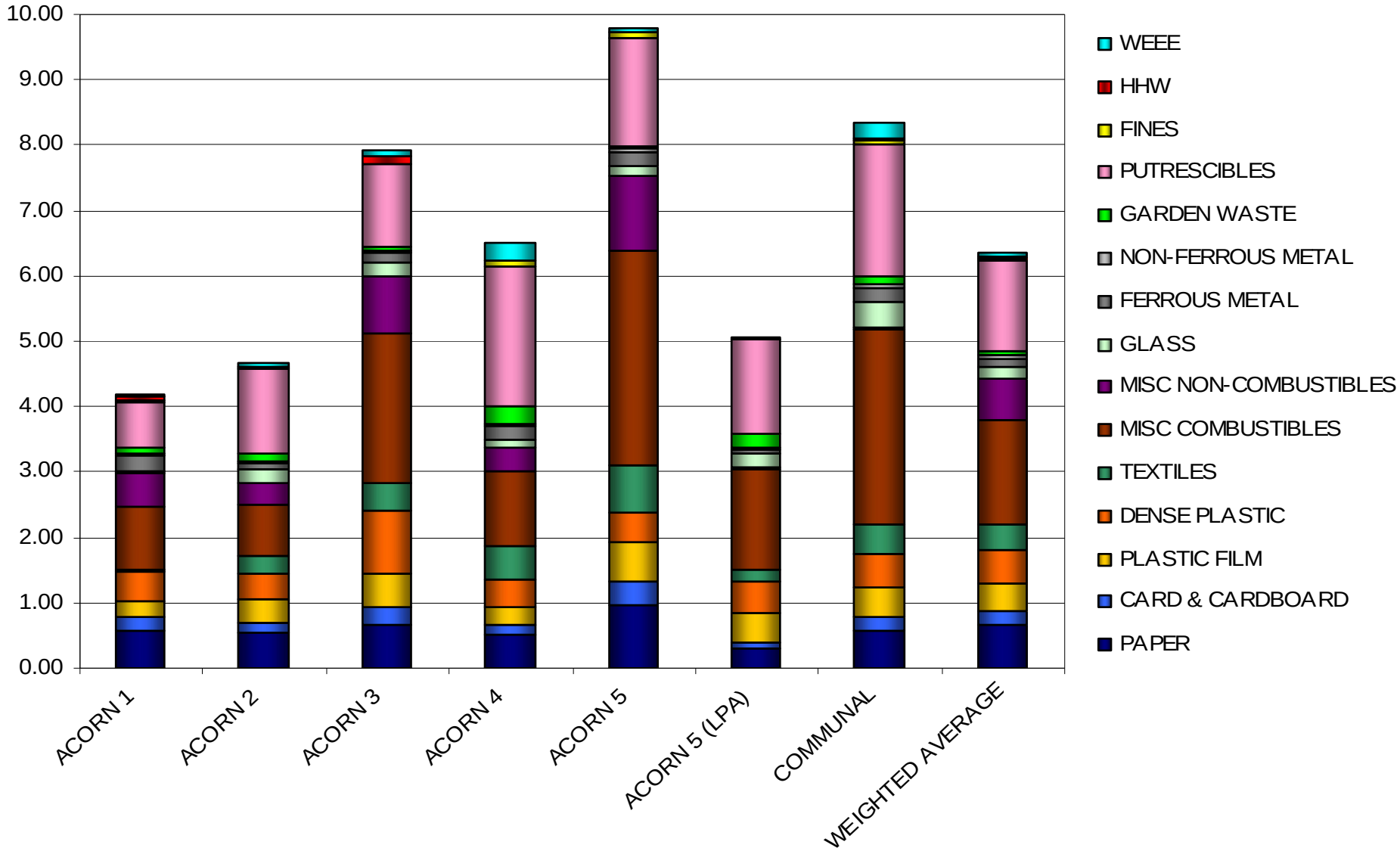


Figure 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)



4.2.1 Organic Waste

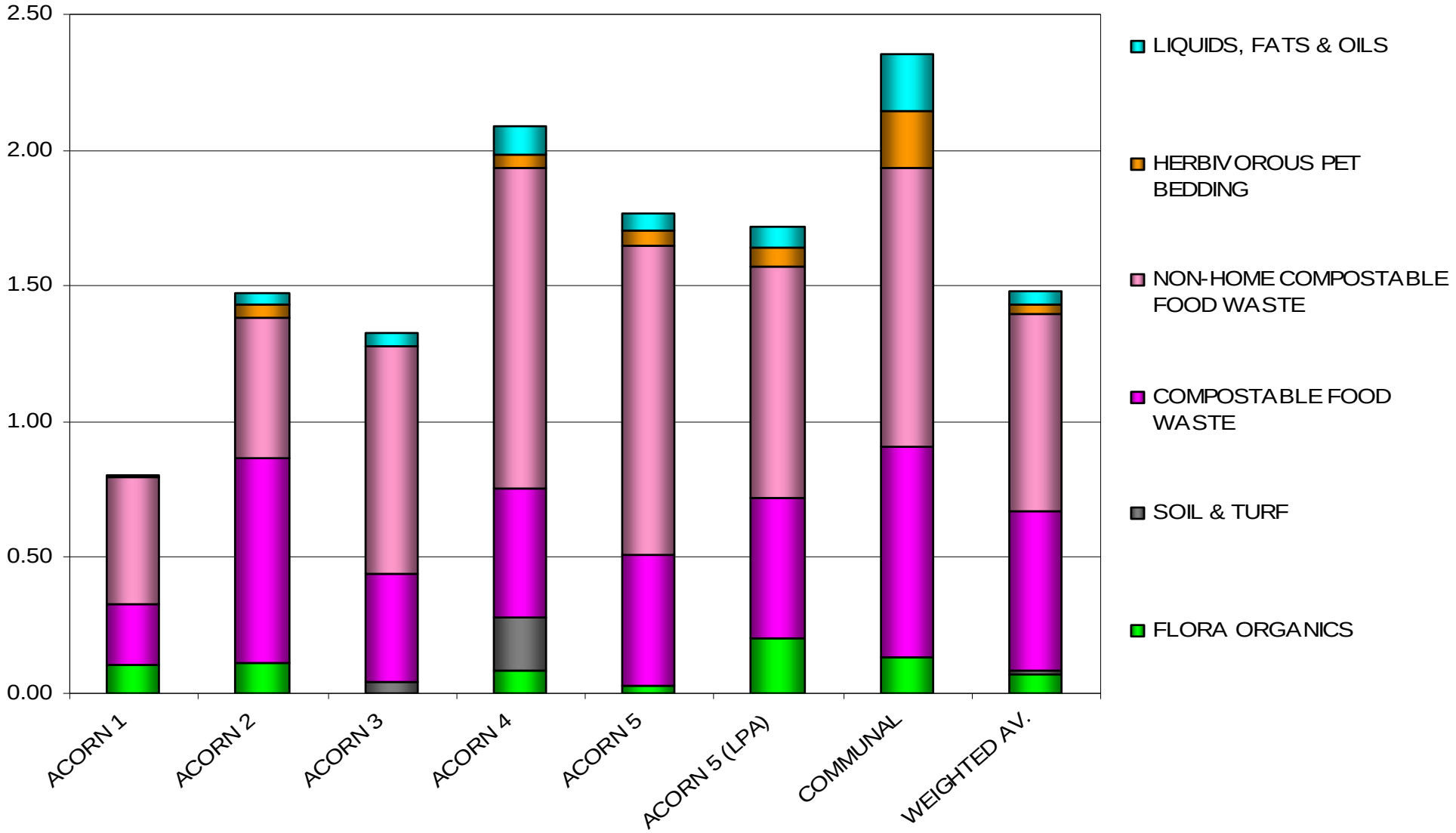
Organic waste, which includes garden and food waste (putrescibles), formed the greatest weight concentration of the primary waste categories for all Acorns. Ranges seen were from 16.7% from Acorn 3 households to 33.9% in Acorn 5 (LPA) households. Across the City as a whole around 23.3% of all residual waste (1.48kg/hh/wk) is classified as organic waste. Food waste accounted for between 15.6% (Acorn 3) and 27.4% (Acorn 2) of residual waste. Across the City as a whole around 20.6% of all residual waste (1.31kg/hh/wk) is classified as food waste. Currently Cambridge residents are able to recycle food waste at the kerbside using their green bin collection. Residents from Acorn 3 placed the most recyclable food into their residual bins at 2.81kg/hh/wk. Overall approximately 45% of this food waste (0.58kg/hh/wk) is potentially compostable in a general garden compost bin.

Residents throughout Cambridge can also utilise their green bins for the collection of general garden waste. In Acorns 3 and 5 levels of garden waste in residual bins were very low at 0.5% and 0.3% respectively. This equated to less than 0.05kg/hh/wk in total. In contrast the residual waste from Acorn 4 and Acorn 5(LPA) was over 4% garden waste; the equivalent of 0.28kg/hh/wk and 0.20kg/hh/wk respectively. Averaged for Cambridge it is seen that 17% of this garden waste consisted of soil and turf which is discouraged from the recycling collection. Across the City, recyclable forms of garden waste (i.e. garden clippings but not soil and turf) are responsible for an average of just 1.1%, or 0.07kg/hh/wk of residual waste. Table 4.2.1.1 and Figure 4.2.1.1 show the amounts of the different forms of organic waste found within the samples from each sample.

Table 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL ORGANICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
FLORA ORGANICS	0.10	0.11	0.00	0.08	0.03	0.20	0.13	0.07
SOIL & TURF	0.00	0.00	0.04	0.19	0.00	0.00	0.00	0.01
COMPOSTABLE FOOD WASTE	0.22	0.75	0.40	0.47	0.48	0.52	0.78	0.58
NON-HOME COMPOSTABLE FOOD WASTE	0.47	0.52	0.84	1.19	1.14	0.85	1.02	0.73
HERBIVOROUS PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	0.21	0.04
LIQUIDS, FATS & OILS	0.00	0.05	0.05	0.10	0.06	0.07	0.21	0.05
KG/HH/WK ORGANICS	0.80	1.48	1.33	2.09	1.77	1.72	2.35	1.48
% ORGANICS	19.08%	31.71%	16.71%	32.09%	18.06%	33.92%	28.22%	23.31%
KG/HH/WK FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	1.80	1.31
% FOOD WASTE	16.45%	27.37%	15.57%	25.53%	16.47%	27.00%	21.61%	20.59%

Figure 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)



4.2.2 Paper

On average, Acorn 1 residents had the highest concentrations of this type of waste (13.8%), with Acorn 5 disposing of the most at 0.96kg/hh/wk. In comparison just 5.9% (0.30kg/hh/wk) of residual waste from Acorn 5(LPA) was due to paper based materials. Across the City it was seen that around 10.2% or 0.65kg/hh/wk of residual waste consisted of discarded paper.

A proportion of this paper is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling higher grade white paper such as newspapers, junk mail, envelopes and directories. In addition to this higher grade paper, Cambridge residents are able to place shredded paper into their green organics bin. It was found that between 50.5% (Acorn 3 and Acorn 5(LPA) and 74.8% (Acorn 1) of paper could have been placed in either the blue or green bins as opposed to the residual bin.

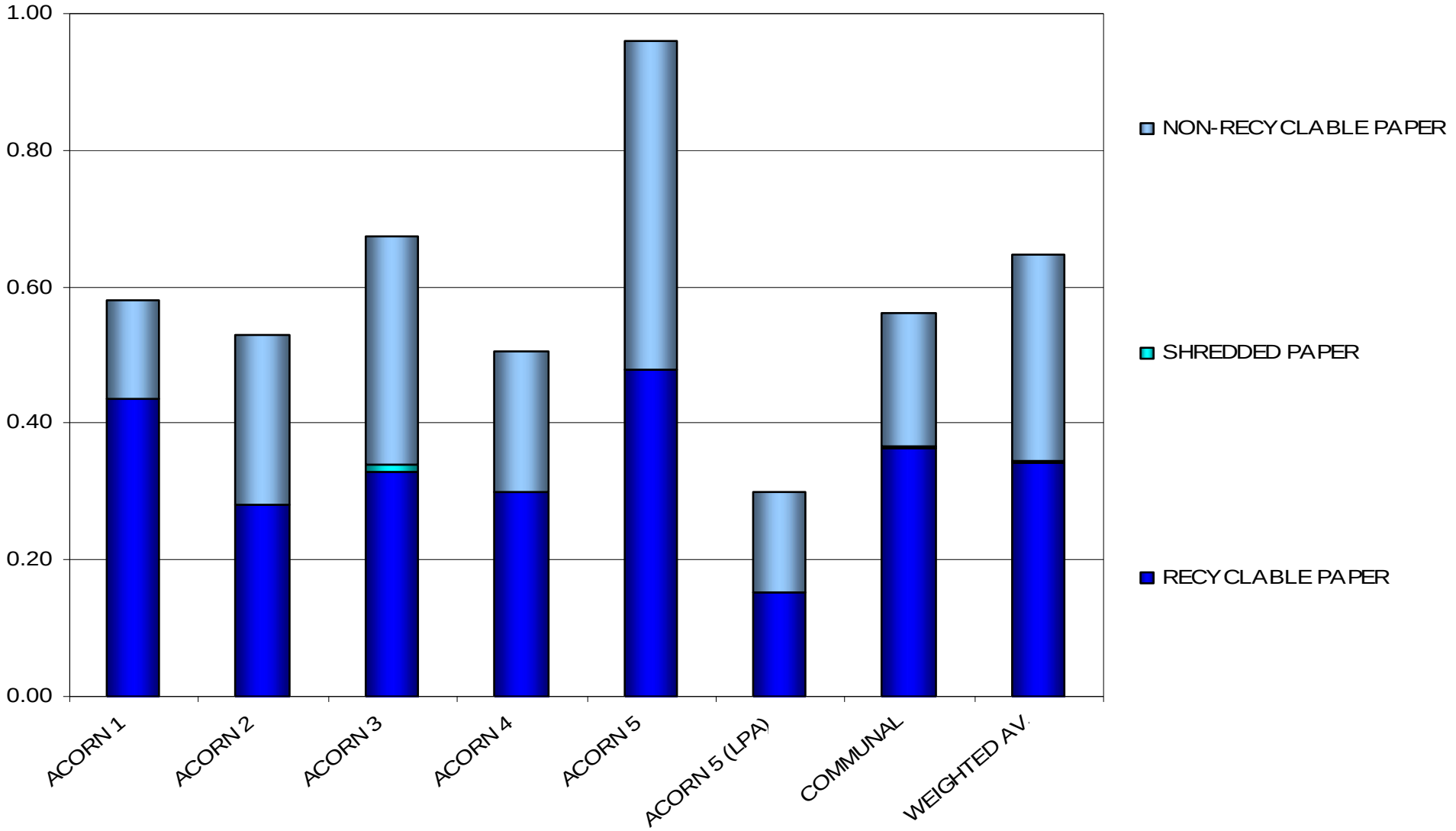
When accounting for all of the various types of paper within the residual waste, it is seen that 53.3% of residual paper was recyclable which accounted for 5.4% of all the residual waste or 0.35kg/hh/wk.

Table 4.2.2.1 and Figure 4.2.2.1 show the amounts of the different forms of paper waste for each Acorn.

Table 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PAPER	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.33	0.30	0.48	0.15	0.36	0.34
SHREDDED PAPER	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER	0.15	0.25	0.33	0.21	0.48	0.15	0.20	0.30
KG/HH/WK TOTAL PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
KG/HH/WK RECYCLABLE PAPER	0.43	0.28	0.34	0.30	0.48	0.15	0.37	0.35
% PAPER RECYCLABLE	74.77%	53.37%	50.52%	59.17%	49.83%	50.52%	65.29%	53.27%

Figure 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)



4.2.3 Card & Cardboard

On average, Acorn 1 residents had the highest concentrations of this type of waste (5%), with Acorn 5 disposing of the most at 0.36kg/hh/wk. In comparison just 1.9% (0.10kg/hh/wk) of residual waste from Acorn 5(LPA) was due to card and cardboard based materials. Across the City it was seen that around 3.5% or 0.22kg/hh/wk of residual waste consisted of discarded card and cardboard.

A proportion of this card & cardboard is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling thin card, corrugated cardboard and drinks cartons. It was found that between 65% (Acorn 1) and 94% (Acorn 5-LPA) of card and cardboard could have been placed in the blue bin as opposed to the residual bin. Across Cambridge, 84% of residual card and cardboard was compatible with recycling collections which accounted for 2.9% of all the residual waste or 0.18kg/hh/wk.

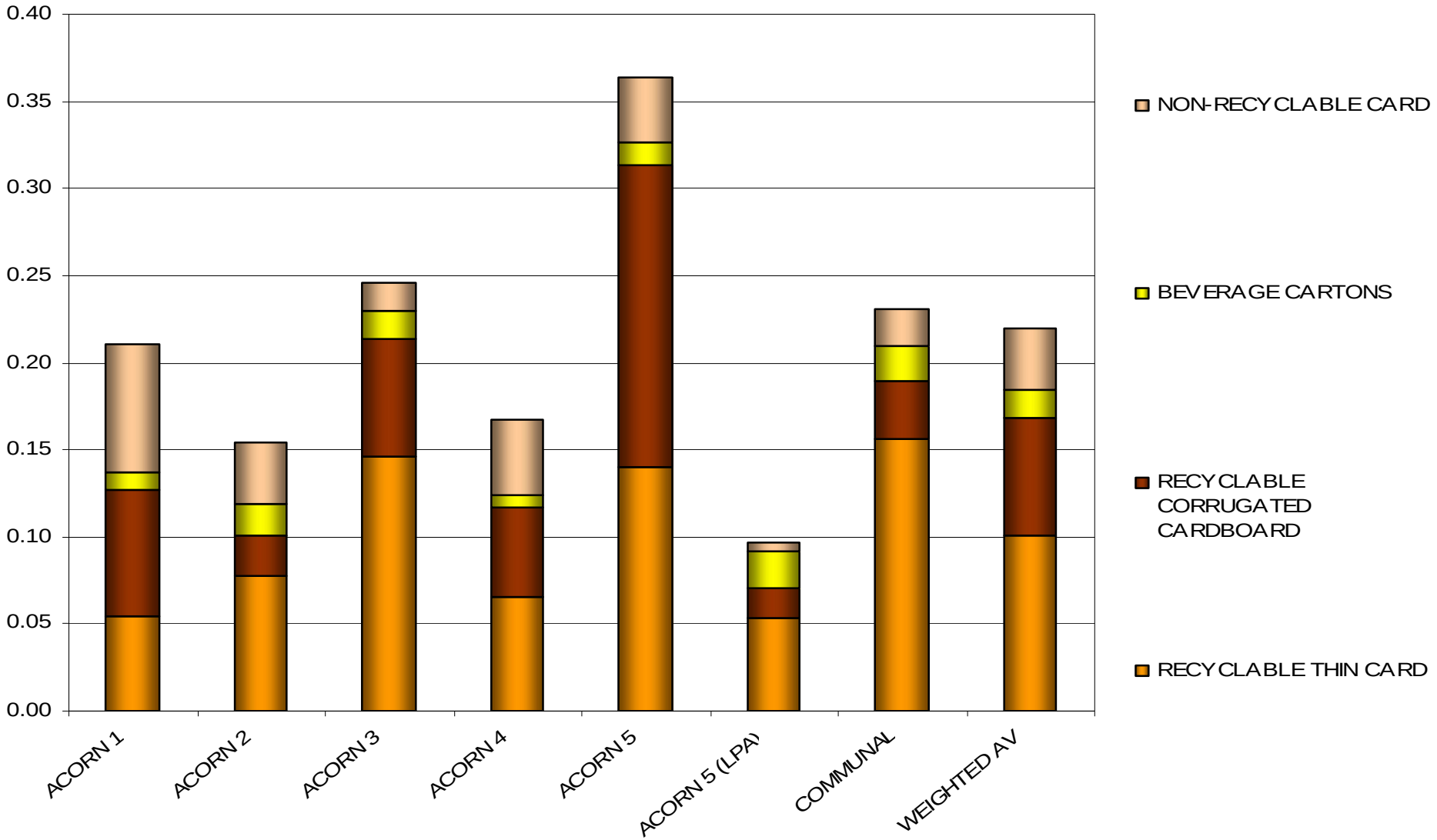
Table 4.2.3.1 and Figure 4.2.3.1 show the amounts of the different forms of card and cardboard waste for each Acorn.

When combining paper and card together it is estimated that 61% of that present in residual bins could have been recycled via kerbside recycling collections. This amounts to 8.3% of all the residual waste being collected – a total of 0.53kg/hh/wk.

Table 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL CARD	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE THIN CARD	0.05	0.08	0.15	0.07	0.14	0.05	0.16	0.10
RECYCLABLE CORRUGATED CARDBOARD	0.07	0.02	0.07	0.05	0.17	0.02	0.03	0.07
BEVERAGE CARTONS	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE CARD	0.07	0.04	0.02	0.04	0.04	0.01	0.02	0.04
KG/HH/WK TOTAL CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
KG/HH/WK RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	0.33	0.09	0.21	0.18
% CARD KERBSIDE RECYCLABLE	65.22%	77.15%	93.19%	74.50%	89.79%	94.04%	90.71%	83.93%

Figure 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)



4.2.4 Plastics

As a UK average approximately 12% of the waste disposed of by households is plastic. In this sampling campaign average ranges seen were 10.7% total plastic by weight from Acorn 4 households to 18.6% in the waste from Acorn 3 households. Cambridge residents currently recycle plastic bottles as part of their blue bin collections. Across the City as a whole, 14.9% of residual waste was classified as plastic which equates to 0.94kg/hh/wk. On the whole plastic waste, although not heavy in itself, can produce large volumes of waste.

Figure 4.2.4.1 clearly shows the levels of recyclable plastic bottles within the plastic portion of the residual waste. On average, around 46% of this plastic waste present in the residual was due to plastic film with the remainder being dense plastic. Up to 9.9% of residual dense plastic consisted of plastic bottles meaning that just 0.8% of residual waste (0.05kg/hh/wk) collected throughout Cambridge was made up of plastic bottles that could have been recycled. Up to 0.13kg/hh/wk of plastic bottles were seen in communal bins representing over a quarter of all the dense plastic present.

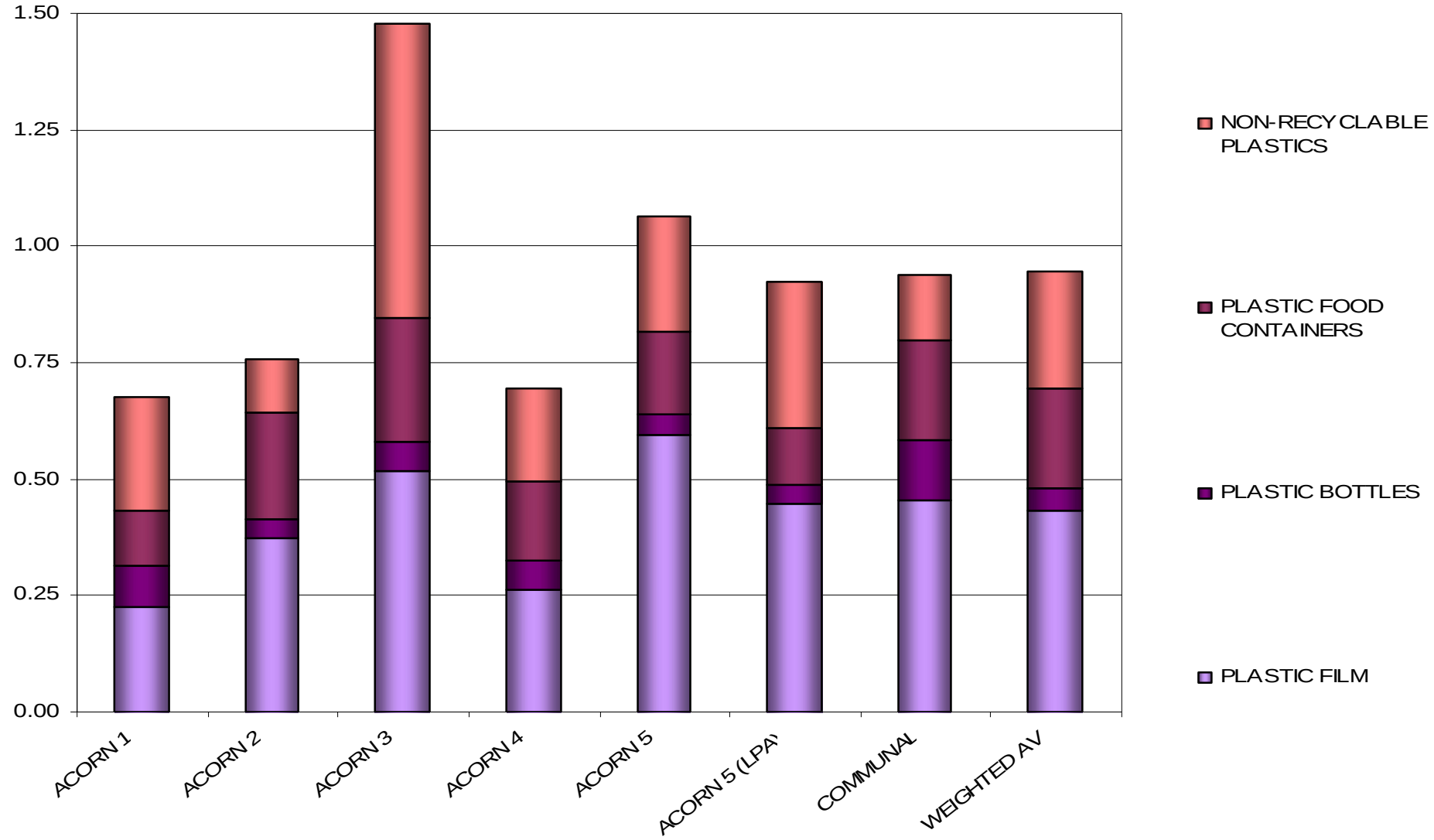
From July 2012 Cambridge households will be able to recycle plastic food containers in addition to plastic bottles. On average these formed 3.4% of the total residual waste equating to 0.21kg/hh/wk. This means that 0.27kg/hh/wk or 4.2% of the residual waste is due to recyclable plastic bottles and containers.

Table 4.2.4.1 and Figure 4.2.4.1 show the amounts of the different forms of plastic waste found within the residual samples from each Acorn.

Table 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PLASTICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	0.13	0.05
PLASTIC FOOD CONTAINERS	0.12	0.23	0.27	0.17	0.18	0.12	0.22	0.21
NON-RECYCLABLE PLASTICS	0.25	0.11	0.63	0.20	0.24	0.31	0.14	0.25
KG/HH/WK TOTAL PLASTIC	0.68	0.76	1.48	0.70	1.06	0.92	0.94	0.94
% DENSE PLASTIC RECYCLABLE	19.39%	11.04%	6.41%	14.22%	9.84%	9.18%	26.63%	9.85%

Figure 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)



4.2.5 Metals

In this sampling campaign average concentrations of residual metals were seen to be 1.9% total metal by weight from Acorn 5(LPA) households to 5.8% in the waste from Acorn 1 households, averaging 2.8% overall. Cambridge residents have access to a recycling collection of food and drink cans as well as empty aerosols and clean foil via their blue bin service. The average weight of metals in the residual waste from Acorn 5(LPA) was 0.09kg/hh/wk rising to 0.27kg/hh/wk in communal bins.

A proportion of this metal waste is available for recycling at the kerbside relative to the blue bin collection. It was found that just 13% of Acorn 1 metals were recyclable rising to 77% for the metals in Acorn 5(LPA) residual waste. Across the City an average of 52.5% or 0.09kg/hh/wk of residual metal is classified as recyclable, this equates to 1.5% of all collected residual waste.

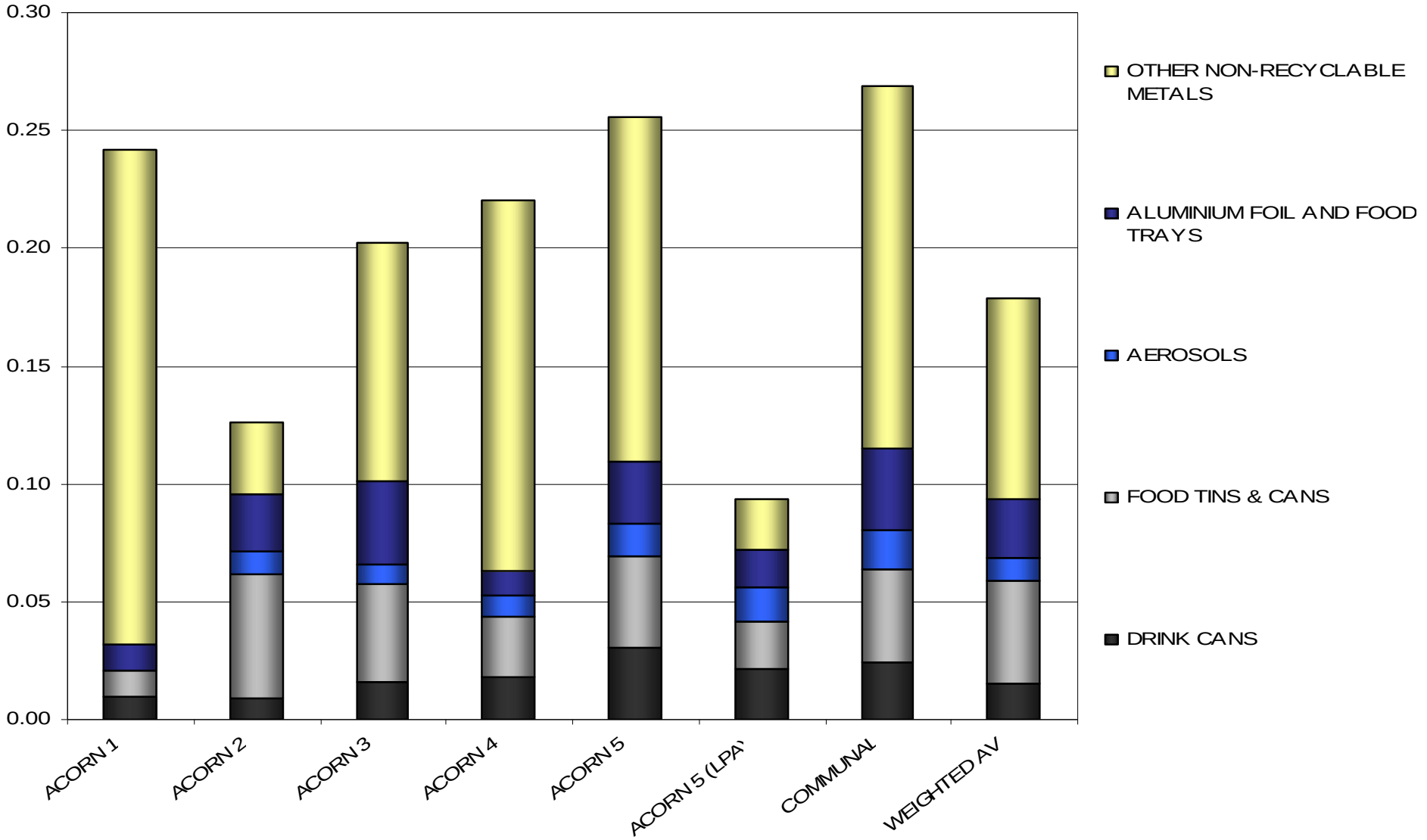
On the whole 78% of metals were ferrous accounting for 0.14kg/hh/wk with non-ferrous metals contributing 0.04kg/hh/wk. The majority of metallic waste present in all samples was seen to be ferrous.

Table 4.2.5.1 and Figure 4.2.5.1 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 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)

RESIDUAL METALS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
DRINK CANS	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01
FOOD TINS & CANS	0.01	0.05	0.04	0.03	0.04	0.02	0.04	0.04
AEROSOLS	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01
ALUMINIUM FOIL AND FOOD TRAYS	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.03
OTHER NON-RECYCLABLE METALS	0.21	0.03	0.10	0.16	0.15	0.02	0.15	0.08
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	0.12	0.09
TOTAL METALS	0.24	0.13	0.20	0.22	0.26	0.09	0.27	0.18
% FERROUS	90.16%	71.00%	79.19%	87.30%	78.93%	55.42%	77.02%	77.64%
% RECYCLABLE	13.31%	76.02%	49.78%	28.45%	42.69%	77.11%	42.82%	52.46%

Figure 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)



4.2.6 Glass

In this sampling campaign the average concentration of residual glass was seen to be 1% total glass by weight from Acorn 1 households rising to 4.6% in the waste from communal bins. Cambridge residents are able to recycle glass bottles and jars at the kerbside using their blue bin service. The weight of glass in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.38kg/hh/wk in communal bins. This represented a City wide average of 2.8% or 0.18kg/hh/wk.

A proportion of this glass consists of bottles and jars which could have been recycled at the kerbside. It was found that across Cambridge an average of 94% or 0.16kg/hh/wk of residual glass is classified as recyclable, this equates to 2.6% of all collected residual waste.

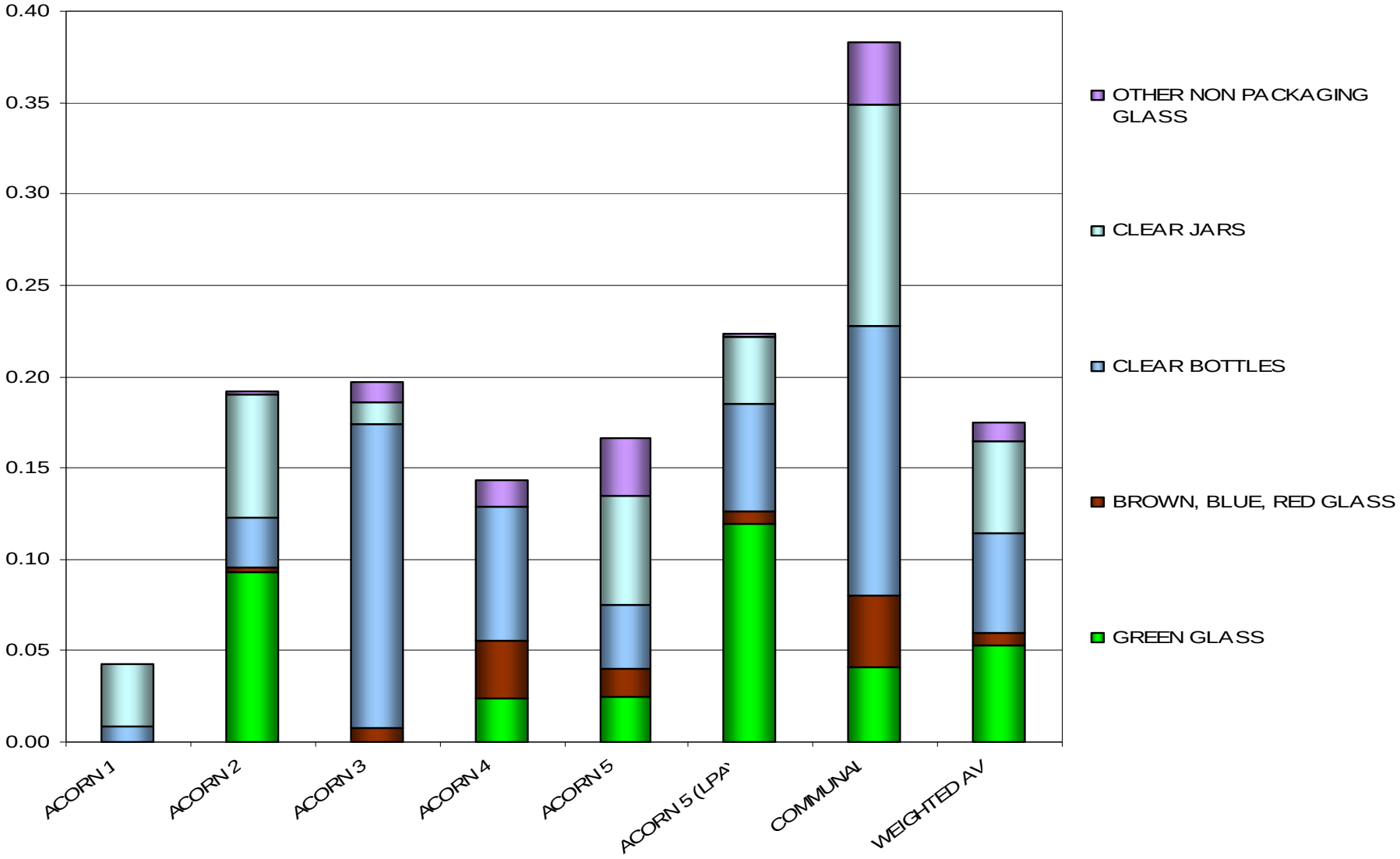
In most samples the majority of recyclable glass was seen to be higher grade clear glass, across Cambridge 64% of recyclable glass was clear, accounting for 0.11kg/hh/wk of residual waste. Around 52% of the clear glass was due to jars as opposed to bottles.

Table 4.2.6.1 and Figure 4.2.6.1 show the amounts of the different forms of glass waste found within the samples from each Acorn.

Table 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)

RESIDUAL GLASS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
GREEN GLASS	0.00	0.09	0.00	0.02	0.02	0.12	0.04	0.05
BROWN, BLUE, RED GLASS	0.00	0.00	0.01	0.03	0.02	0.01	0.04	0.01
CLEAR BOTTLES	0.01	0.03	0.17	0.07	0.03	0.06	0.15	0.05
CLEAR JARS	0.03	0.07	0.01	0.00	0.06	0.04	0.12	0.05
OTHER NON PACKAGING GLASS	0.00	0.00	0.01	0.01	0.03	0.00	0.03	0.01
KG/HH/WK TOTAL GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
KG/HH/WK RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	0.35	0.16
% RECYCLABLE	100%	98.99%	94.36%	89.99%	80.74%	99.24%	91.15%	94.17%
% OF RECYCLABLE GLASS - CLEAR	100%	49.56%	95.85%	57.08%	70.33%	42.98%	76.93%	63.76%

Figure 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)



4.2.7 Textiles

The concentration of residual textile waste was seen to be 1% textiles from Acorn 1 households to 7.7% in the waste from Acorn 4 households. Cambridge residents are currently not able to recycle textiles at the kerbside. The average weight of textile waste in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.71kg/hh/wk in Acorn 5. On average 6.2% or 0.39kg/hh/wk of residual waste is classified as textile waste.

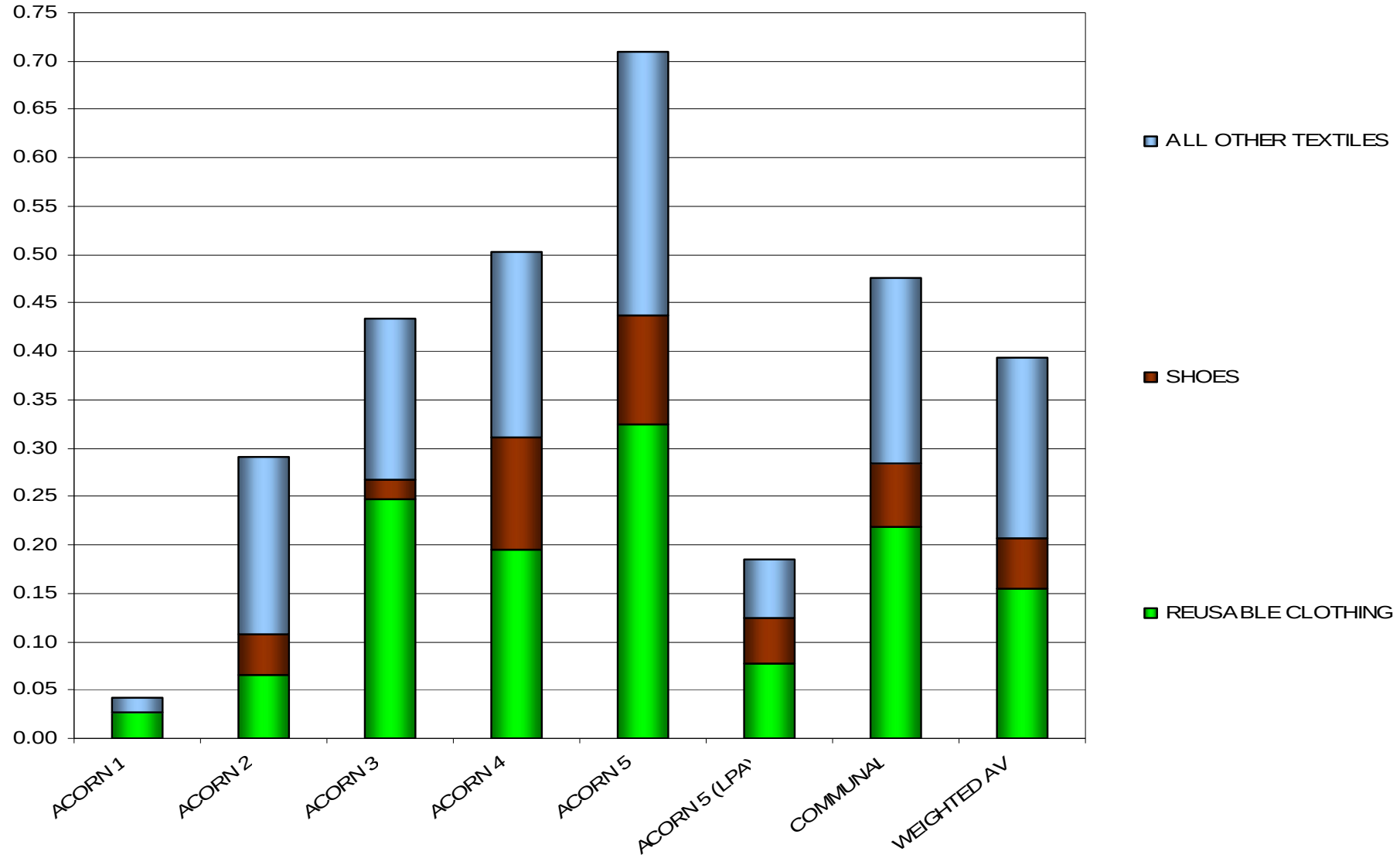
A proportion of this textile waste is available for recycling either at bring banks or charity outlets in the form of reusable clothes and shoes. It was found that between 37% (Acorn 2) and 67% of Acorn 5(LPA) of textile waste was of this potentially recyclable type. Up to 0.44kg/hh/wk (Acorn 5) of recyclable textiles are being placed into the residual waste by Cambridge householders. Across Cambridge an average of 52.5% or 0.21kg/hh/wk of residual textiles is classified as reusable, this equates to 3.3% of all collected residual waste.

Table 4.2.7.1 and Figure 4.2.7.1 show the amounts of the different forms of textile waste found within the samples from each Acorn.

Table 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)

RESIDUAL TEXTILES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
REUSABLE CLOTHING	0.03	0.07	0.25	0.20	0.33	0.08	0.22	0.15
SHOES	0.00	0.04	0.02	0.12	0.11	0.05	0.07	0.05
ALL OTHER TEXTILES	0.01	0.18	0.17	0.19	0.27	0.06	0.19	0.19
KG/HH/WK TOTAL TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
KG/HH/WK REUSABLE TEXTILES	0.03	0.11	0.27	0.31	0.44	0.12	0.28	0.21
% REUSABLE TEXTILES	66.10%	36.88%	61.45%	61.89%	61.69%	67.35%	59.77%	52.51%

Figure 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)



4.2.8 Hazardous Items (HHW) & WEEE

In this sampling campaign the average overall concentration of hazardous and WEEE waste was seen to be 1.6% which equates to around 0.10kg/hh/wk. Acorn 4 households disposed of the most HHW and WEEE waste, where it was responsible for 4.3% of collected waste or 0.28kg/hh/wk. Table 4.2.8.1 shows the amounts of HHW and WEEE within the samples from each Acorn.

Table 4.2.8.1: Levels of HHW and WEEE within each Acorn (kg/hh/wk)

RESIDUAL HHW & WEEE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	0.11	0.06	0.21	0.28	0.07	0.02	0.25	0.10
% HHW & WEEE	2.64%	1.40%	2.65%	4.27%	0.67%	0.44%	3.00%	1.61%

HHW	WEEE
PAINT	CHARGERS
HALOGEN BULB	GAME REMOTE
BATTERIES	XMAS LIGHTS
MEDICINES	THERMOSTAT
WEED KILLER	MOBILE PHONE
	TORCHES
	SMOKE ALARM
	SWITCH
	MODEM
	LAMPS
	KETTLES
	STEREO & SPEAKERS
	MOTOR
	TELEPHONE
	HAIR STRAIGHTENERS
	CABLES & LEADS
	SOCKERS
	DEEP FAT FRYER
	FAN
	BLENDER
	CALCULATOR

4.2.9 Disposable Nappies

The profile of this type of waste has increased in recent years. Levels of this waste within the residual bins of households with babies can be extremely high. In this survey the concentrations of disposable nappies ranged between 1.3% in Acorn 3 up to 33.5% in communal bins. Communal bins were seen to contain around 2.79kg/hh/wk of disposable nappies. Throughout Cambridge as a whole around 17% of collected residual waste consists of disposable nappies, which equates to 1.08kg/hh/wk.

4.3 Potential recyclability of the residual waste

The overall recyclability of the residual waste relates to all the items present that could have been accepted into the kerbside recycling schemes currently running in Cambridge. Results from the survey showed that the overall recyclability of the residual waste was highest in Acorn 2 households at 45.4%, and lowest in Acorn 3 at 27.2%. Across Cambridge it is expected that 35.1% of all residual waste being disposed of is recyclable at the kerbside.

The majority of the recyclable materials present within the residual waste were compatible with the green organics bin. On average 22% of residual waste could have been recycled in the green bin ranging from 15.7% of Acorn 3 waste up to 32.6% of Acorn 4 waste.

On average just over 13% of the residual waste throughout Cambridge was recyclable via the blue bin collection. Around 10 4% of the residual waste from Acorn 4 was compatible with blue bins compared with 17.5% of that from Acorn 1.

Table 4.3.1.1: Proportion of residual waste currently recyclable relative to current schemes (%)

% RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	17.47%	15.67%	11.43%	10.41%	11.16%	11.48%	14.01%	13.15%
GREEN BIN RECYCLABLE	18.94%	29.72%	15.72%	32.64%	16.78%	31.01%	23.21%	21.95%
TOTAL RECYCLABLE	36.41%	45.39%	27.15%	43.05%	27.94%	42.50%	37.21%	35.11%

In terms of the amount of recyclables disposed of it is seen that Acorn 1 householders place around 1.53kg/hh/wk of materials in residual bins that could either be placed into their blue or green recycling bins. For communal bins this amount was 3.1kg/hh/wk. Across Cambridge around 2.23kg/hh/wk of recyclable material is being disposed of in the residual waste.

Table 4.3.1.2: Kg/hh/wk of residual waste currently and potentially recyclable relative to current schemes

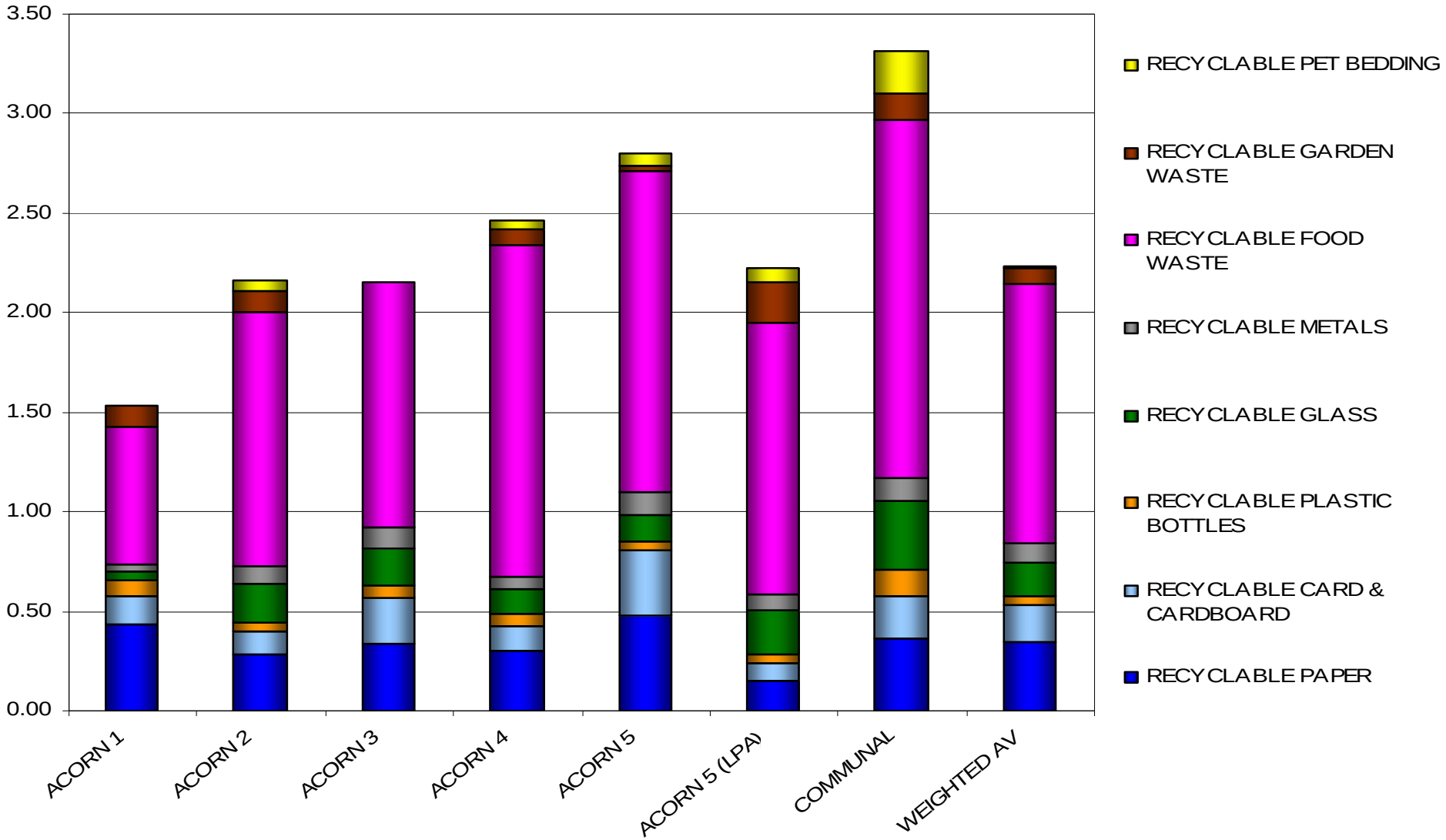
KG/HH/WK RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	0.73	0.73	0.91	0.68	1.09	0.58	1.17	0.84
GREEN BIN RECYCLABLE	0.80	1.38	1.25	2.12	1.64	1.57	1.93	1.40
TOTAL RECYCLABLE	1.53	2.11	2.15	2.80	2.74	2.15	3.10	2.23

Figure 4.3.1.1 clearly shows the levels of residual materials currently collectable in the recycling collections available in Cambridge. Different households were seen to dispose of differing levels of recyclable materials, both in terms of volume and composition (Table 4.3.1.3). Without exception it is seen that the two Acorn 5 samples and the waste from the communal bins contained the highest levels of each material compatible with kerbside recycling.

Table 4.3.1.3: Kg/hh/wk of residual waste potentially 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	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.34	0.30	**0.48**	0.15	0.37	0.35
RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	**0.33**	0.09	0.21	0.18
RECYCLABLE PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	**0.13**	0.05
RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	**0.35**	0.16
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	**0.12**	0.09
RECYCLABLE FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	**1.80**	1.31
RECYCLABLE GARDEN WASTE	0.10	0.11	0.00	0.08	0.03	**0.20**	0.13	0.07
RECYCLABLE PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	**0.21**	0.01
TOTAL RECYCLABLE	1.53	2.16	2.15	2.47	2.80	2.22	3.31	2.23

Figure 4.3.1.1: Kg/hh/wk of residual waste potentially recyclable relative to Acorn (Kg/hh/wk)



4.4 Biodegradable waste

These figures are useful when considering the proportion of biodegradable waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using the compositional data in accordance with the percentages outlined in previous reports. For example, only 50% of miscellaneous combustible materials are considered to be biodegradable whereas 100% of paper and card is considered to be biodegradable.

National average figures are around 68%; in this survey the biodegradability of residual waste weighted across Cambridge was well below this level at 50.7%. Acorn 4 residual waste displayed the highest concentration of biodegradable items at 59.4%, with Acorn 3 residual waste being just 44.4% biodegradable. On average, around 3.22kg/hh/wk of biodegradable material was being placed into residual containers by Cambridge residents.

Table 4.4.1: Percentage composition of residual waste per Acorn – biodegradable materials

BIODEGRADABLE CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	17.19%	12.94%	10.94%	9.61%	11.96%	7.39%	8.80%	12.25%
TEXTILES	0.50%	3.12%	2.74%	3.87%	3.62%	1.83%	2.85%	3.10%
MISC. COMBUSTIBLE*	11.26%	8.35%	14.36%	8.84%	16.80%	15.07%	17.84%	12.60%
	7.94%	5.73%	8.53%	4.78%	12.16%	12.51%	16.76%	8.51%
PUTRESCIBLES	18.98%	30.22%	16.40%	36.43%	17.10%	31.74%	24.44%	22.53%
FINES	0.26%	0.00%	0.00%	0.61%	0.46%	0.10%	0.49%	0.18%
TOTAL BIODEGRADABLE	48.18%	54.63%	44.44%	59.36%	49.94%	56.13%	54.42%	50.66%

* Disposable nappies are part of the miscellaneous combustible section. Their contribution to this section of biodegradable waste is highlighted in red.

4.5 Packaging Waste

These figures are useful when considering the proportion of packaging waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using a similar method to that used to calculate biodegradability.

Levels of packaging in the residual waste ranged from 12.3% in Acorn 5 residual waste to 22.1% in Acorn 2 residual waste. On average, around 1.08kg/hh/wk of packaging materials were being placed into residual containers by Cambridge residents, 17% of the total waste being disposed of.

Table 4.5.1: Percentage composition of residual waste per Acorn – packaging materials

PACKAGING CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	4.62%	4.43%	3.32%	2.98%	4.28%	2.41%	3.88%	4.09%
PLASTIC FILM	3.69%	5.06%	4.61%	2.62%	2.89%	5.53%	3.40%	4.11%
DENSE PLASTIC	7.36%	6.70%	4.88%	3.90%	2.81%	4.28%	4.41%	4.96%
GLASS	1.01%	4.08%	2.34%	1.99%	1.37%	4.39%	4.18%	2.59%
METALS	0.63%	1.79%	1.05%	0.89%	0.98%	1.27%	1.17%	1.27%
TOTAL PACKAGING	17.31%	22.06%	16.20%	12.37%	12.34%	17.87%	17.05%	17.02%

5) Mixed dry recycling waste

5.1 Set out rates and waste generation

Table 5.1.1 and Figure 5.1.1 highlight the set out rates for blue recycling bins observed at the time waste was collected for compositional analysis. Table 5.1.2 and Figure 5.1.2 show the amount of mixed recycling waste generated in kg/hh/wk. The same houses were visited that had their residual waste surveyed. It was possible to calculate the set out relating to the proportion of these households actively placing out their waste. The 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. Set out rates for mixed recycling waste ranged between 66% for Acorn 4 and 84% for Acorn 3. Across Cambridge it is estimated that around 78% of residents are placing out their blue bins for collection.

Table 5.1.1: Average Set Out for mixed recycling waste (%)

ACORN	% SET OUT
1	74%
2	75%
3	84%
4	66%
5	82%
5 (LPA)	78%
COMMUNAL	N/A
WEIGHTED AVERAGE	78%

In this survey the average amount of mixed recycling generated in blue bins ranged between 2.36kg/hh/wk from Acorn 1 to 3.83kg/hh/wk from Acorn 3. Across Cambridge around 3.16kg/hh/wk of blue bin recycling waste is being placed out for collection at the kerbside.

Table 5.1.2: Average Mixed Recycling waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	2.36
2	3.07
3	3.83
4	2.95
5	3.09
5 (LPA)	2.52
COMMUNAL	3.80
WEIGHTED AVERAGE	3.16

Figure 5.1.1: Average Set Out for mixed recycling waste (%)

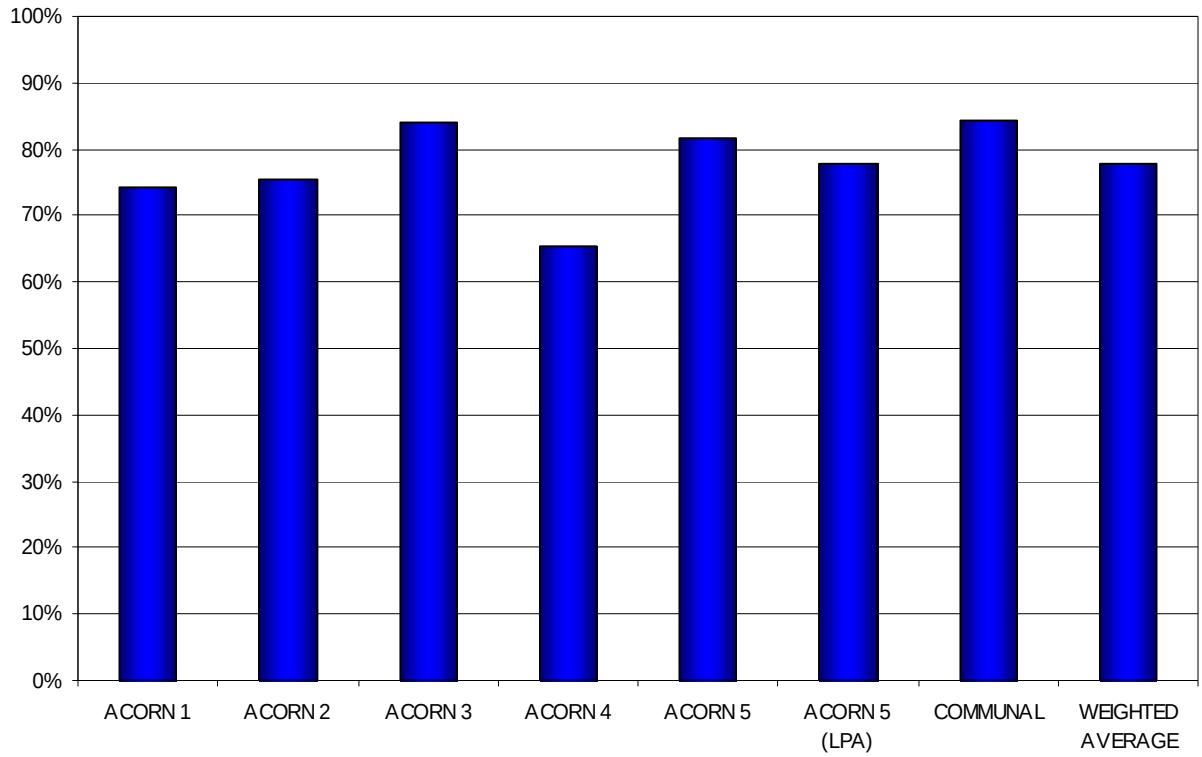
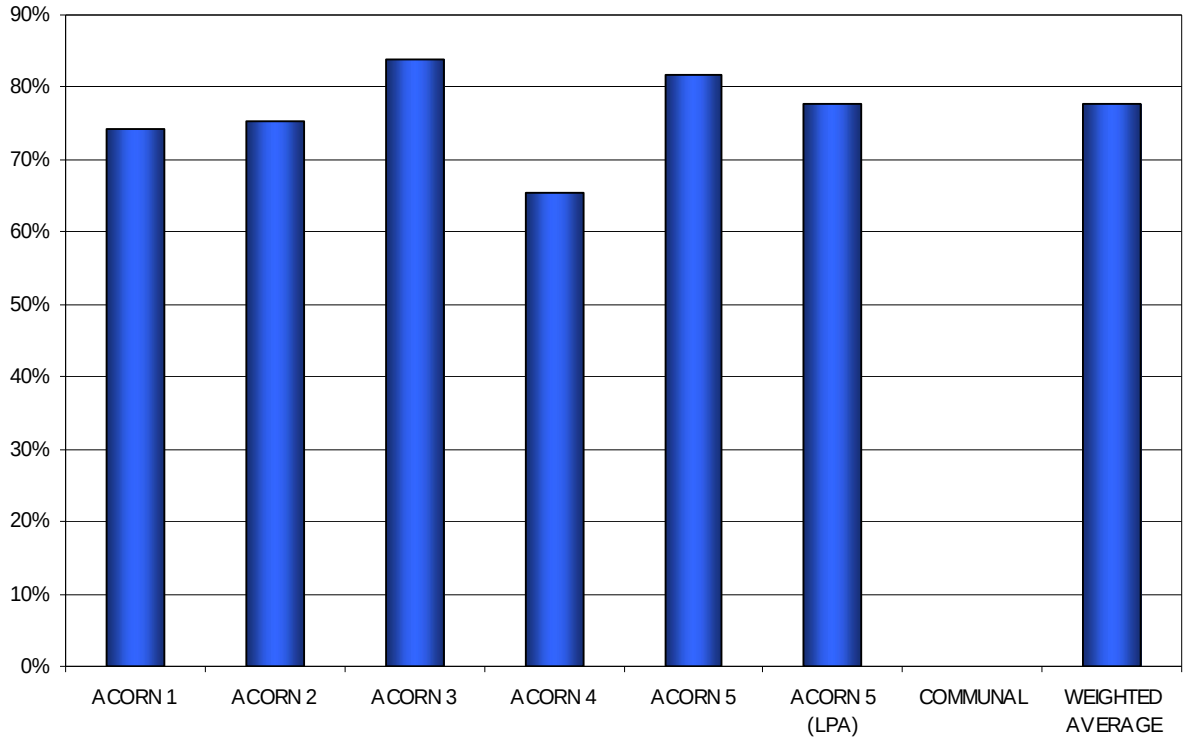


Figure 5.1.2: Average Mixed recycling waste generation rates (kg/hh/wk)



5.2 Compositional analysis of mixed recycling waste

This section looks at the average amount and composition of the mixed recycling waste presented by households sampled throughout Cambridge. 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 5.2.1 and Figure 5.2.1 show mixed recycling data in terms of percentage composition with Table 5.2.2 and Figure 5.2.2 showing generation rates for major materials in terms of kg/hh/wk for each sample taken from the blue recycling bins.

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

Table 5.2.1: Composition of mixed recycling (% concentration) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	50.89%	46.17%	23.96%	25.91%	23.28%	31.61%	32.48%	36.16%
RECYCLABLE CARD & CARDBOARD	12.80%	12.42%	14.12%	13.13%	17.38%	13.94%	14.95%	13.85%
RECYCLABLE PLASTIC BOTTLES	4.33%	4.28%	7.60%	5.74%	7.68%	8.58%	7.17%	5.76%
RECYCLABLE GLASS	18.59%	30.83%	41.13%	36.02%	35.39%	32.94%	25.61%	33.55%
RECYCLABLE METALS	5.08%	2.87%	6.02%	5.95%	5.12%	4.86%	5.56%	4.25%
CONTAMINATION MATERIALS	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%
TOTAL RECYCLING	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	1.20	1.42	0.92	0.76	0.72	0.80	1.24	1.14
RECYCLABLE CARD & CARDBOARD	0.30	0.38	0.54	0.39	0.54	0.35	0.57	0.44
RECYCLABLE PLASTIC BOTTLES	0.10	0.13	0.29	0.17	0.24	0.22	0.27	0.18
RECYCLABLE GLASS	0.44	0.95	1.58	1.06	1.09	0.83	0.97	1.06
RECYCLABLE METALS	0.12	0.09	0.23	0.18	0.16	0.12	0.21	0.13
CONTAMINATION MATERIALS	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20
TOTAL RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16

Figure 5.2.1: Composition of mixed recycling (%) by Acorn

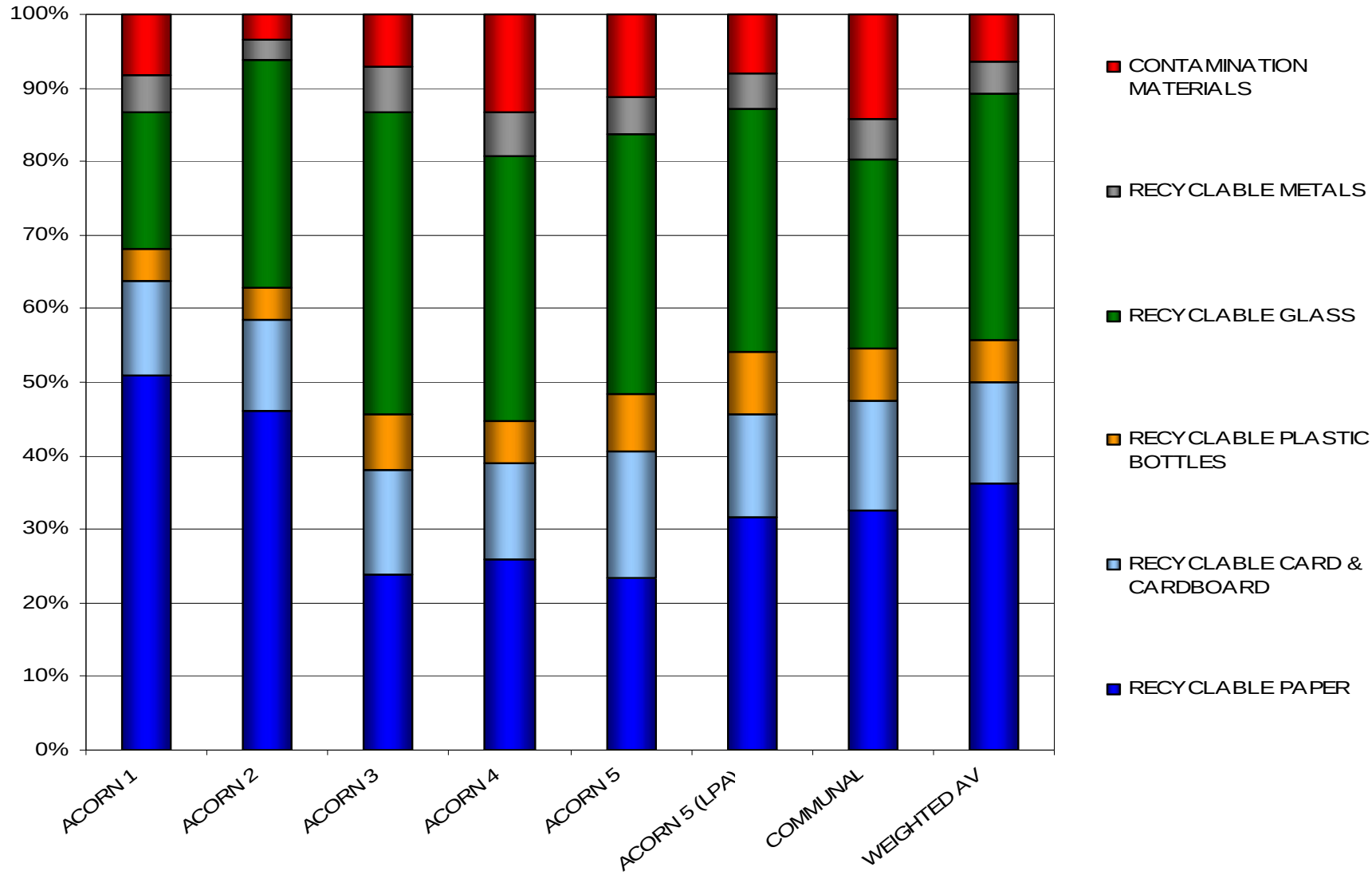
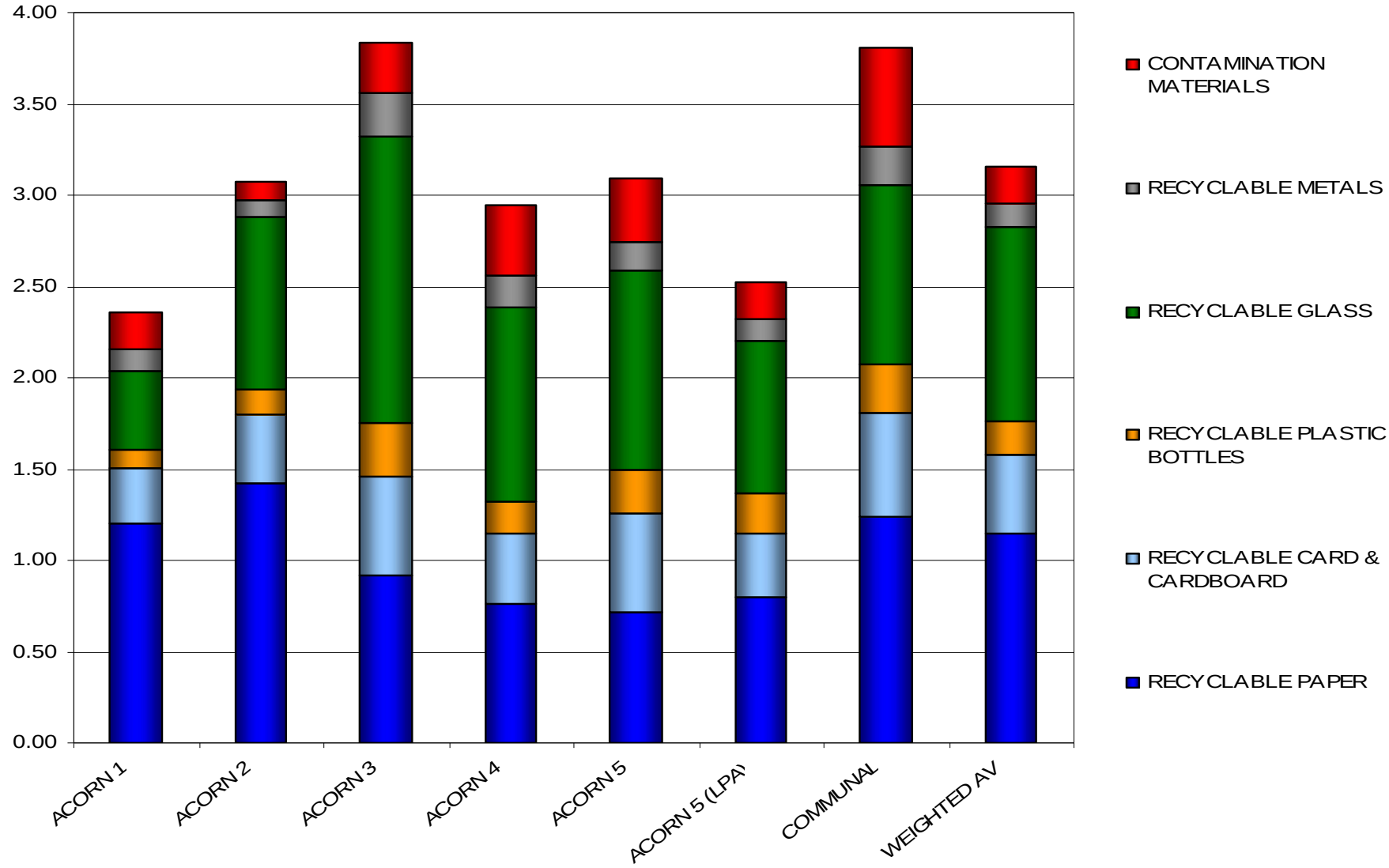


Figure 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn



5.3 Materials placed out for mixed recycling collections

This chapter looks in more detail at the individual materials placed out for blue bin recycling collections and highlights the effectiveness with which the mixed recycling scheme is capturing these items. Looking at the relationship between the residual and recycling waste streams presented will additionally give indications as to the overall diversion being achieved in the Cambridge samples.

Table 5.3.1 summarises the capture and diversion rates seen for the range of materials collected in the dry recycling collections. Recyclable paper, card & cardboard, plastics, glass and metals are collected in the blue bin.

Across Cambridge around 75.6% of all the materials currently collected in blue bins are being correctly recycled at the kerbside. Acorns 1 – 4 all recycled between 73% and 79% of their blue bin materials. In comparison Acorn 5 households recycled 69% whilst those using communal bins recycled just 58%. Overall it is estimated that 23.7% of kerbside waste throughout Cambridge is diverted through blue bin collections.

Table 5.3.1: Summary table for material capture and diversion rates (%) for mixed recycling

% CAPTURE RATES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	73.72%	83.14%	72.96%	72.49%	59.96%	84.58%	83.29%	76.73%
RECYCLABLE CARD & CARDBOARD	72.89%	77.28%	72.19%	77.83%	66.54%	82.21%	81.76%	72.67%
PLASTIC BOTTLES	53.80%	75.57%	82.58%	73.38%	83.76%	83.16%	62.63%	78.24%
COLOURED GLASS BOTTLES & JARS	100.00%	87.60%	99.09%	88.53%	93.66%	72.18%	80.07%	91.55%
CLEAR GLASS BOTTLES	91.08%	86.29%	70.26%	89.58%	90.54%	81.91%	74.03%	82.40%
CLEAR GLASS JARS	79.37%	60.32%	96.72%	N/A	74.00%	86.58%	65.68%	75.68%
ALL RECYCLABLE GLASS	91.20%	83.29%	89.45%	89.15%	89.05%	78.94%	73.64%	86.53%
DRINK CANS	67.43%	75.29%	75.31%	82.71%	63.14%	64.51%	68.55%	71.54%
FOOD TINS	88.57%	51.11%	78.10%	73.66%	70.06%	75.17%	65.10%	65.51%
AEROSOLS	100.00%	35.30%	71.44%	61.23%	46.61%	52.05%	43.96%	51.30%
OTHER RECYCLABLE METALS	19.96%	7.86%	25.61%	26.29%	12.14%	29.91%	63.26%	14.45%
ALL RECYCLABLE METALS	78.80%	47.98%	69.56%	73.66%	59.18%	62.96%	63.49%	58.87%
ALL BLUE BIN MATERIALS	72.69%	79.14%	78.60%	77.33%	69.48%	77.35%	58.45%	76.55%
% DIVERSION	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%

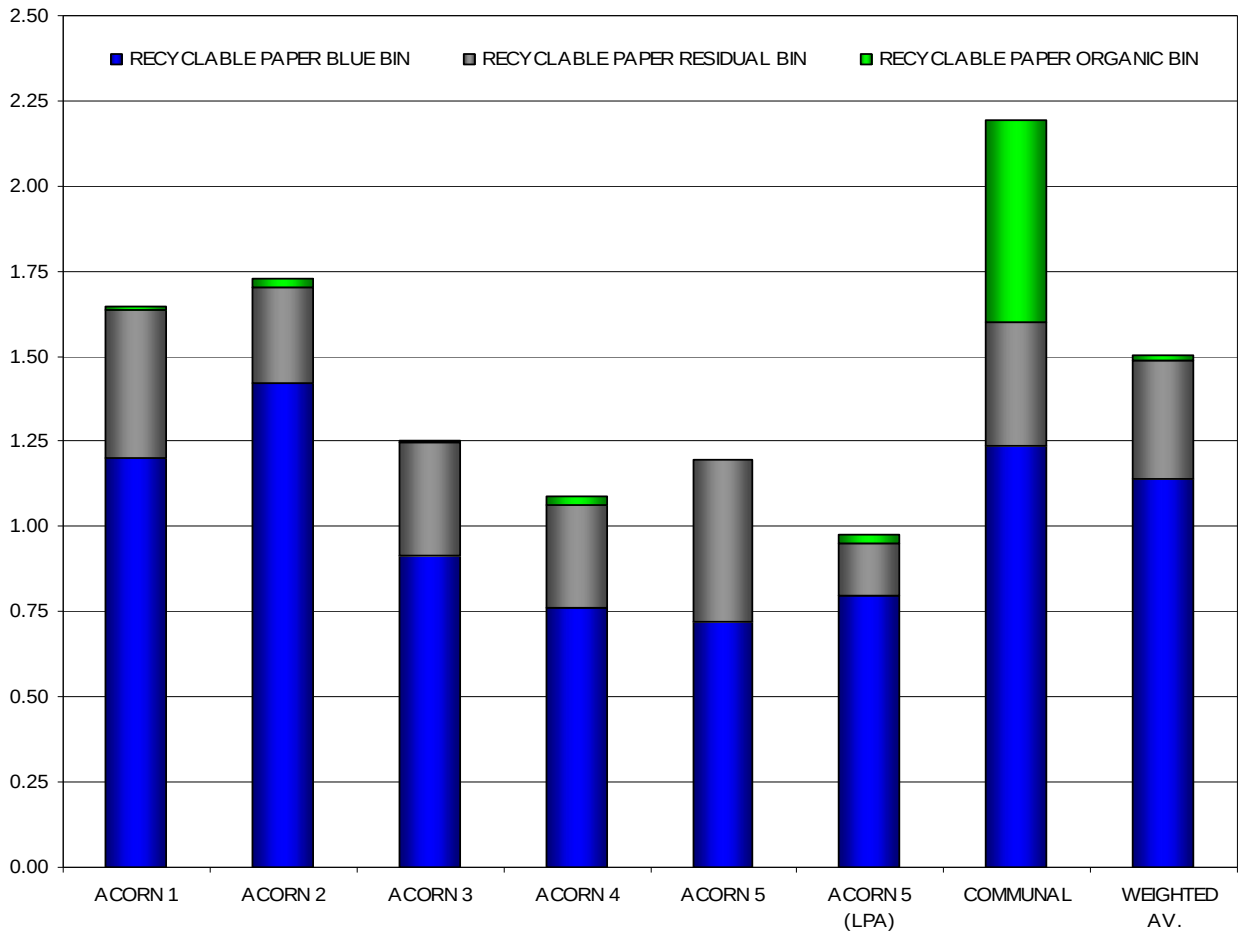
5.3.1 Paper Capture

Acorn 2 residents captured the highest proportion of their recyclable paper with 82% correctly being recycled; they generated 1.73kg/hh/wk of this material. Residents in communal bin areas captured the least recyclable paper at 56% additionally they also generated the most of this recyclable paper at 2.19kg/hh/wk.

Across Cambridge it is estimated that 1.50kg/hh/wk of recyclable paper is generated with around 76% being correctly placed into the blue bin*.

There are many different forms of paper and decisions have to be made by residents as to whether a particular piece of paper is to go into the recycling or residual waste. On average, the majority of all recyclable forms of paper are being correctly diverted by all the residents sampled although there is around 0.36kg/hh/wk of potentially recyclable paper not being placed into blue bins. On average 23% of recyclable paper is in the residual bin with 1% in the organic bin. Figure 5.3.2.1 shows the distribution of recyclable paper throughout the residual and recycling waste by Acorn category.

Figure 5.3.1.1: Distribution of recyclable paper within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes the paper disposed of in the organics bin. Although it is preferential that recyclable paper is put into the blue bin it is acceptable for the green bin. Shredded paper is only acceptable in green bins.

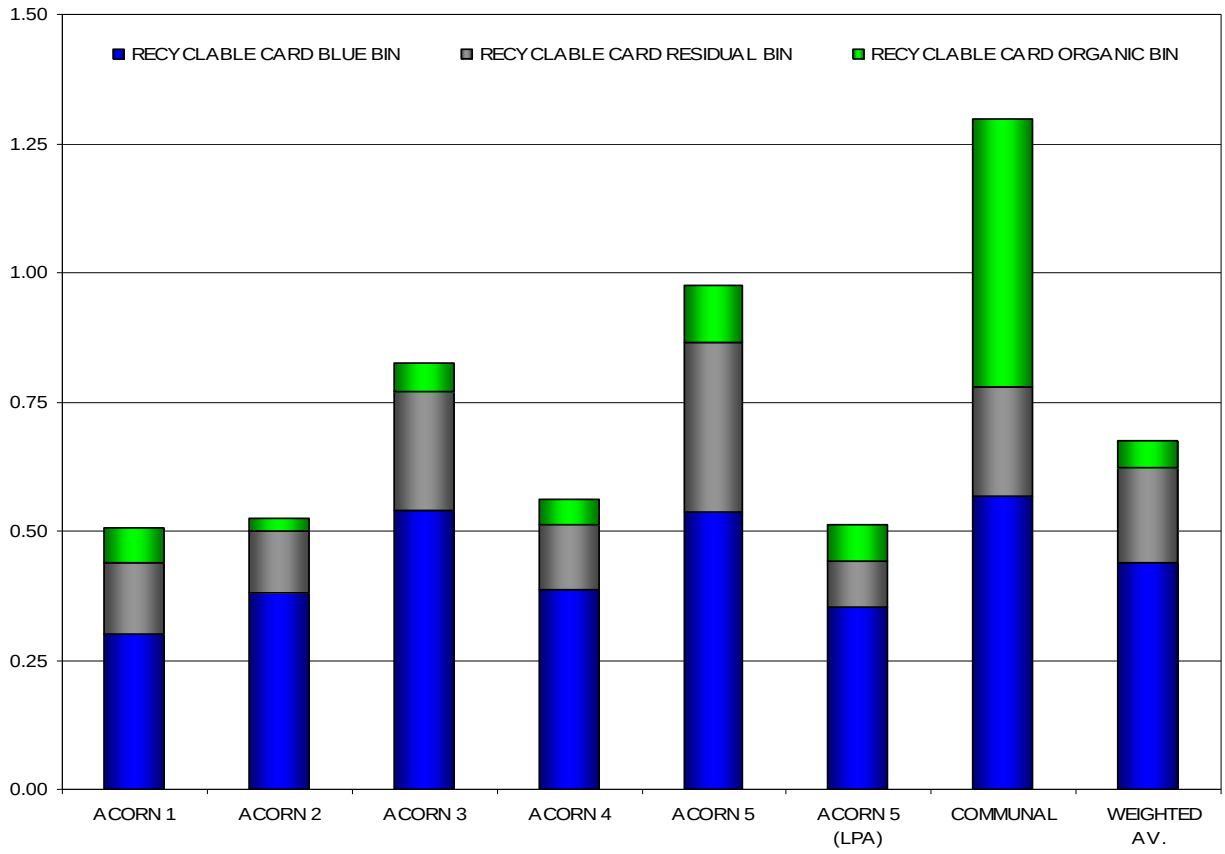
5.3.2 Card & Cardboard Capture

Acorn 2 residents captured the highest proportion of their recyclable card & cardboard with 73% correctly being recycled; they generated 0.52kg/hh/wk of this material. Residents in communal bin areas captured the least at less than 44% additionally they also generated the most of this recyclable card & cardboard at 1.30kg/hh/wk.

Across Cambridge it is estimated that 0.67kg/hh/wk of recyclable paper is generated with around 65% being correctly placed into the blue bin*.

As for paper, are many different forms of card & cardboard and decisions have to be made by residents as to whether a particular piece is to go into the recycling or residual waste. With the exception of residents in the communal bin sample, the majority of all recyclable forms of card & cardboard are being correctly diverted by all the residents surveyed although there is around 0.24kg/hh/wk of potentially recyclable card & cardboard not being placed into blue bins. On average 27% of recyclable card & cardboard is in the residual bin with 8% in the organic bin. Figure 5.3.3.1 shows the distribution of recyclable card & cardboard throughout the residual and recycling waste by Acorn category.

Figure 5.3.2.1: Distribution of recyclable card within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes certain card disposed of in the organics bin. Although it is preferential that recyclable card & cardboard is put into the blue bin it is acceptable for the green bin. Tetrapaks are only acceptable in blue bins.

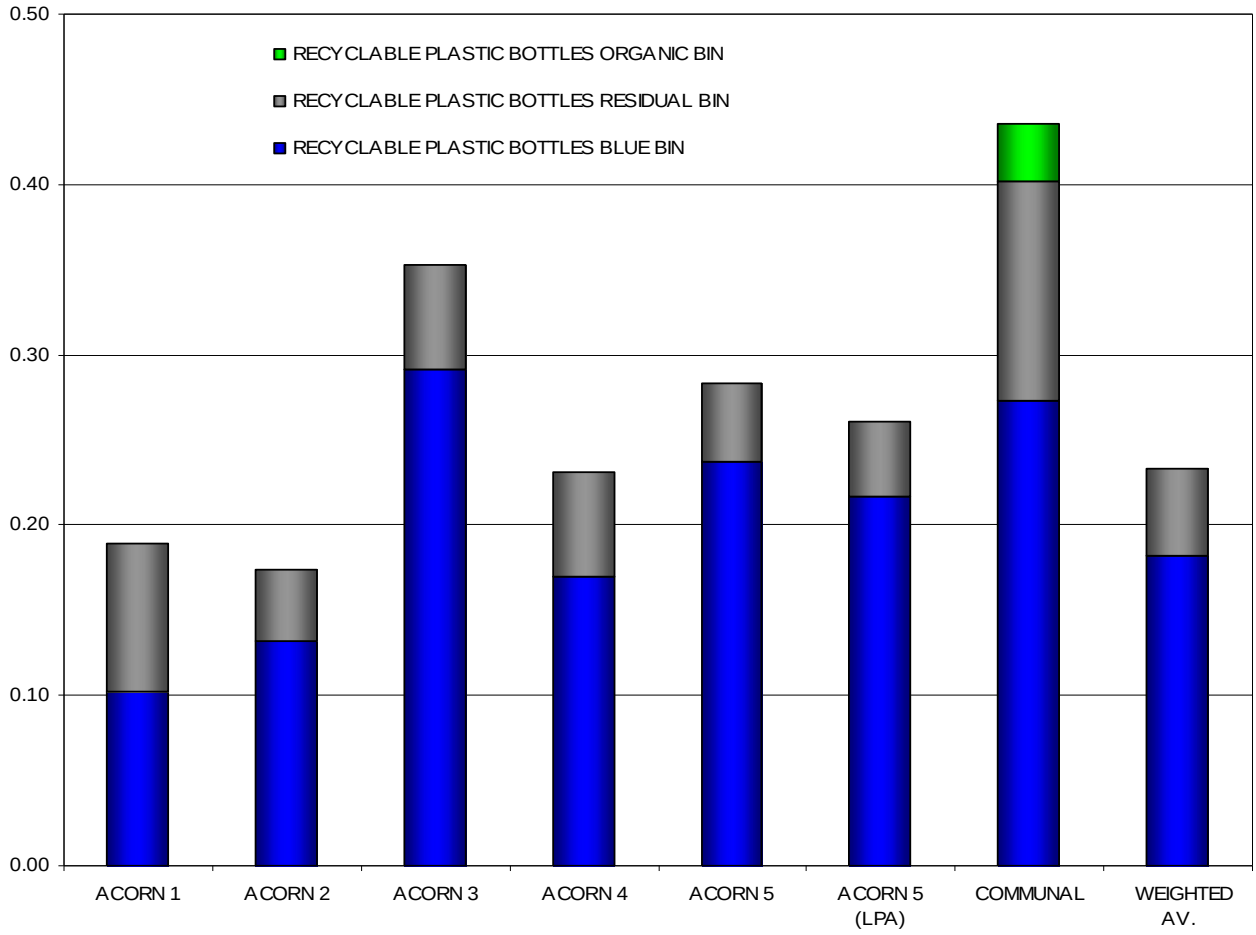
5.3.3 Plastic Bottles Capture

Acorn 5 residents captured the highest proportion of their recyclable plastic bottles with 84% correctly being recycled; they generated 0.26kg/hh/wk of this material. Residents in Acorn 1 areas captured the least recyclable paper at 54% additionally they generated 0.19kg/hh/wk.

Across Cambridge it is estimated that 0.23kg/hh/wk of recyclable plastic bottles are generated with around 78% being correctly placed into the blue bin.

Plastic bottles are easily identifiable when compared with other non-recyclable plastics. The majority of all recyclable plastic bottles are being correctly diverted by all the residents surveyed and there is just 0.05kg/hh/wk of these bottles not being placed into blue bins. On average 22% of recyclable plastic bottles are in the residual bin. Figure 5.3.3.1 shows the distribution of recyclable plastic bottles throughout the residual and recycling waste by Acorn category.

Figure 5.3.3.1: Distribution of recyclable plastic bottles within residual and mixed recycling samples (kg/hh/wk)

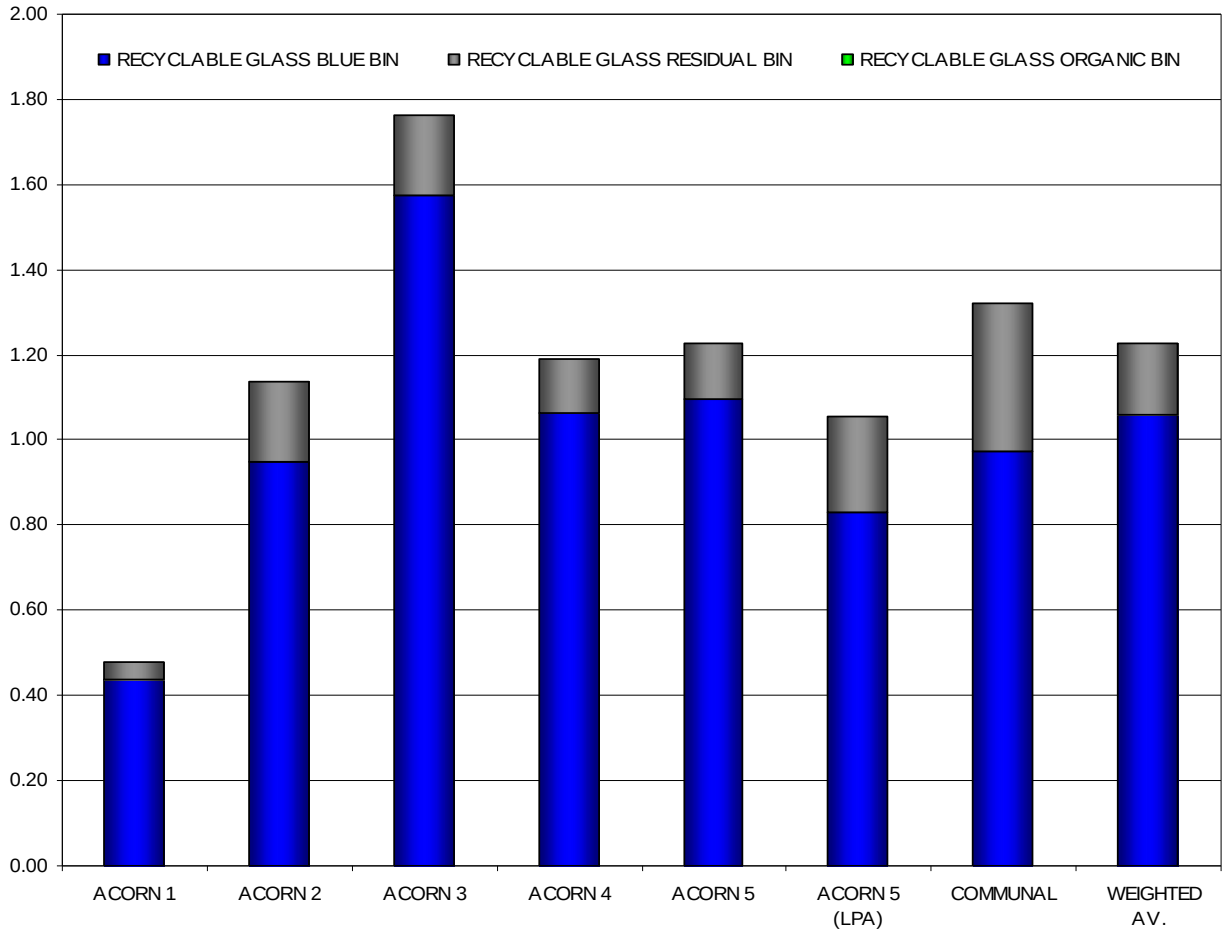


5.3.4 Glass Capture

Acorn 1 residents captured the highest proportion of their recyclable glass with 91% correctly being recycled, while residents from communal bin areas captured 74%. Acorn 3 residents produced the most recyclable glass in their combined kerbside waste at 1.76kg/hh/wk compared with 0.48kg/hh/wk from Acorn 1. On average, 87% of all recyclable glass is being correctly diverted by the Cambridge residents sampled with around 1.23kg/hh/wk being sampled.

Overall capture rates for coloured glass bottles were 92% with 82% of clear glass bottles similarly captured. Clear glass is generally considered to be more highly valued as a recyclate and it was seen that just 76% of glass jars were captured. It is often seen to be the case that empty jars are more messy than empty bottles and residents may not clean them for recycling, thus choosing to place them in the residual bins. On average, the vast majority of all recyclable forms of glass are being correctly diverted by the residents sampled although there is around 13% or 0.16kg/hh/wk of potentially recyclable glass not being placed into blue bins. Figure 5.3.4.1 shows the distribution of recyclable glass throughout the residual and mixed recycling waste.

Figure 5.3.4.1: Distribution of recyclable glass within residual and mixed recycling samples (kg/hh/wk)



5.3.5 Metals Capture

Acorn 1 residents captured the highest proportion of their recyclable metals with 79% correctly being recycled, while residents from Acorn 2 captured just 48%. Acorn 3 and communal bin users produced the most recyclable metals in their combined kerbside waste at 0.33kg/hh/wk compared with 0.15kg/hh/wk from Acorn 1. On average, 59% of all recyclable metals are being correctly diverted by Cambridge residents sampled with around 0.23kg/hh/wk being generated.

Overall capture rates for drinks cans were 72%, with 66% of food tins recycled. It is often seen to be the case that residents are unwilling to clean out food tins before recycling and this can lead to low capture rates when compared with cleaner drinks cans. Capture rates for empty aerosols were seen to be lower with just 51% of those available being placed into recycling containers. With the exception of Acorn 2 residents, the majority of all recyclable forms of metals are being correctly diverted, although there is around 0.09kg/hh/wk of potentially recyclable metal not being placed into blue bins. On average 41% of recyclable metal are in the residual bin. Figure 5.3.5.1 shows the distribution of recyclable metals throughout the residual and mixed recycling waste.

Figure 5.3.5.1: Distribution of recyclable metals within residual and mixed recycling samples (kg/hh/wk)

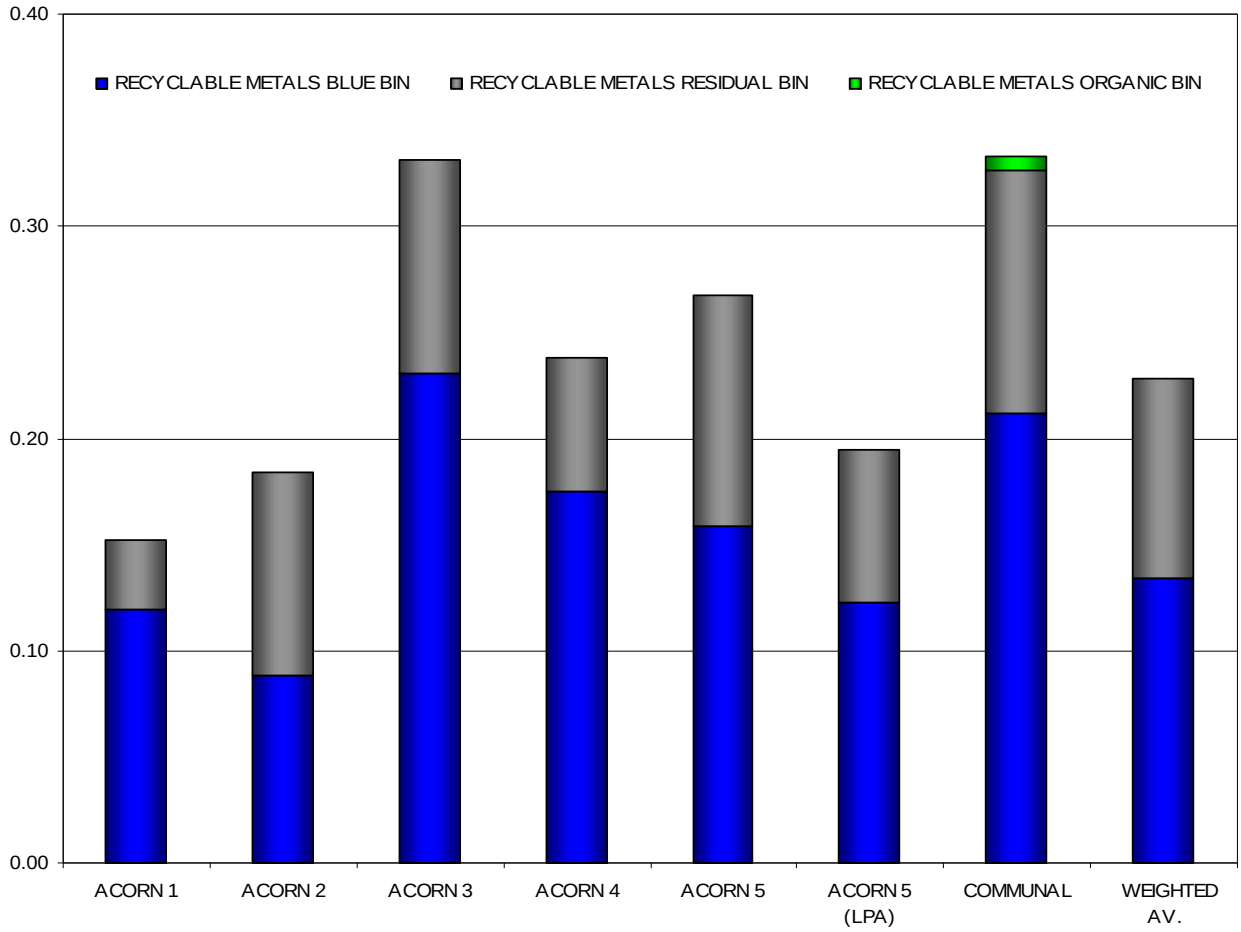
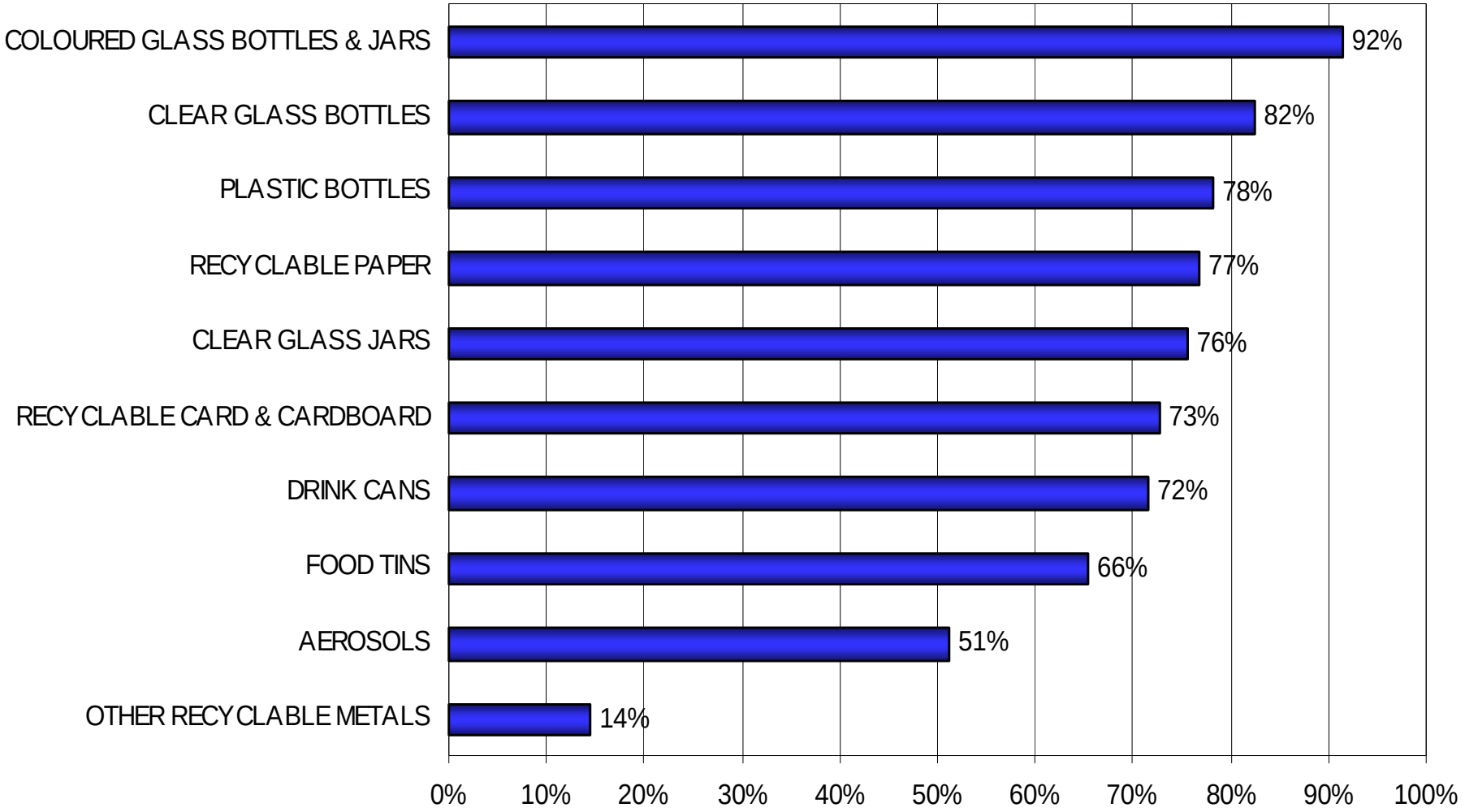


Figure 5.3.5.2: Summary chart of capture rates for blue bin recyclables.



5.4 Blue Bin Recycling Contamination

From Table 5.2.1 it has been shown that on average 6.4% of blue bin recycling is made up of contamination. This equates to around 0.20kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the recycling waste in Cambridge.

Some forms of contamination may be due to residents' lack of knowledge in relation to the recycling scheme. For example a householder may believe all plastic containers are accepted alongside recyclable plastic bottles. Other contamination will be formed from waste that is totally unrelated to the materials collected (i.e. disposable nappies, wood or bagged kitchen waste). Table 5.4.1 and Figure 5.4.1 show the amounts of contamination materials recovered from the blue bin.

The blue bin contained between 0.11kg/hh/wk (Acorn 2) and 0.54kg/hh/wk (communal bin households) of contamination.

Table 5.4.1: Breakdown of contamination materials in the blue bin recycling waste (kg/hh/wk)

BLUE BIN CONTAMINATION KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	0.04	0.03	0.06	0.04	0.13	0.04	0.06	0.06
PLASTIC FILM	0.01	0.01	0.04	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE PLASTICS	0.09	0.04	0.07	0.14	0.08	0.11	0.19	0.06
TEXTILES	0.00	0.01	0.03	0.06	0.00	0.00	0.00	0.01
NON-RECYCLABLE GLASS	0.00	0.01	0.00	0.00	0.00	0.01	0.00	<0.01
NON-RECYCLABLE METALS	0.04	0.00	0.00	0.00	0.00	0.01	0.01	<0.01
FOOD WASTE	0.00	0.01	0.02	0.10	0.08	0.01	0.07	0.03
LIQUIDS	0.01	0.00	0.01	0.04	0.00	0.00	0.02	<0.01
ALL OTHER CONTAMINATION	0.01	0.00	0.04	0.00	0.04	0.01	0.17	0.02
TOTAL CONTAMINATION	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20

Figure 5.4.1: Breakdown of contamination materials present within blue bin recycling containers (kg/hh/wk).

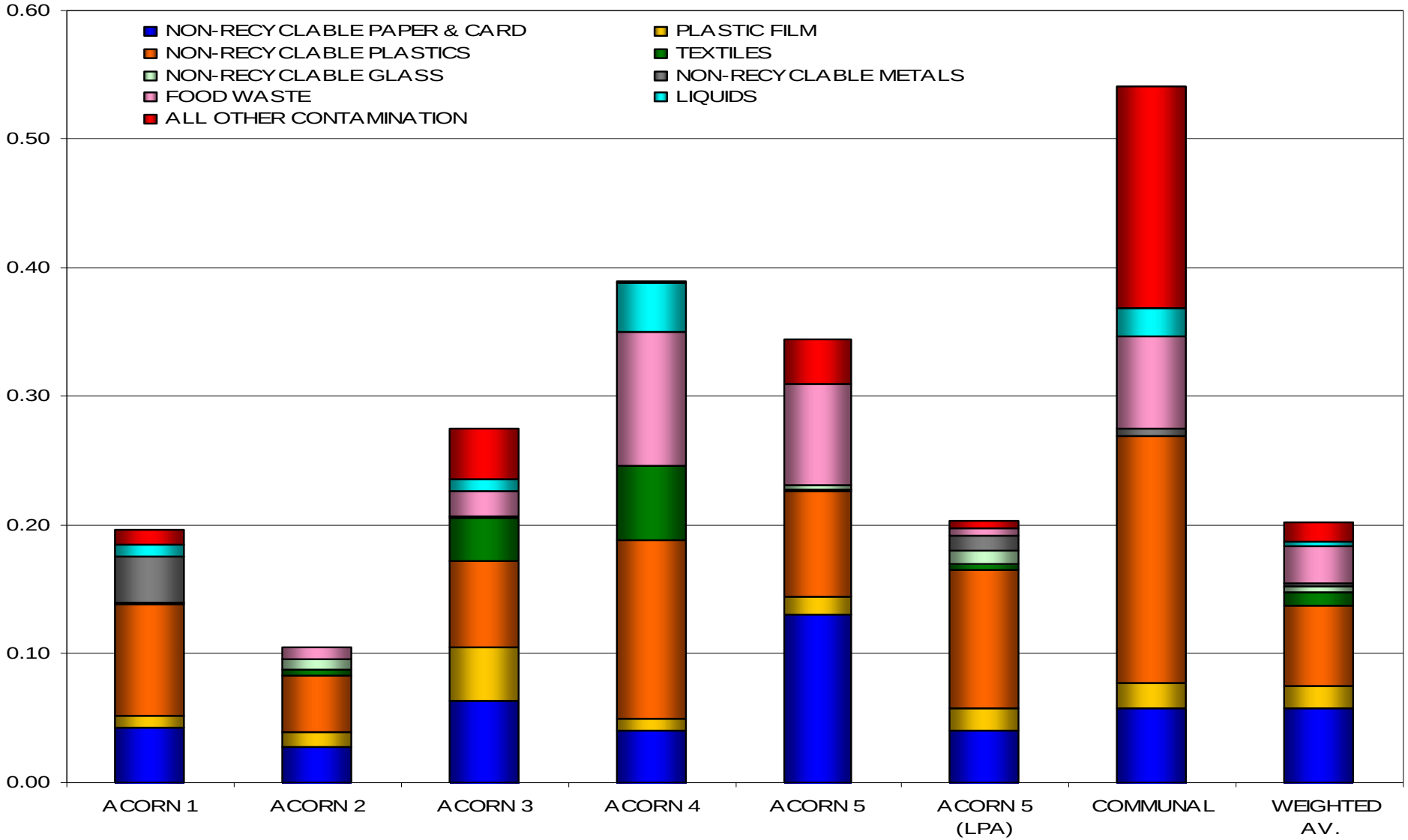


Table 5.4.2 shows the levels of contamination materials recovered from the blue bin as a percentage of the total. On average 6.4% of blue bin recycling is deemed to be contamination. Almost 4% of contamination is due to non-recyclable plastic containers, paper and card. Just over 3% of Acorn 2 recycling was classed as contamination compared with over 14% of that from households on communal bins.

Table 5.4.2: Levels of contamination within the blue bin recycling waste (% of total)

BLUE BIN CONTAMINATION %	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	1.84%	0.90%	1.67%	1.35%	4.23%	1.61%	1.52%	1.82%
PLASTIC FILM	0.39%	0.39%	1.07%	0.33%	0.43%	0.70%	0.53%	0.54%
NON-RECYCLABLE PLASTICS	3.65%	1.42%	1.75%	4.71%	2.68%	4.25%	5.04%	1.98%
TEXTILES	0.00%	0.17%	0.88%	1.96%	0.02%	0.17%	0.00%	0.35%
NON-RECYCLABLE GLASS	0.05%	0.25%	0.04%	0.00%	0.10%	0.40%	0.00%	0.16%
NON-RECYCLABLE METALS	1.52%	0.00%	0.00%	0.00%	0.00%	0.50%	0.13%	0.08%
FOOD WASTE	0.00%	0.31%	0.49%	3.54%	2.54%	0.23%	1.90%	0.89%
LIQUIDS	0.42%	0.00%	0.26%	1.27%	0.00%	0.00%	0.57%	0.12%
ALL OTHER CONTAMINATION	0.44%	0.00%	1.01%	0.07%	1.14%	0.21%	4.53%	0.48%
TOTAL CONTAMINATION	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%

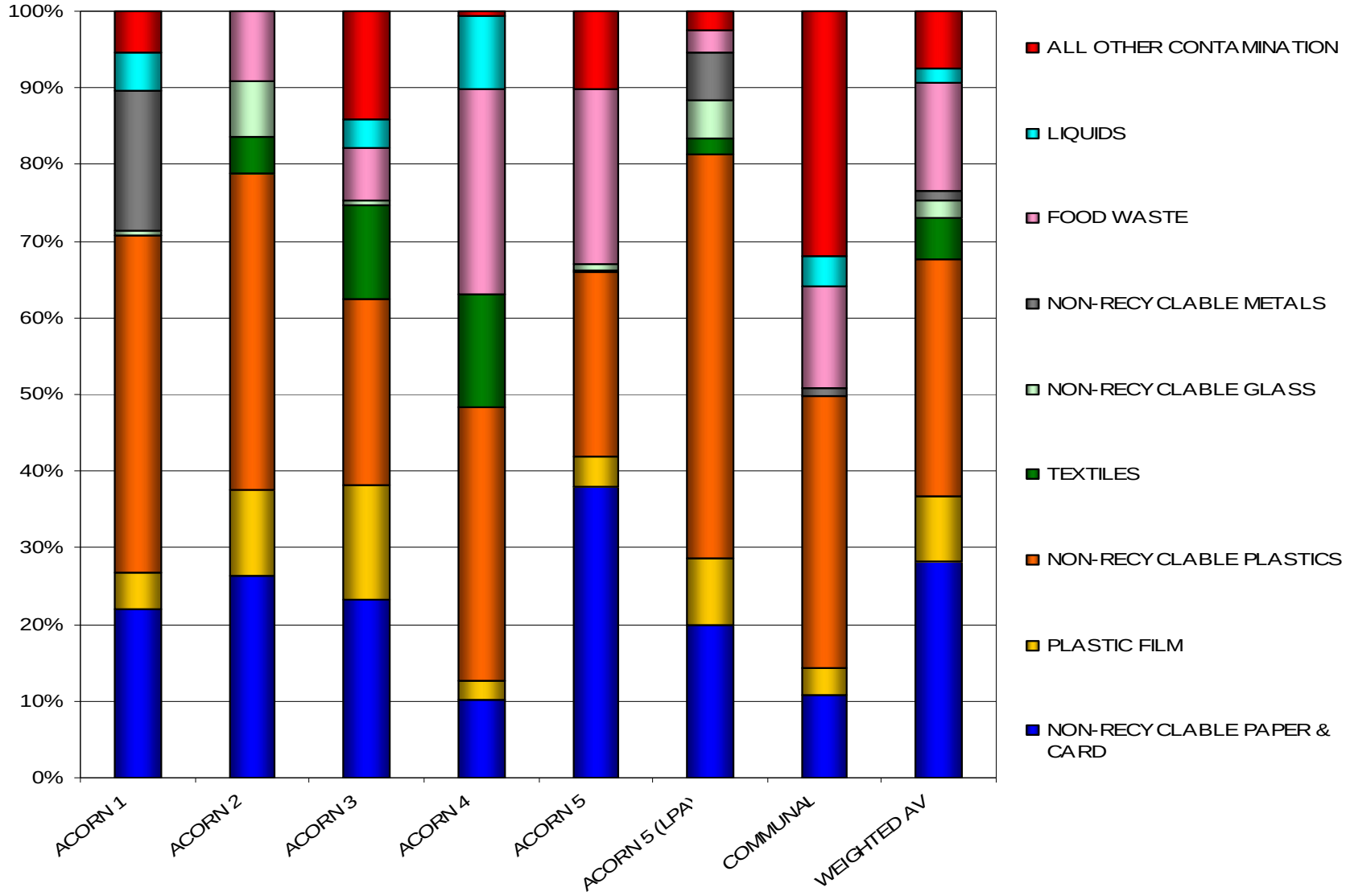
Table 5.4.3 and Figure 5.4.2 show a breakdown of the contaminants to highlight materials causing the greatest contribution to the overall contamination levels within blue bins. Around 31% of the contamination was due to non-recyclable dense plastics, these formed over half of the contamination from Acorn 5(LPA) households. Over 28% of contamination was due to non-recyclable paper and card; this formed almost 40% of Acorn 5 contamination. Up to 14% of contamination was formed from food waste and this material represented a quarter of the overall contamination from Acorn 4 and 5 households.

Blue bins from communal households had very high levels of miscellaneous contamination at 32% of the total. These items are typical of general residual waste being placed into recycling bins.

Table 5.4.3: Proportional breakdown of blue bin contaminants (% of contamination).

% OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	22.09%	26.25%	23.24%	10.23%	37.98%	19.92%	10.70%	28.31%
PLASTIC FILM	4.74%	11.25%	14.85%	2.49%	3.87%	8.66%	3.70%	8.48%
NON-RECYCLABLE PLASTICS	43.90%	41.25%	24.42%	35.58%	24.04%	52.71%	35.46%	30.78%
TEXTILES	0.00%	4.86%	12.28%	14.84%	0.21%	2.16%	0.00%	5.38%
NON-RECYCLABLE GLASS	0.64%	7.36%	0.62%	0.00%	0.88%	4.96%	0.00%	2.43%
NON-RECYCLABLE METALS	18.22%	0.00%	0.00%	0.00%	0.00%	6.17%	0.92%	1.27%
FOOD WASTE	0.00%	9.03%	6.80%	26.73%	22.82%	2.86%	13.33%	13.94%
LIQUIDS	5.09%	0.00%	3.68%	9.59%	0.00%	0.00%	4.04%	1.91%
ALL OTHER CONTAMINATION	5.32%	0.00%	14.12%	0.55%	10.19%	2.55%	31.86%	7.52%
TOTAL CONTAMINATION	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5.4.2: Proportional breakdown of blue bin contaminants (% of contamination).



6) Green Bin Organic Recycling Waste

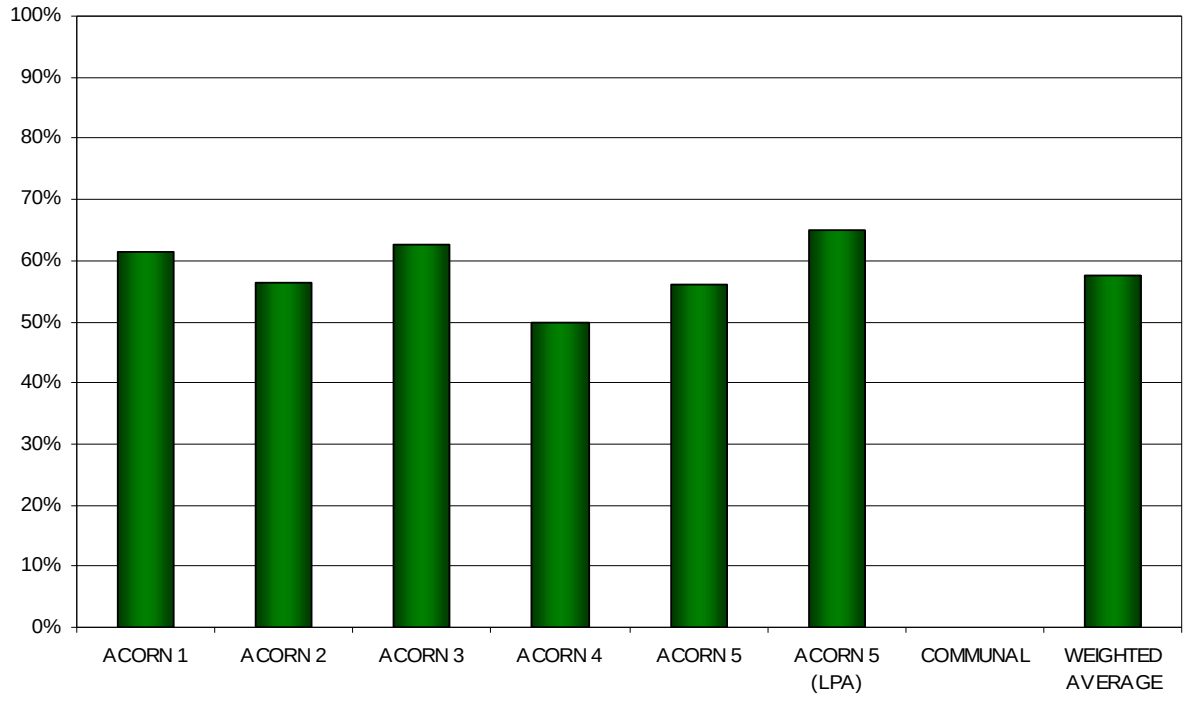
6.1 Set out rates and waste generation

Table 6.1.1 and Figure 6.1.1 highlight the average set out rates for green bin organic recycling waste observed during the compositional analysis. Table 6.1.2 and Figure 6.1.2 show the average amounts of this recycling waste generated in kg/hh/wk. Set out rates ranged between 50% for Acorn 4 and 65% for Acorn 5(LPA) were observed. Across Cambridge around 58% of residents are opting to place out organic waste containers for collection.

Table 6.1.1: Average Set Out For Green Bin Waste (%)

ACORN	% SET OUT
1	61%
2	57%
3	63%
4	50%
5	56%
5 (LPA)	65%
COMMUNAL	N/A
WEIGHTED AVERAGE	58%

Figure 6.1.1: Average Set Out For Green Bin Waste (%)

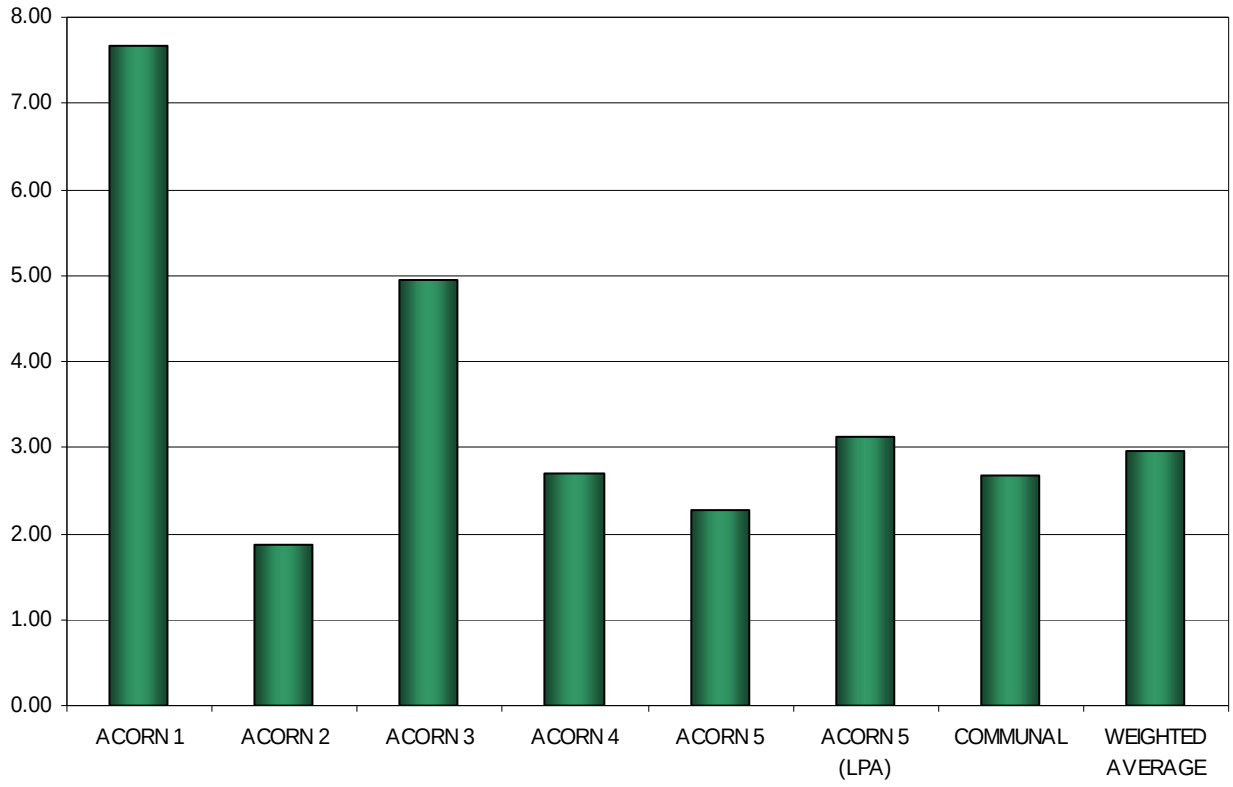


In this survey the amount of green bin recycling generated ranged between 1.86kg/hh/wk from Acorn 2 to 7.66kg/hh/wk from Acorn 1. Across Cambridge around 2.96kg/hh/wk organically recycled waste is being collected from the kerbside.

Table 6.1.2: Average green bin waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	7.66
2	1.86
3	4.95
4	2.71
5	2.27
5 (LPA)	3.13
COMMUNAL	2.69
WEIGHTED AVERAGE	2.96

Figure 6.1.2: Average green bin waste generation rates (kg/hh/wk)



6.2 Compositional analysis of green recycling bins

This section looks at the average amount and composition of the green bin organic recycling waste presented by participating households sampled throughout Cambridge. Results can again be expressed in terms of percentage concentration and kg/hh/wk for individual samples and in relation to the household Acorn surveyed.

Table 6.2.1 and Figure 6.2.1 show green bin recycling data in terms of percentage composition with Table 6.2.2 and Figure 6.2.2 showing average generation rates for major materials in terms of kg/hh/wk. As residual waste will contain a proportion that is classified as potentially recyclable; then recycling waste will contain a faction that is deemed to be contamination. That is to say that it is not compatible with the materials currently acceptable to the green bin recycling scheme.

Table 6.2.1: Average Composition of organic recycling (% concentration) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	2.50%	1.99%	11.17%	10.82%	6.71%	2.90%	25.30%	5.93%
NON-HOME COMPOSTABLE FOODS	0.66%	15.64%	3.09%	7.53%	0.88%	9.13%	1.41%	6.38%
FLORA ORGANICS	92.93%	79.43%	81.99%	74.25%	77.77%	72.68%	0.39%	82.30%
OTHER ACCEPTABLE ORGANICS	3.67%	2.83%	1.24%	2.73%	4.95%	13.64%	41.62%	2.84%
SOIL & TURF	0.00%	0.00%	0.00%	4.22%	0.00%	0.00%	0.00%	0.13%
NON-RECYCLABLE PAPER & CARD	0.00%	0.11%	0.02%	0.08%	0.13%	1.01%	8.60%	0.06%
PLASTICS	0.00%	0.00%	0.02%	0.00%	0.07%	0.00%	6.17%	0.02%
TEXTILES	0.24%	0.00%	0.00%	0.00%	3.37%	0.00%	2.21%	0.59%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.00%
ALL OTHER WASTE	0.00%	0.00%	2.47%	0.36%	6.13%	0.64%	13.52%	1.75%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6.2.2: Average Composition of organic recycling (kg/hh/wk) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	0.19	0.04	0.55	0.29	0.15	0.09	0.68	0.18
NON-HOME COMPOSTABLE FOODS	0.05	0.29	0.15	0.20	0.02	0.29	0.04	0.19
FLORA ORGANICS	7.12	1.48	4.06	2.01	1.77	2.28	0.01	2.43
OTHER ACCEPTABLE ORGANICS	0.28	0.05	0.06	0.07	0.11	0.43	1.12	0.08
SOIL & TURF	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER & CARD	0.00	0.00	0.00	0.00	0.00	0.03	0.23	0.00
PLASTICS	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00
TEXTILES	0.02	0.00	0.00	0.00	0.08	0.00	0.06	0.02
GLASS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
ALL OTHER WASTE	0.00	0.00	0.12	0.01	0.14	0.02	0.36	0.05
TOTAL	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96

Figure 6.2.1: Average Composition of organic recycling (% by weight) by Acorn

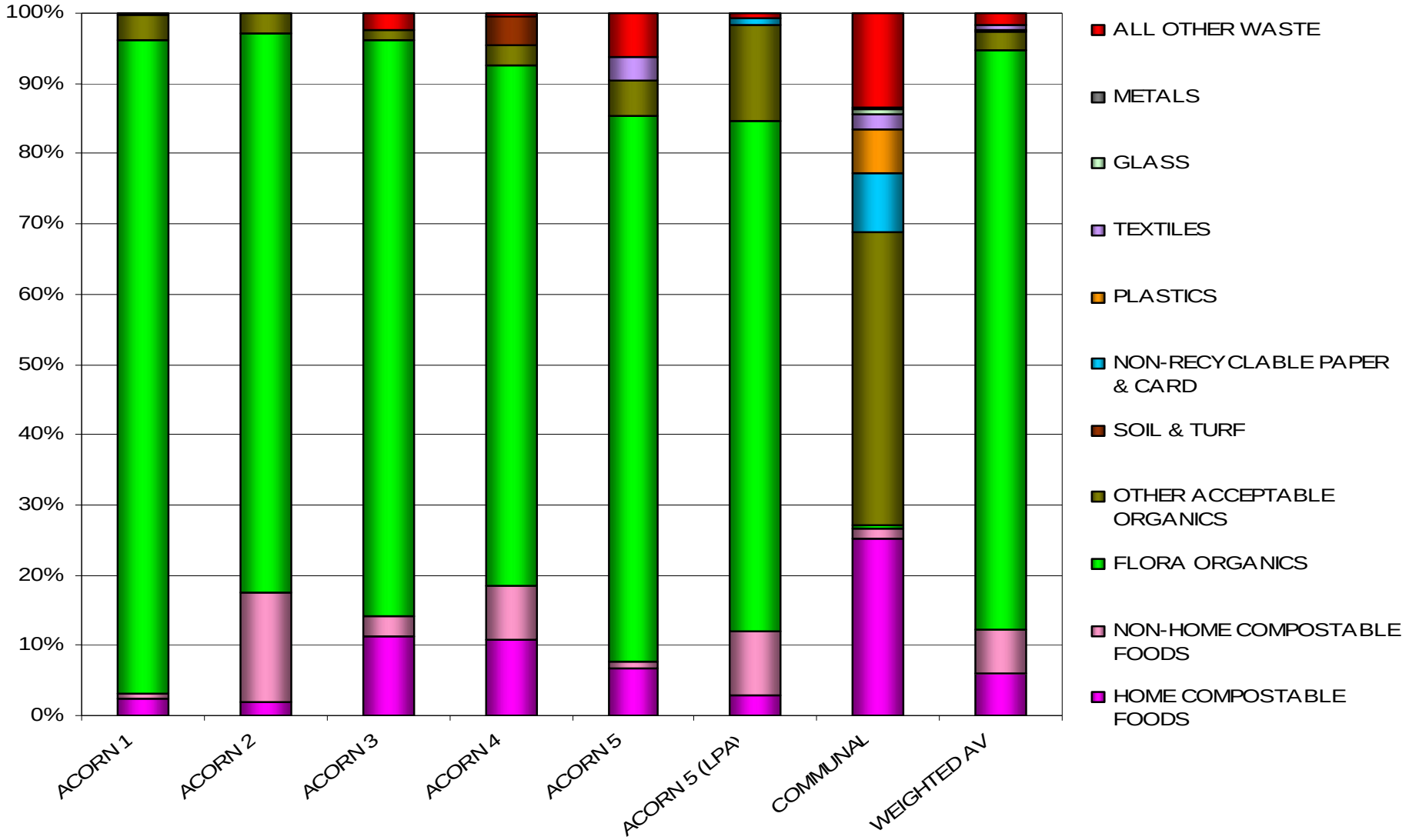
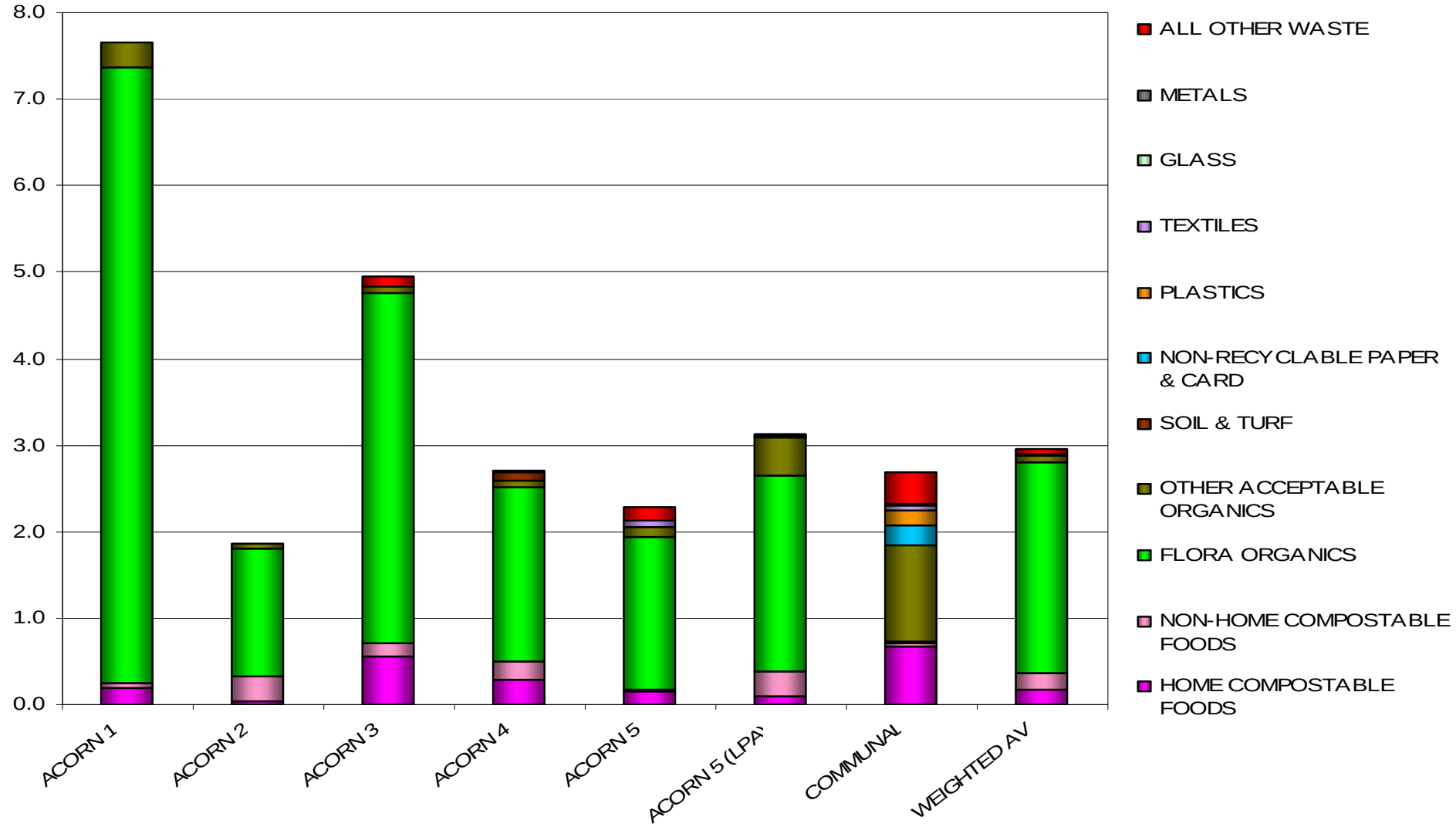


Figure 6.2.2: Composition of organic recycling (kg/hh/wk) by Acorn



6.3 Materials placed out for green bin recycling collections

This chapter looks in more detail at the individual materials placed out for green bin recycling collections and highlights the effectiveness with which this scheme is capturing these items. Looking at the relationship between the residual, dry recycling and green bin recycling waste presented will additionally give indications as to the overall diversion being achieved throughout Cambridge.

Table 6.3.1: Summary table for material capture and diversion rates (%) for green bin recycling

CAPTURE & DIVERSION RATES (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	46.37%	4.67%	58.24%	38.15%	24.18%	14.92%	46.36%	23.12%
NON-HOME COMPOSTABLE FOODS*	9.71%	35.45%	15.16%	13.65%	1.61%	25.11%	3.37%	20.00%
ALL FOOD WASTE	25.96%	20.33%	36.04%	21.97%	9.25%	21.56%	27.69%	21.39%
FLORA ORGANICS	98.55%	93.12%	100.00%	96.06%	98.29%	91.73%	7.40%	97.15%
PET BEDDING & UNTREATED WOOD	100.00%	N/A	N/A	0.00%	N/A	100.00%	100.00%	75.69%
ACCEPTABLE PAPER & CARD	4.14%	2.37%	3.07%	4.56%	5.27%	7.22%	32.03%	3.28%
ALL ORGANICS	90.49%	56.22%	79.01%	52.97%	52.93%	65.41%	27.50%	66.27%
% DIVERSION	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%

* Contains all unidentifiable and unsortable composite food waste. Some of this will be home compostable fragments, however, due to a significant proportion being non fruit and vegetable waste; this faction is deemed non-home compostable.

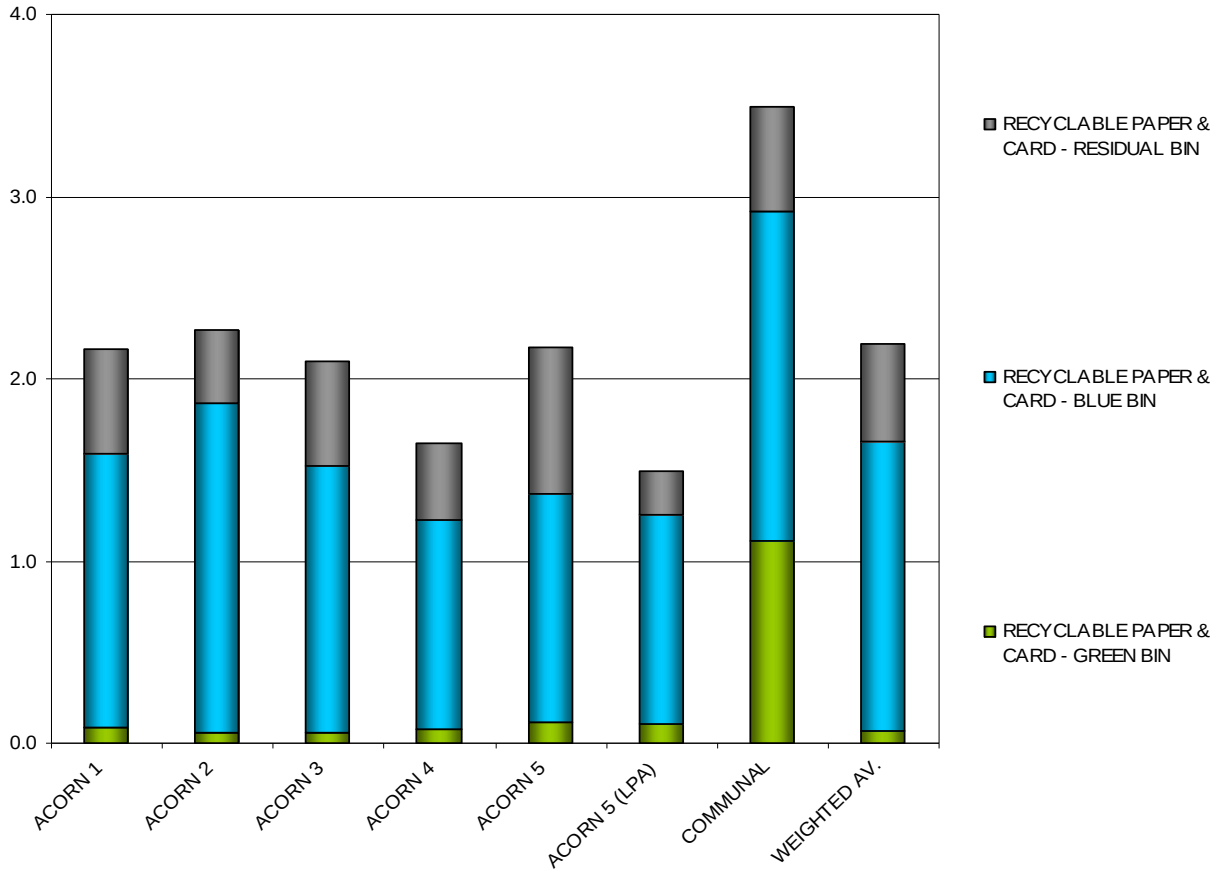
Table 6.3.1 summarises the average capture and diversion rates seen for materials achieved for the green bin organic recycling collections. By far the most efficient recyclers of organic waste were Acorn 1 households who recycled over 90% of that being generated. Acorn 3 households captured over 79% of their organics whilst the rate for Acorns 2, 4 and 5 was between 53% and 56%. IN contrast it was seen that residents in communal bin areas only managed to capture 27.5% of the organic waste that they were disposing of. Across Cambridge, 66.3% of the organics available for green bin recycling were correctly captured by participating households.

6.3.1 Paper & Card Capture

Residents are able to recycle paper, thin card and corrugated cardboard in their green bins. It is however the case that with the exception of shredded paper, it is preferable for these recyclables to be placed into blue recycling bins.

Figure 6.3.1.1. shows the distribution of recyclable paper, card and cardboard throughout the three kerbside schemes by Acorn category. It is clear that residents using communal bins not only generate the most recyclable paper and card; they also place by far the highest proportion in their green bins at 32%. Typically between 2% and 5% of all recyclable paper and card was present in green bins for Acorns 1 – 5 with just over 7% seen for the Acorn 5(LPA) sample.

Figure 6.3.1.1 Distribution of recyclable paper & card within residual and recycling samples (kg/hh/wk)



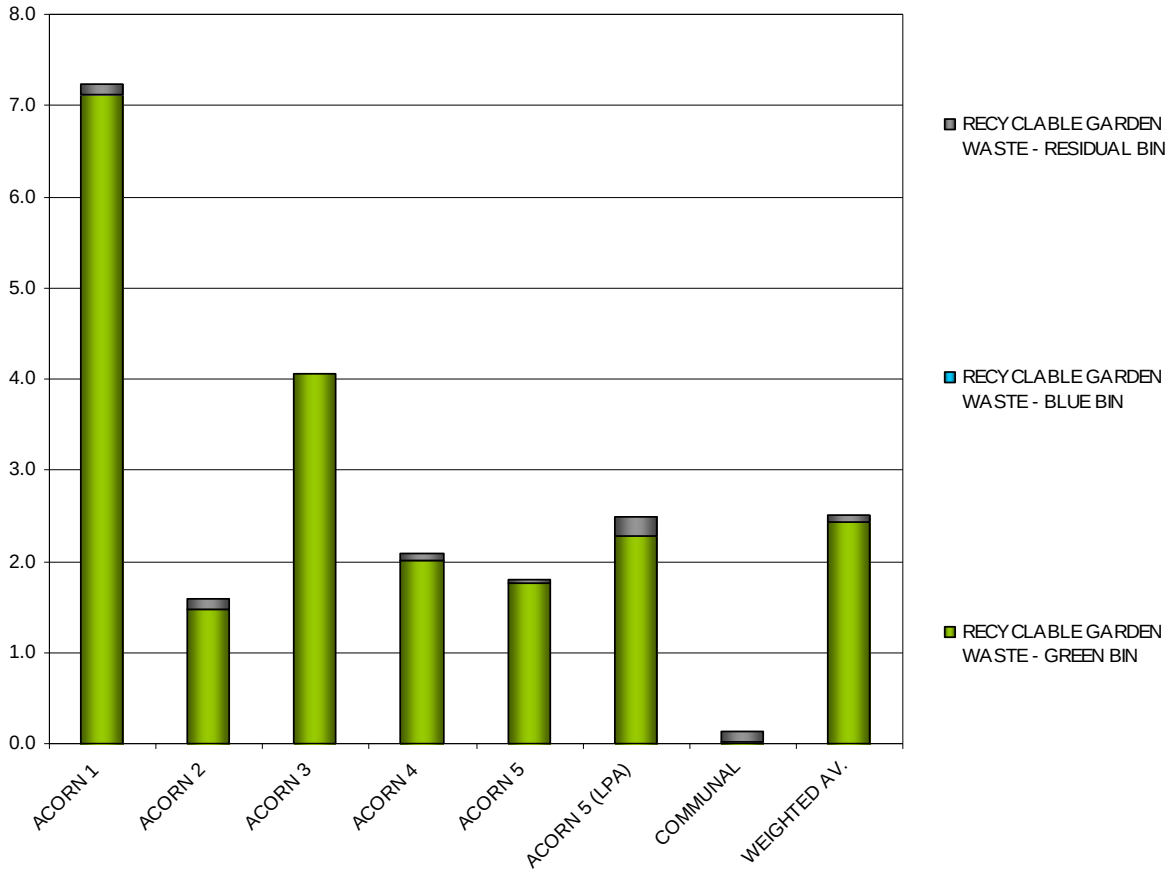
6.3.2 Garden Waste Capture

Residents are able to recycle garden clippings in their green bins. With the exception of the communal bin residents it was seen that garden waste was by far the greatest constituent of the presented organic recycling. Just 7% of garden waste was captured in communal bins areas although very little of this type of waste is actually generated. On average it is seen that over 97% of the available garden waste is recycled by Cambridge residents. All Acorns recorded capture rates of between 92% and 100%.

It is seen that communal bin households generated just 0.13kg/hh/wk of recyclable garden waste compared with 7.23kg/hh/wk from Acorn 1 households. On average residents throughout Cambridge create 2.51kg/hh/wk of recyclable garden waste.

Soil and turf are also classed as garden waste but are not allowable in green bins. This waste was only generated in low amounts across Cambridge (0.02kg/hh/wk) with around 22% ending up in green bins.

Figure 6.3.2.1. Distribution of garden waste within residual and recycling samples (kg/hh/wk)



6.3.3 Food Waste Capture

Residents are able to all forms of food waste in their green bins. Capture rates were seen to vary greatly across the samples taken. Food waste can broadly be divided into two types. Firstly 'home-compostable' which covers things like raw fruit and vegetable waste, egg shells, tea bags etc which could potentially be composted in standard compost bins. Non-home compostable food are generally cooked and prepared foods and plate scrapings which residents would not normally compost with their garden, fruit and vegetable wastes.

Overall capture rates for all food waste varied at between 9.3% in Acorn 5 up to 36% in Acorn 3. This represented an average figure of 21.4% for Cambridge. Acorn 1 households produced just 0.93kg/hh/wk of total food waste compared with 2.59kg/hh/wk from communal bin households. On average Cambridge residents are producing of 1.70kg/hh/wk of food waste.

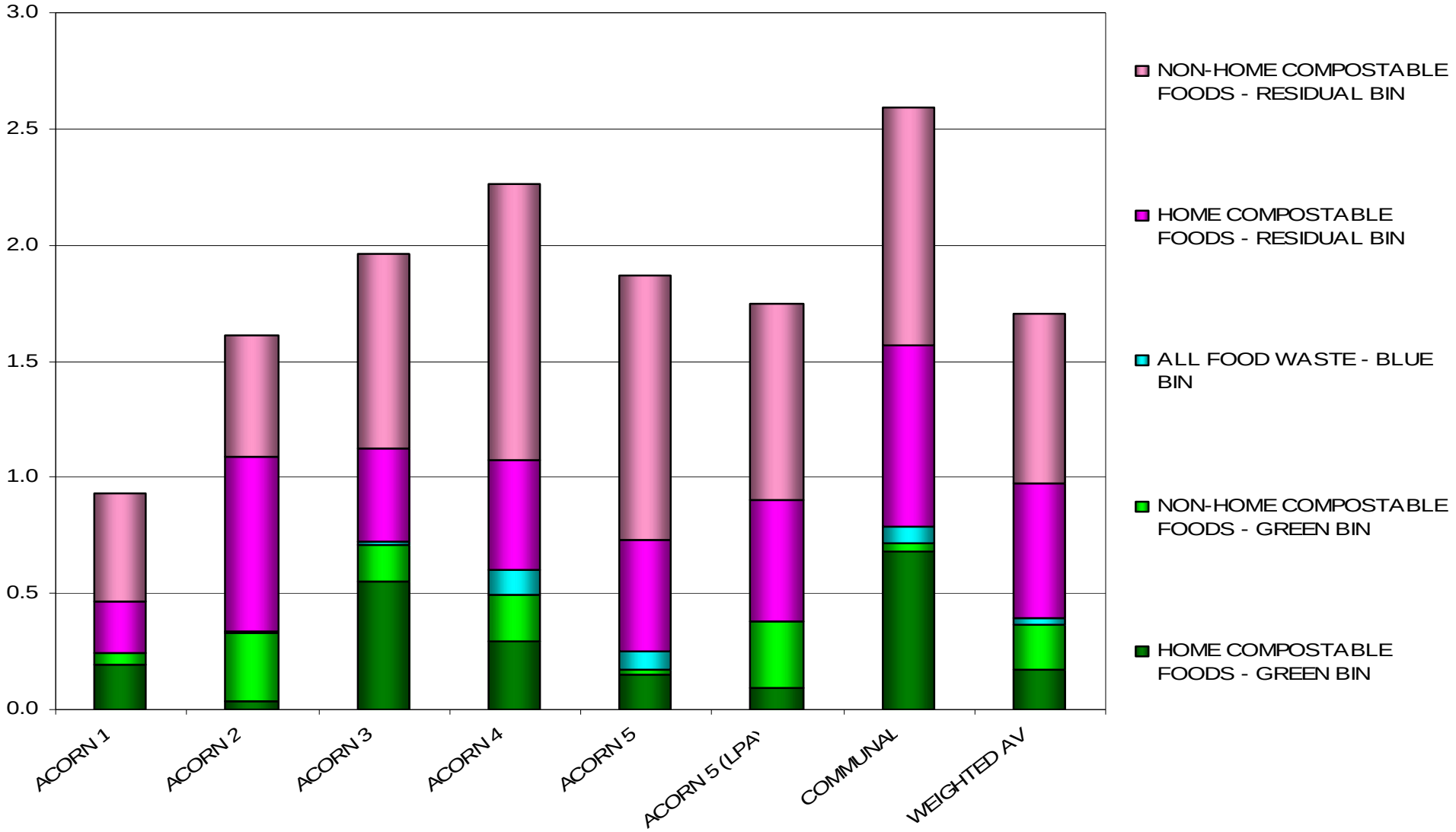
As well as differences in the levels and capture rates for food waste between the Acorn samples, there was a significant difference between the types of food being recycled. Home compostable food waste is generally less 'messy' than non-home compostable food waste and was seen to have capture rates of between 4.7% (Acorn 2) and 58.2% (Acorn 3) at an average of 23.1%. Conversely capture rates for non-home compostable food waste were lower at between 1.6% (Acorn 5) and 35.5% (Acorn 2); an average of 20%.

In terms of diversion solely through the green bin recycling it is seen that just 12.5% diversion is achieved by communal bin users compared with almost 54% for Acorn 1. Overall this is an average diversion of 23.1% which is very similar to that recorded for blue bins. Total diversion rates for the combined recycling collections are shown in section 7.

With the exception of communal bin users, all sample areas were seen to generate more non-home compostable food waste than home compostable food waste at average figures of 0.94kg/hh/wk and 0.76kg/hh/wk respectively. During the sorting of the waste it is the method to class some of the food waste as unidentifiable or unsortable. This is basically a degraded mixture of foods which are recyclable and are classified as non-compostable as will contain waste other than fruit and vegetable matter.

Figure 6.3.3.1 shows the distribution and levels of food waste throughout the residual and green bin containers. Overall, 0.58kg/hh/wk of home compostable and 0.75kg/hh/wk of non-home composable food waste is not being recycled in the green bins. This represents a total of 1.34kg/hh/wk of potentially recyclable material.

Figure 6.3.2.1. Distribution of food waste within residual and recycling samples (kg/hh/wk)



6.4 Green Bin Recycling Contamination

From Table 6.2.1 it has been shown that between 0.1% (Acorn 2) and 31.3% (communal bin users) of collected green bin recycling is due to contamination. Across Cambridge approximately 2.6% of green bin recycling waste was not compatible with the accepted materials, equating to 0.08kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the green bin recycling waste in Cambridge.

Table 6.4.1 and Figures 6.4.1 and 6.4.2 show the proportions of contamination materials in each area.

Table 6.4.1: Percentage breakdown of contamination in green bin waste

% BREAKDOWN OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
SOIL & TURF	0.00%	0.00%	0.00%	90.45%	0.00%	0.00%	0.00%	5.28%
NON-RECYCLABLE PAPER & CARD	0.00%	100.00%	0.65%	1.77%	1.31%	61.27%	27.50%	2.47%
PLASTICS	0.00%	0.00%	0.65%	0.00%	0.76%	0.00%	19.71%	0.66%
TEXTILES	100.00%	0.00%	0.00%	0.00%	34.71%	0.00%	7.07%	22.96%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.70%	<0.01%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.79%	<0.01%
ALL OTHER WASTE	0.00%	0.00%	98.70%	7.78%	63.22%	38.73%	43.22%	68.63%
TOTAL CONTAMINATION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
CONTAMINATION KG/HH/WK	0.02	0.00	0.12	0.13	0.22	0.05	0.84	0.08
% CONTAMINATION	0.24%	0.11%	2.50%	4.67%	9.70%	1.64%	31.28%	2.55%

Figure 6.4.1: Contamination materials in green bin recycling

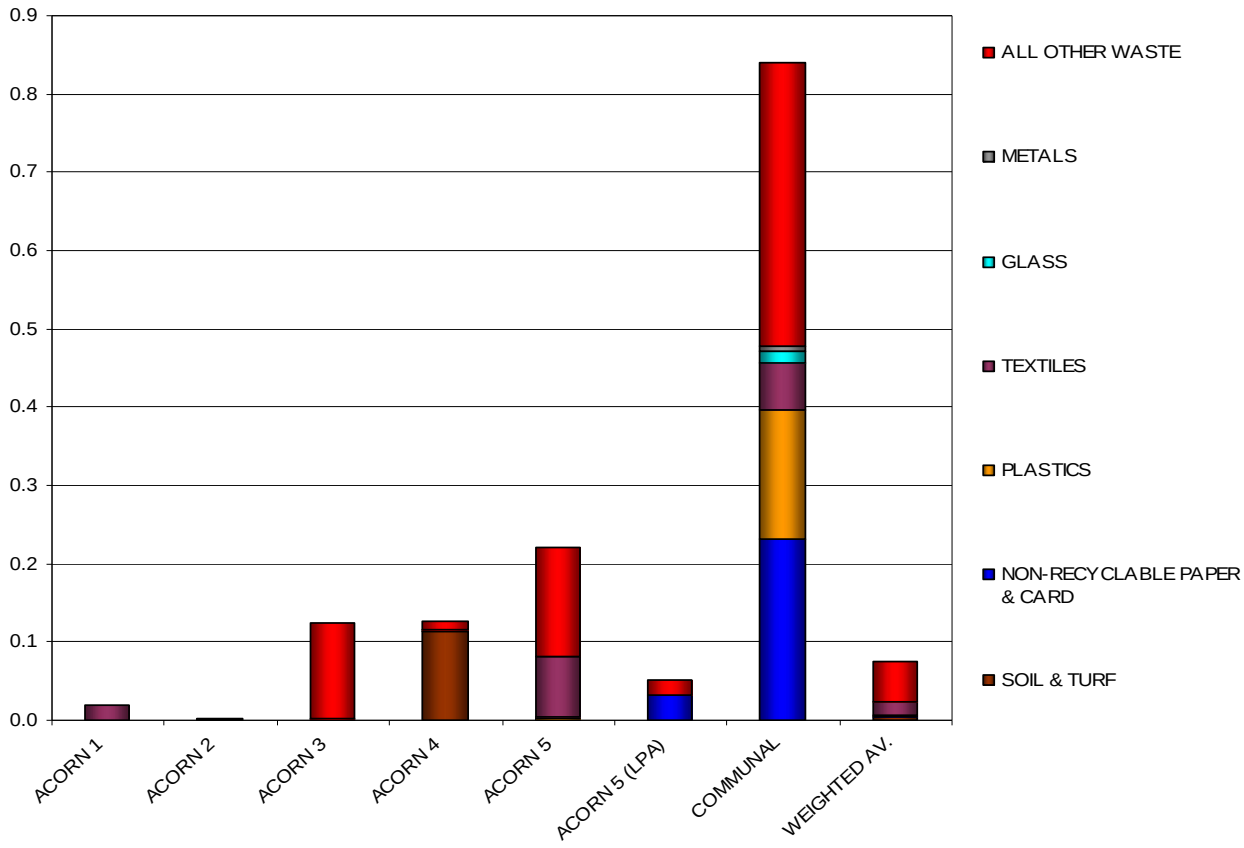
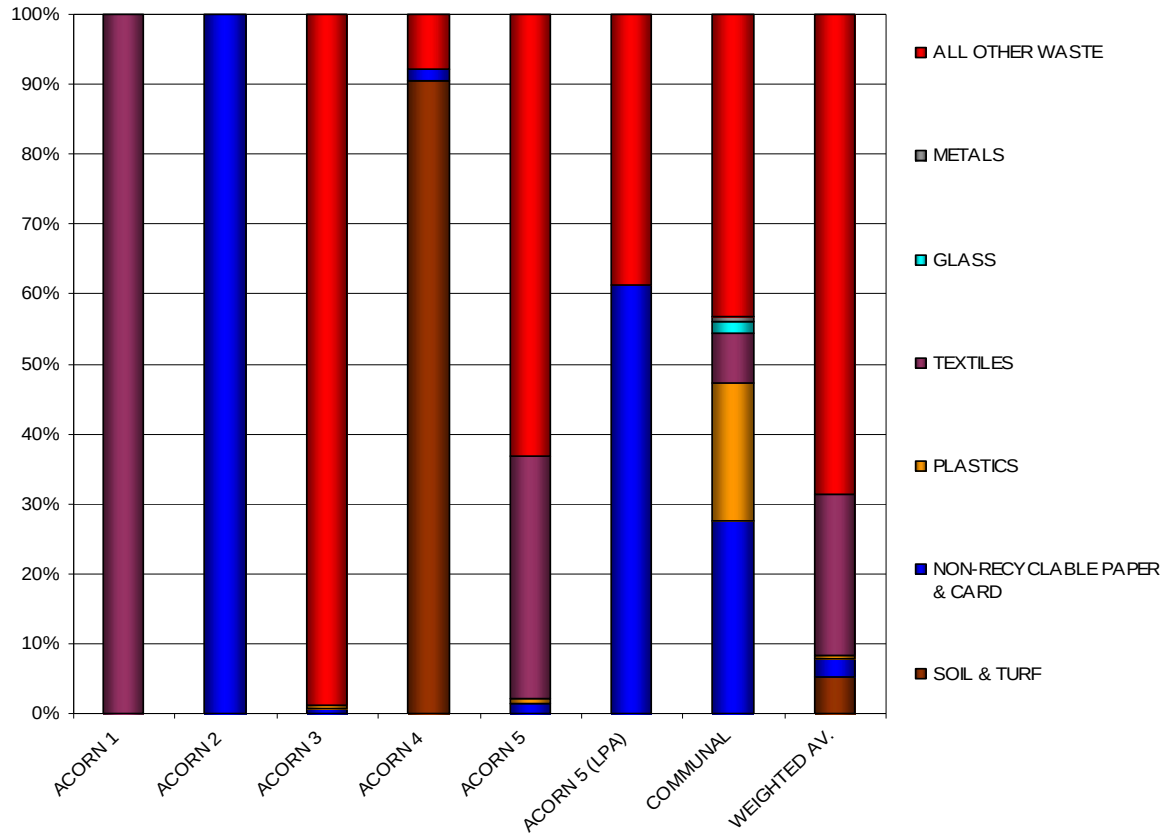


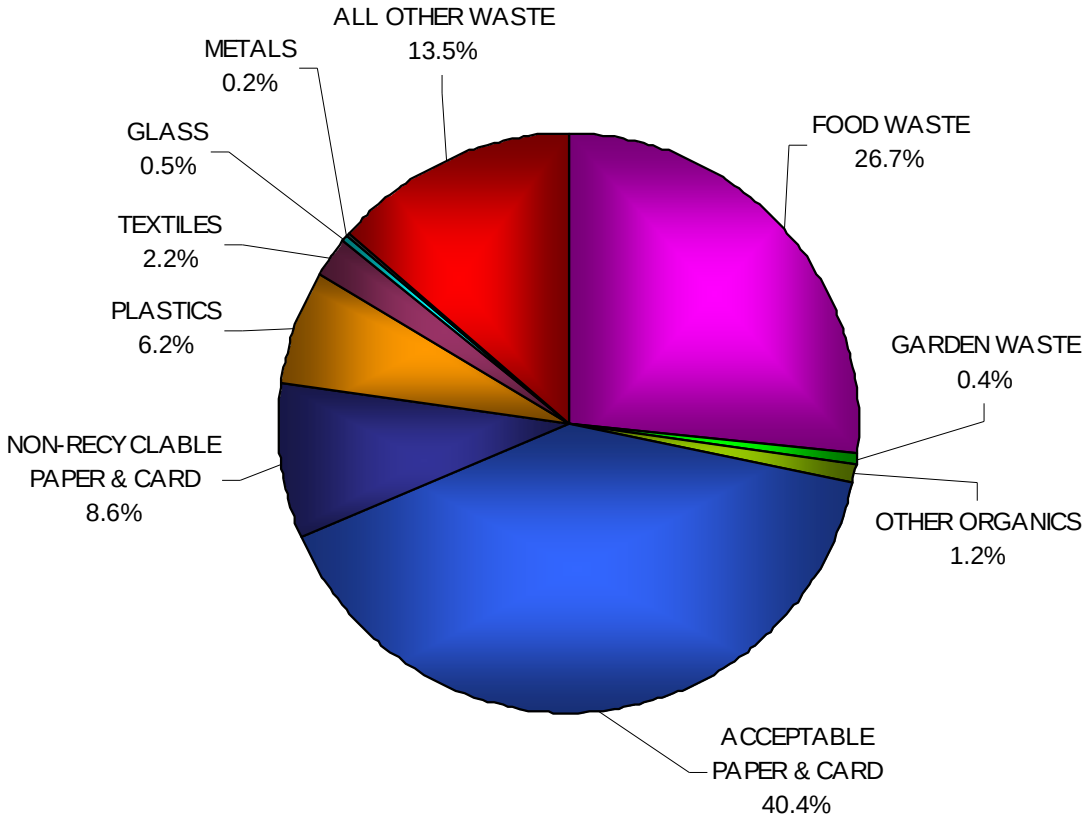
Figure 6.4.2: % breakdown of contaminants within green recycling bins



Overall it was seen that 68.8% of the contamination was due to miscellaneous other waste. This would be a mixture of general waste that can generally be considered to be residual waste. This material formed up to 99% of the contamination seen in Acorn 3 green bins. Up to 23% of contamination was due to textile waste. Around 35% of Acorn 5 green bin contamination was due to waste textiles. All of the contamination in Acorn 2 green bins was due to non-recyclable paper and card and over 90% of the contamination in Acorn 4 was due to soil and turf. Combined these wastes formed just under 8% of the contamination.

The composition of the organic recycling collected from households using communal bins was markedly different from all of the other samples. Of the 2.69kg/hh/wk presented up to 0.84kg/hh/wk or 31.3% was due to contaminants; this was far greater than any of the other samples. A wide range of contaminants including general residual waste, glass, metal and plastic were seen in these recycling bins and they appear to be used by residents as general waste disposal containers. These bins also contain significantly more paper and cardboard waste than other sample surveyed.

Figure 6.4.3 % breakdown of contaminants within green recycling bins from communal users



7) Overall Diversion through Recycling Collections

7.1 Total waste generation levels & diversion

Capture rates determine how much of a material that should be recycled actually is being recycled. Diversion rates show the percentage of total generated waste produced from an area that is being 'Diverted' via the available recycling stream(s).

Table 7.1.1 and Figure 7.1.1 show the total waste generation (residual, blue bin and green bin recycling) for each of areas sampled. Acorn 2 produced the lowest levels of total waste at 9.59kg/hh/wk with the households from Acorn 3 generating the most at 16.71kg/hh/wk. Across Cambridge it is estimated that the weekly output of kerbside waste is 12.48kg/hh/wk.

Table 7.1.2 and Figure 7.1.2 show the proportion of this total waste that is being diverted through the various kerbside recycling collections. Using the blue and green recycling bins, Cambridge residents are diverting an average of 46.8% of all waste generated at the kerbside. Residents from Acorn 1 were managing to divert almost 69% of their waste compared with 50% for Acorns 2 and 3, 42% for Acorn 4 and 32% for Acorn 5. The low performing Acorn 5 area residents also diverted around 50% of their waste with households using communal bins diverting around 34.5%.

Table 7.1.1: Average annual waste generation levels by Acorn (kg/hh/wk)

TOTAL KERBSIDE WASTE (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RESIDUAL WASTE	4.20	4.66	7.93	6.50	9.80	5.06	8.33	6.36
BLUE BIN RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16
GREEN BIN RECYCLING	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96
TOTAL WASTE	14.22	9.59	16.71	12.16	15.17	10.71	14.82	12.48

Figure 7.1.1: Total waste generation levels by Acorn (kg/hh/wk)

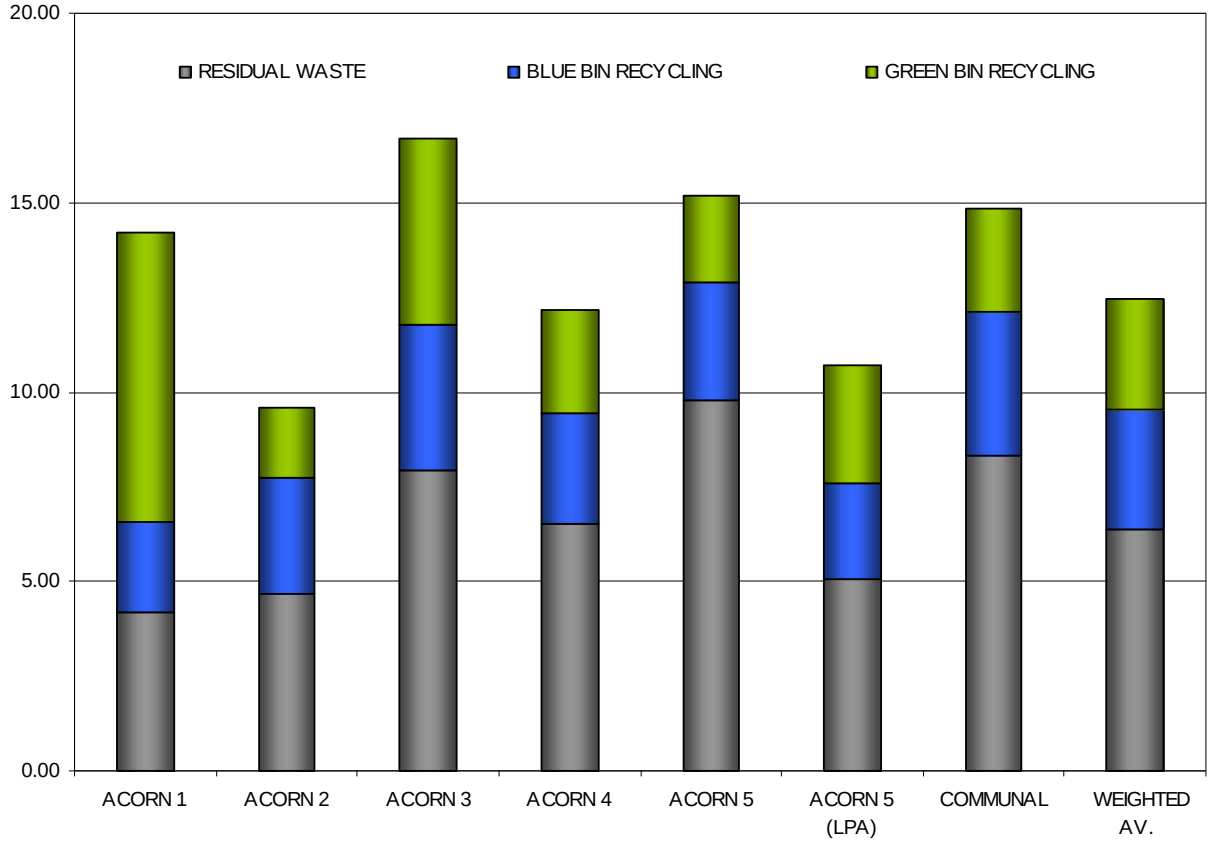
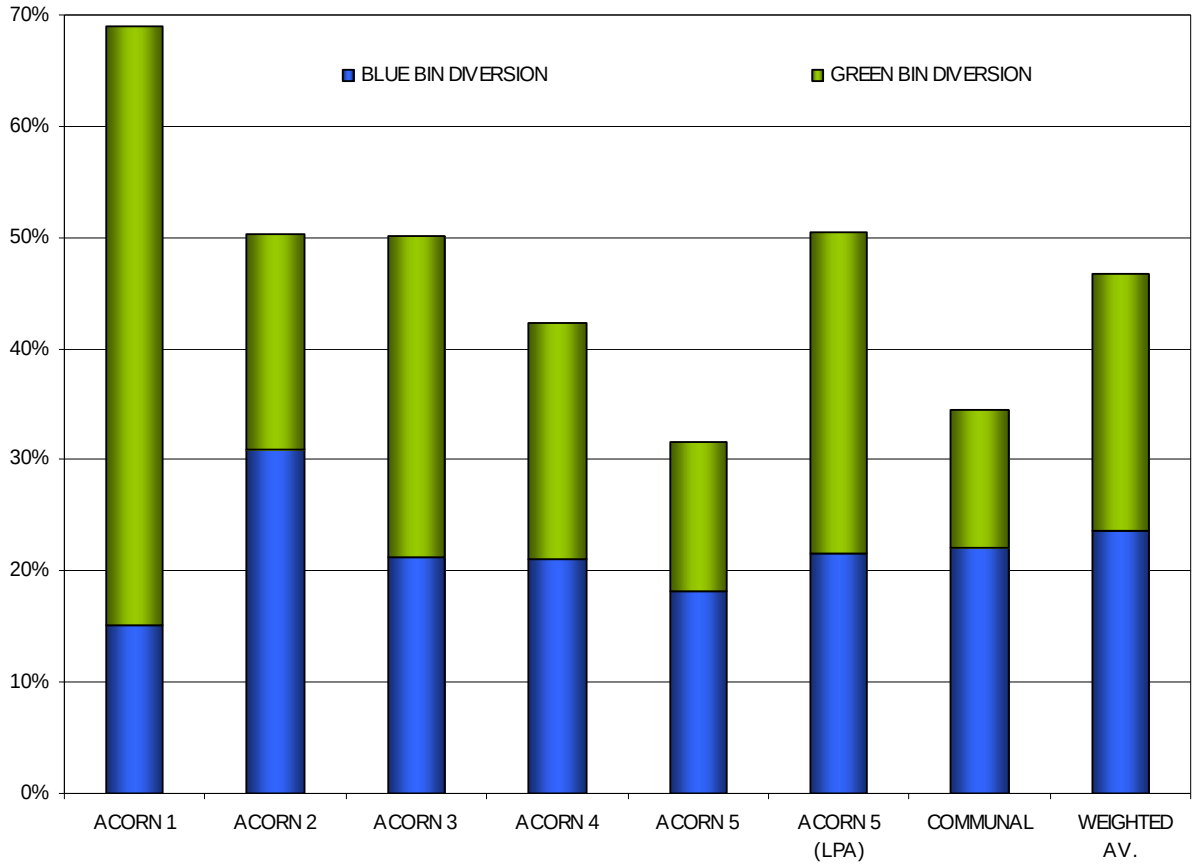


Table 7.1.2: Diversion rates (%) for individual recycling collections and overall

% DIVERSION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE RECYCLING BINS	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%
GREEN RECYCLING BINS	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%
TOTAL DIVERSION	68.96%	50.32%	50.16%	42.27%	31.65%	50.41%	34.46%	46.79%

Figure 7.1.2: Diversion rates (%) for individual recycling collections and overall



Current recycling figures for Cambridge suggest a waste diversion rate of 43.7%. Therefore weighted figures for the City during this survey show a level of around 3% above this rate and 1.8% above the aspirational target of 45% for 2012.

Data from this survey suggests a level of 331.9kg/hh/yr for residual waste and 651.1kg/hh/yr for total kerbside waste.

Were all of the currently recyclable materials being disposed of at the kerbside placed into the correct recycling bin then the maximum achievable diversion rate for Cambridge would be 65%.

Appendix 1: ACORN Category Classification[1].

ACORN 1 – WEALTHY ACHIEVERS – U.K. AVERAGE 23.3%
These are some of the most successful and affluent people in the UK. They live in wealthy, high status rural, semi-rural and suburban areas of the country. Middle-aged or older people predominate, with many empty nesters and wealthy retired. Some neighbourhoods contain large numbers of well-off families with school age children, particularly in the more suburban locations. These people live in large houses, which are usually detached with four or more bedrooms. Almost 90% are owner occupiers, with half of those owning their home outright. They are very well educated and most are employed in managerial and professional occupations. Many own their own business. Car ownership is high, with many households running two or more cars. Incomes are high, as are levels of savings and investments. These people are well established at the top of the social ladder. They enjoy all the advantages of being healthy, wealthy and confident consumers.
ACORN 2 – URBAN PROSPERITY – U.K. AVERAGE 13.3%
These are well educated and mostly prosperous people living in our major towns and cities. They include both older wealthy people living in the most exclusive parts of London and other cities, and highly educated younger professionals moving up the corporate ladder. This category also includes some well educated but less affluent individuals, such as students and graduates in their first jobs. The wealthier people tend to be in senior managerial or professional careers, and often live in large terraced or detached houses with four or more bedrooms. Some of the younger professionals may be buying or renting flats. The less affluent will be privately renting. These people have a cosmopolitan outlook and enjoy their urban lifestyle. They like to eat out in restaurants, go to the theatre and cinema and make the most of the culture and nightlife of the big city.
ACORN 3 – COMFORTABLY OFF – U.K. AVERAGE 28.1%
This category contains much of 'middle-of-the-road' Britain. Most people are comfortably off. They may not be wealthy, but they have few major financial worries. All life stages are represented in this category. Younger singles and couples, just starting out on their careers, are the dominant group in some areas. Other areas have mostly stable families and empty nesters, especially in suburban or semi-rural locations. Comfortably off pensioners, living in retirement areas around the coast or in the countryside, form the other main group in this category. Most people own their own home, with owner occupation exceeding 80%. Most houses are semidetached or detached. Employment is in a mix of professional and managerial, clerical and skilled occupations. Educational qualifications tend to be in line with the national average. This category incorporates the home-owning, stable and fairly comfortable backbone of modern Britain.
ACORN 4 – MODERATE MEANS – U.K. AVERAGE 13.2%
This category contains much of what used to be the country's industrial heartlands. Many people are still employed in traditional, blue-collar occupations. Others have become employed in service and retail jobs as the employment landscape has changed. In the better off areas, incomes are in line with the national average and people have reasonable standards of living. However, in other areas, where levels of qualifications are low, incomes can fall below the national average. There are also some isolated pockets of unemployment and long-term illness. This category also includes some neighbourhoods with very high concentrations of Asian families on low incomes. Most housing is terraced, with two or three bedrooms, and largely owner occupied. It includes many former council houses, bought by their tenants in the 1980s. Overall, the people in this category have modest lifestyles, but are able to get by.
ACORN 5 – HARD PRESSED – U.K. AVERAGE 21.7%
This category contains the poorest areas of the UK. Unemployment is well above the national average. Levels of qualifications are low and those in work are likely to be employed in unskilled occupations. Household incomes are low and there are high levels of long-term illness in some areas. Housing is a mix of low-rise estates, with terraced or semi-detached houses, and purpose built flats, including high-rise blocks. Properties tend to be small and there is much overcrowding. Over 50% of the housing is rented from the local Council or a housing association. There are a large number of single adult households, including many single Pensioners and lone parents. In some neighbourhoods, there are high numbers of black and Asian residents. These people are experiencing the most difficult social and economic conditions in the whole country, and appear to have limited opportunity to improve their circumstances.

[1] http://www.caci.co.uk/download.aspx?path=/libraries/document/394.pdf

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Cambridge City Waste Composition Analysis

Cambridge Council

May / June 2012

FINAL REPORT

Measurement ◆ Evaluation ◆ Learning

Contents Page

1) Project details and acknowledgements

Title	Cambridge City Waste Composition Analysis.
Client	Cambridge City
Project number	12012
Client reference	Final Report_Version_1
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Measurement Evaluation Learning

2) Introduction

Background

Cambridge City Council currently has a combined recycling and composting rate of 43.7% (2010/11). The Authority now wishes to study the composition of domestic kerbside collected residual and recycling waste streams to provide current baseline data and to help inform future communication campaigns. As well as giving indications as to the current levels of waste and recycling being generated, observations will be made showing the levels of materials that are currently recyclable at the kerbside and those which could potentially be recyclable via future schemes. The Council hopes to achieve 45% by the end of 2012 with a future target for 2015-16 of 50-55%.

This report presents results from the analysis of kerbside collected residual and recycling waste collected during a two week period in May / June 2012. The survey focused on the levels and composition of all waste containers that are currently available for residents to place for collection at the kerbside. The sampling regime involved the direct collection and compositional analysis of residual waste from a target of 300 properties representing each of the five main socio-demographic categories (Acorns). Results could therefore be weighted to give an even better picture of the waste being collected by the authority as a whole. Additionally around 120 properties were highlighted from a low performing area and a group of properties using communal bins. Knowledge of the waste in these differing areas will help the City Council develop strategies to increase the efficiency with which its residents are recycling their waste. The overall findings of this project will highlight several factors important for improving the recycling rate and directing future strategy and communication campaigns:

Objectives

Specific aims of the work were to:

- Understand, using socio-demographic profiling which sectors of the community are producing which types of waste and which are using the recycling provision most effectively
- Detect capture rates for individual materials which are already collected separately for recycling
- Evaluate the amount of specific materials collected in the residual bin that could potentially be collected separately for recycling
- Evaluate the use of the receptacles used for collecting waste and recycling
- Detect the amount of packaging and biodegradable material present
- Assess the amount of contamination in receptacles meant for recycling material
- Assess the amount of recyclable material being placed in the residual bin

This report will highlight key results recorded for Cambridge City showing data for individual socio-demographics as well as weighted for the City as a whole.

Acknowledgements

M·E·L Research would like to thank the collection authority and their staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results, presents the results in tables and charts and discusses the findings. The views and opinions expressed in this report are those of M.E.L Research Ltd. and are not necessarily shared by officers from Cambridge City Council.

Accuracy Statement

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

3) Executive Summary

Key findings

Kerbside residual waste

- Weighted across all Acorn samples, 84% of households sampled throughout Cambridge presented residual waste bins for collection.
- In terms of waste generation, households were setting out an average of 6.36kg/hh/wk.
- Food waste was seen to be the major component of residual waste forming 20.6% of the total, equating to 1.31kg/hh/wk – 45% of this is potentially home compostable
- Paper items made up 10.2% of the residual waste; 53% of this (0.35kg/hh/wk) was alternatively recyclable at the kerbside.
- Card and cardboard made up around 3.5% of collected residual waste; 84% of this (0.18kg/hh/wk) was alternatively recyclable at the kerbside.
- Plastics formed 14.9% of the residual waste; 10% of dense plastic waste (0.05kg/hh/wk) was due to recyclable plastic bottles with a further 0.21kg/hh/wk formed from the types of plastic containers that will be recyclable from July 2012.
- Just under 3% of residual waste was metallic; 53% of this (0.09kg/hh/wk) was recyclable in blue bins.
- Around 3% of residual waste was seen to be glass; 94% of this (0.16kg/hh/wk) was recyclable in blue bins.
- Over 6% of residual waste was due to textiles; 53% of these items (0.21kg/hh/wk) were seen to consist of reusable clothing and shoes
- Just under 1.6% of residual waste was deemed to be either Hazardous or WEEE. An additional 17% consisted of disposable nappies
- Just over 1.3% of residual waste was found to be garden waste. Around 17% of this was non-recyclable soil and turf, with the remainder consisting of recyclable garden trimmings
- Overall just over 13% of collected residual waste could have been placed into the blue recycling containers available– the equivalent of 0.84kg/hh/wk.
- Just under 22% of collected residual waste could have been placed into the green recycling containers available– the equivalent of 1.40kg/hh/wk.
- In total over 35% of residual waste collected could have been recycled alternatively at the kerbside – 2.23kg/hh/wk.
- Around 59% of potentially recyclable materials consisted of food waste with 15% being paper and 8% being card and cardboard.
- Residual waste collected from Cambridge households was deemed to be around 51% biodegradable.
- Collected waste had a packaging content of 17%.

Mixed recycling – Blue bins

- Over the survey, 78% of households presented blue bins for collection
- In terms of waste generation, kerbside households were setting out an average of 3.16kg/hh/wk in their blue bins.
- Overall 6.4% of blue bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.20kg/hh/wk.
- Around 77% of paper, 87% of recyclable glass, 73% of card and cardboard, 78% of plastic bottles and 59% of the recyclable metals available for mixed recycling were correctly captured.
- Kerbside properties diverted around 23.7% of their waste through their blue bins.

Organic waste recycling – Green bins

- Over the survey, 58% of households opted to present their green organic recycling bins at the kerbside for collection.
- In terms of waste generation, households were setting out an average of 2.96kg/hh/wk at the kerbside.
- Overall 2.6% of green bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.08kg/hh/wk.
- Green bins collected from households on a communal service had very high contamination levels of 31.3%. Bins had significant levels of residual waste and also large amounts of paper and cardboard.
- The majority of contamination of green bin waste was due to general residual materials; forming 69% of the contamination. Up to 23% of contamination was due to textiles.
- 21% of food waste and 97% of garden waste was correctly captured by households using the scheme.
- Properties on the green bin collection scheme diverted an average of around 23.1% of their waste through these collections.
- When combined with the diversion through mixed recycling collections, Cambridge households are diverting around 46.8% (5.84kg/hh/wk) of their total waste (12.48kg/hh/wk) through recycling collections.

4) Compositional Analysis of Residual Waste

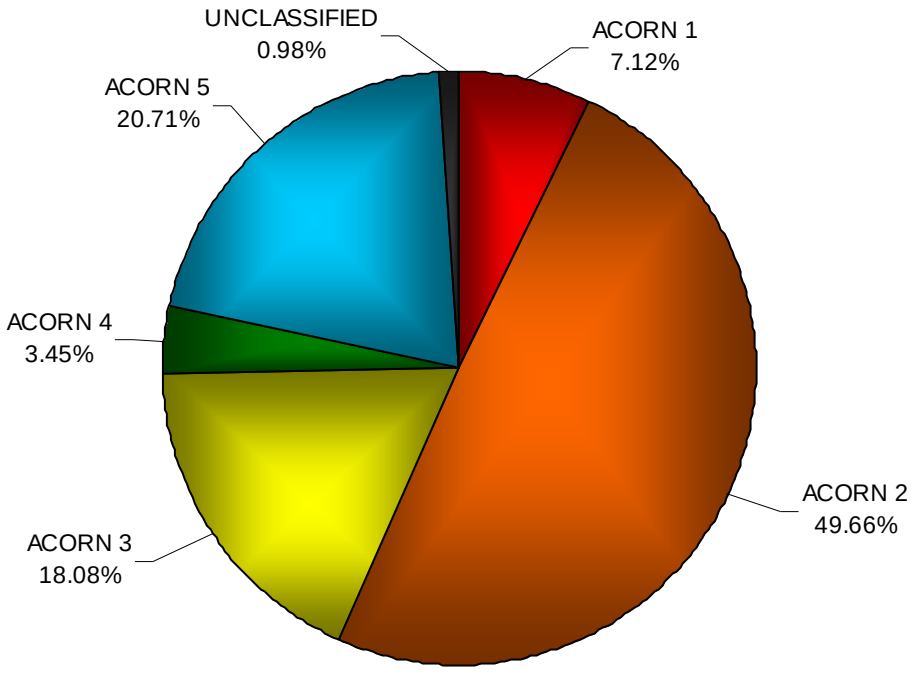
4.1 Set out rates and waste generation levels

Table 4.1.2 and Figure 4.1.2 highlight the average set out rates for residual waste observed at the time waste was collected for compositional analysis. Table 4.1.3 and Figure 4.1.3 show the average amount of residual waste generated in kg/hh/wk. Around 60 households were selected for each sample from each Acorn category with the set out relating to the proportion of these households actively placing out their waste. The amount of waste in kilograms per household per week is collected from each sample of 60 households, not just those that are participating. Results are shown by Acorn; as all five Acorn categories were sampled it was possible to weight the results according to the socio-demographic profile for Cambridge as per Table 4.1.1. A table giving a brief description of the types of households typical for each Acorn category is shown in the appendix section.

Table 4.1.1: Acorn profile for Cambridge

ACORN	% SET OUT
1	7.12%
2	49.66%
3	18.08%
4	3.45%
5	20.71%
UNCLASSIFIED	0.98%
TOTAL	100%

Figure 4.1.1: Acorn profile for Cambridge



Observed set out rates for residual waste ranged between 71% in the low performing Acorn 5 area (LPA) to 95% in Acorn 3. On average 84% of households in Cambridge are projected to be setting out their residual waste for collection.

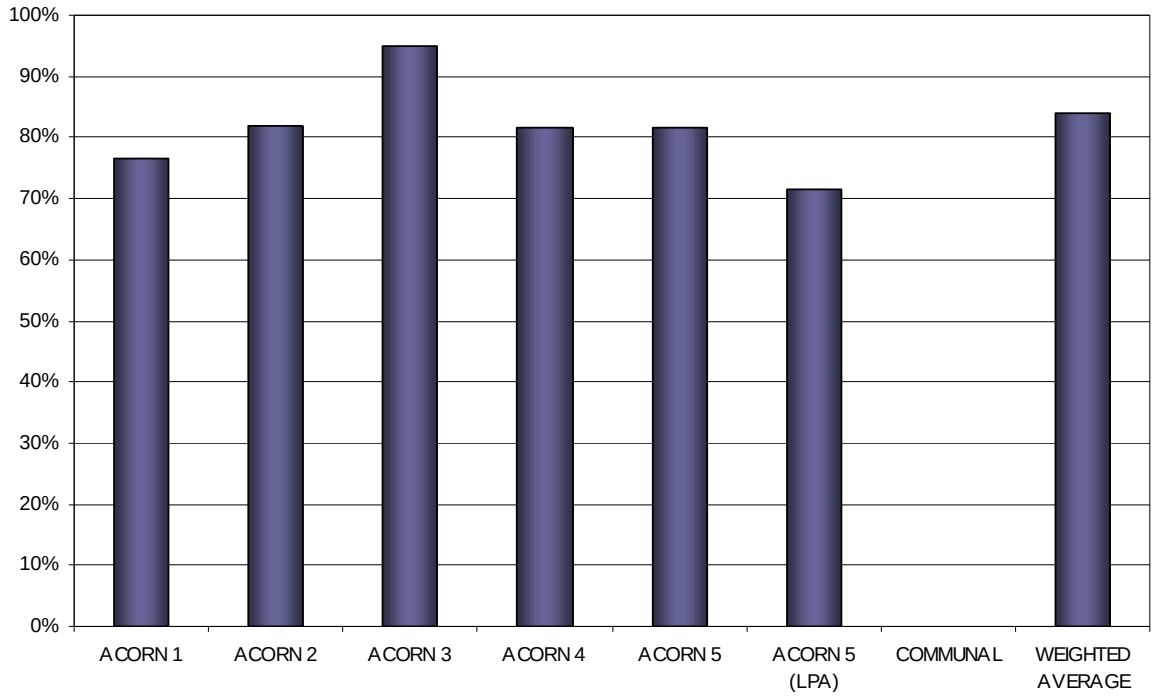
Table 4.1.2: Kerbside residual waste set out rates for each Acorn sample

ACORN	% SET OUT
1	77%
2	82%
3	95%
4	82%
5	82%
5 (LPA)*	71%
COMMUNAL	N/A**
WEIGHTED AVERAGE	84%

***Acorn 5 Low Performing Area**

**** Do not have their own bin so set out is not applicable**

Figure 4.1.2: Kerbside residual waste set out rates by Acorn (%)

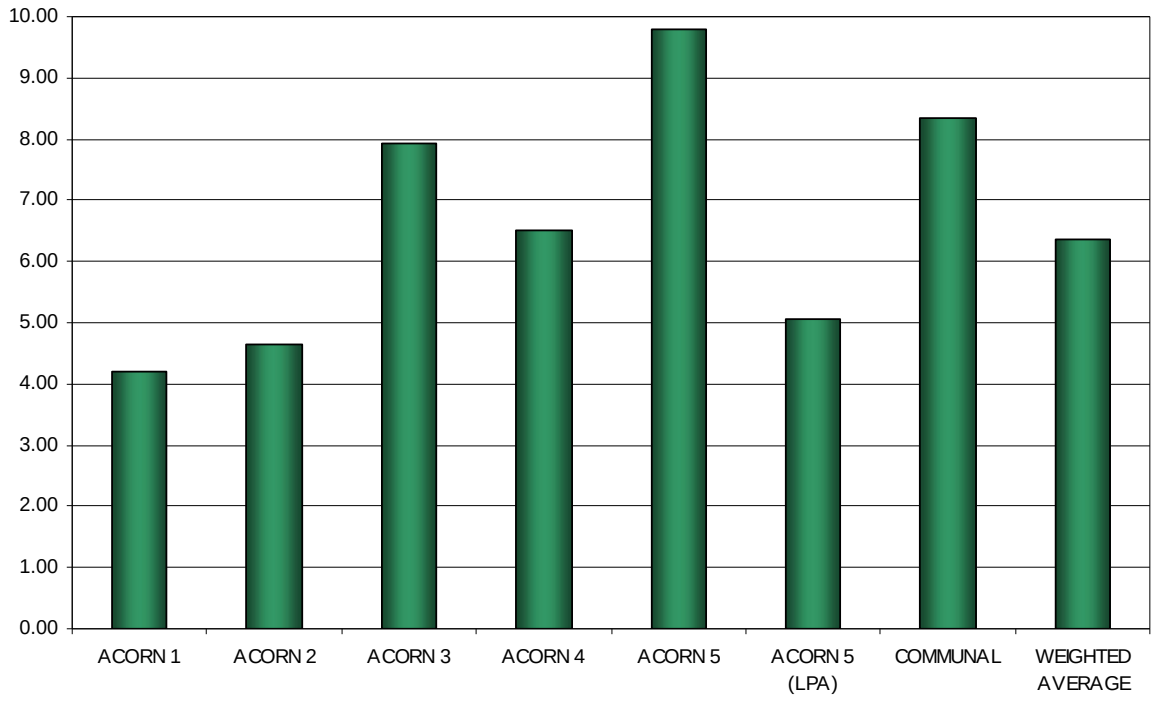


From observed results, the level of residual waste being disposed of at the kerbside ranged between 4.20kg/hh/wk in Acorn 1 to 9.80kg/hh/wk in Acorn 5. On average 6.36kg/hh/wk of residual waste is being disposed of by households throughout Cambridge.

Table 4.1.3: Kerbside residual waste generation rates for each Acorn sample (kg/hh/wk)

ACORN	KG/HH/WK
1	4.20
2	4.66
3	7.93
4	6.50
5	9.80
5 (LPA)	5.06
COMMUNAL	8.33
WEIGHTED AVERAGE	6.36

Figure 4.1.3: Average residual waste generation rates by Acorn (kg/hh/wk)



4.2 Compositional analysis of household residual waste

This section looks at the average amount and composition of the residual waste presented by various socio-demographic households sampled throughout the City. Hand sorting of the residual waste gave concentration by weight figures for the fifteen 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).

By knowing the composition of waste from the various Acorn samples it is possible to gain an insight into the make-up and volumes of the residual waste that can be expected from the City as a whole. Additional information on the selected lower performing and communal bins areas can also be gained. Detailed residual composition tables can be found in a separate data appendix.

Table 4.2.1 and Figure 4.2.1 show residual waste data in terms of percentage composition with Table 4.2.2 and Figure 4.2.2 showing generation rates for major materials in terms of kg/hh/wk. All residual waste will contain a proportion that is classified as potentially recyclable. That is to say that is should have been placed into one of the recycling receptacles supplied by the Council.

Table 4.2.1: Average residual waste composition weighted by Acorn (%)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	13.84%	11.35%	8.51%	7.78%	9.78%	5.93%	6.74%	10.19%
CARD & CARDBOARD	5.01%	3.32%	3.11%	2.57%	3.71%	1.92%	2.77%	3.45%
PLASTIC FILM	5.36%	7.98%	6.54%	4.06%	6.07%	8.81%	5.45%	6.77%
DENSE PLASTIC	10.76%	8.28%	12.09%	6.64%	4.78%	9.45%	5.83%	8.08%
TEXTILES	1.00%	6.24%	5.48%	7.74%	7.24%	3.66%	5.71%	6.19%
MISC COMBUSTIBLES	22.52%	16.70%	28.71%	17.69%	33.61%	30.14%	35.67%	25.19%
MISC NON-COMBUSTIBLES	12.58%	7.20%	11.17%	5.22%	11.50%	0.71%	0.34%	9.67%
GLASS	1.01%	4.13%	2.48%	2.21%	1.70%	4.42%	4.59%	2.75%
FERROUS METAL	5.19%	1.92%	2.02%	2.96%	2.06%	1.03%	2.48%	2.18%
NON-FERROUS METAL	0.57%	0.78%	0.53%	0.43%	0.55%	0.83%	0.74%	0.63%
GARDEN WASTE	2.49%	2.34%	0.52%	4.26%	0.31%	4.02%	1.57%	1.35%
PUTRESCIBLES	16.52%	28.37%	16.20%	32.97%	17.10%	28.45%	24.13%	21.57%
FINES	0.52%	0.00%	0.00%	1.22%	0.93%	0.20%	0.97%	0.37%
HHW	1.47%	0.30%	1.33%	0.00%	0.00%	0.03%	0.10%	0.48%
WEEE	1.17%	1.10%	1.32%	4.27%	0.67%	0.41%	2.91%	1.13%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
BLUE BIN RECYCLABLE	**17.47%**	**15.67%**	**11.43%**	**10.41%**	**11.16%**	**11.48%**	**14.01%**	**13.15%**
GREEN BIN RECYCLABLE	**18.94%**	**29.72%**	**15.72%**	**32.64%**	**16.78%**	**31.01%**	**23.21%**	**21.95%**
TOTAL RECYCLABLE	**36.41%**	**45.39%**	**27.15%**	**43.05%**	**27.94%**	**42.50%**	**37.21%**	**35.11%**

Table 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
DENSE PLASTIC	0.45	0.39	0.96	0.43	0.47	0.48	0.49	0.51
TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
MISC COMBUSTIBLES	0.95	0.78	2.28	1.15	3.29	1.52	2.97	1.60
MISC NON-COMBUSTIBLES	0.53	0.34	0.89	0.34	1.13	0.04	0.03	0.62
GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
FERROUS METAL	0.22	0.09	0.16	0.19	0.20	0.05	0.21	0.14
NON-FERROUS METAL	0.02	0.04	0.04	0.03	0.05	0.04	0.06	0.04
GARDEN WASTE	0.10	0.11	0.04	0.28	0.03	0.20	0.13	0.09
PUTRESCIBLES	0.69	1.32	1.28	2.14	1.68	1.44	2.01	1.37
FINES	0.02	0.00	0.00	0.08	0.09	0.01	0.08	0.02
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	**4.20**	**4.66**	**7.93**	**6.50**	**9.80**	**5.06**	**8.33**	**6.36**
BLUE BIN RECYCLABLE	**0.73**	**0.73**	**0.91**	**0.68**	**1.09**	**0.58**	**1.17**	**0.84**
GREEN BIN RECYCLABLE	**0.80**	**1.38**	**1.25**	**2.12**	**1.64**	**1.57**	**1.93**	**1.40**
TOTAL RECYCLABLE	**1.53**	**2.11**	**2.15**	**2.80**	**2.74**	**2.15**	**3.10**	**2.23**

Figure 4.2.1: Average residual waste composition weighted by Acorn (%)

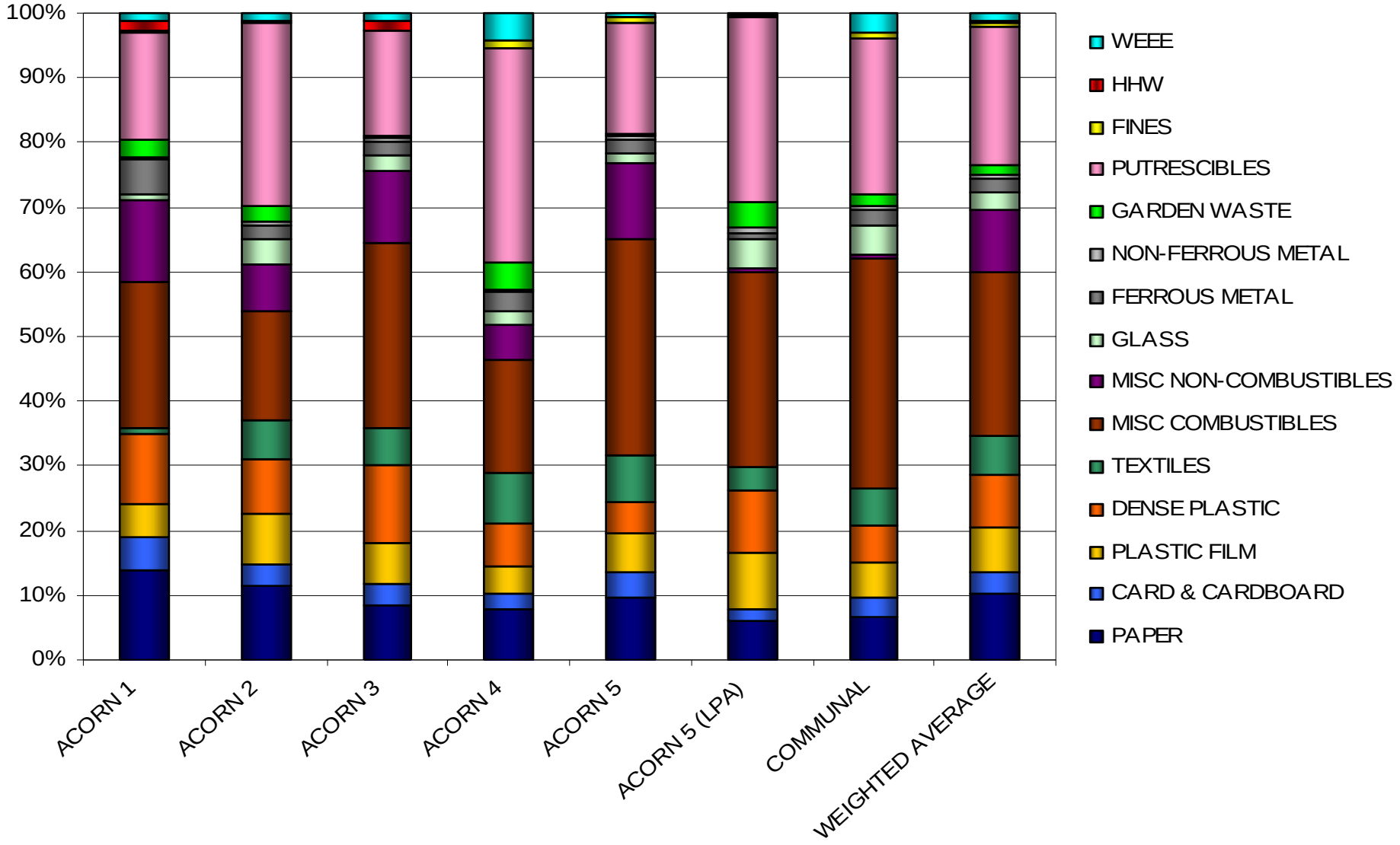
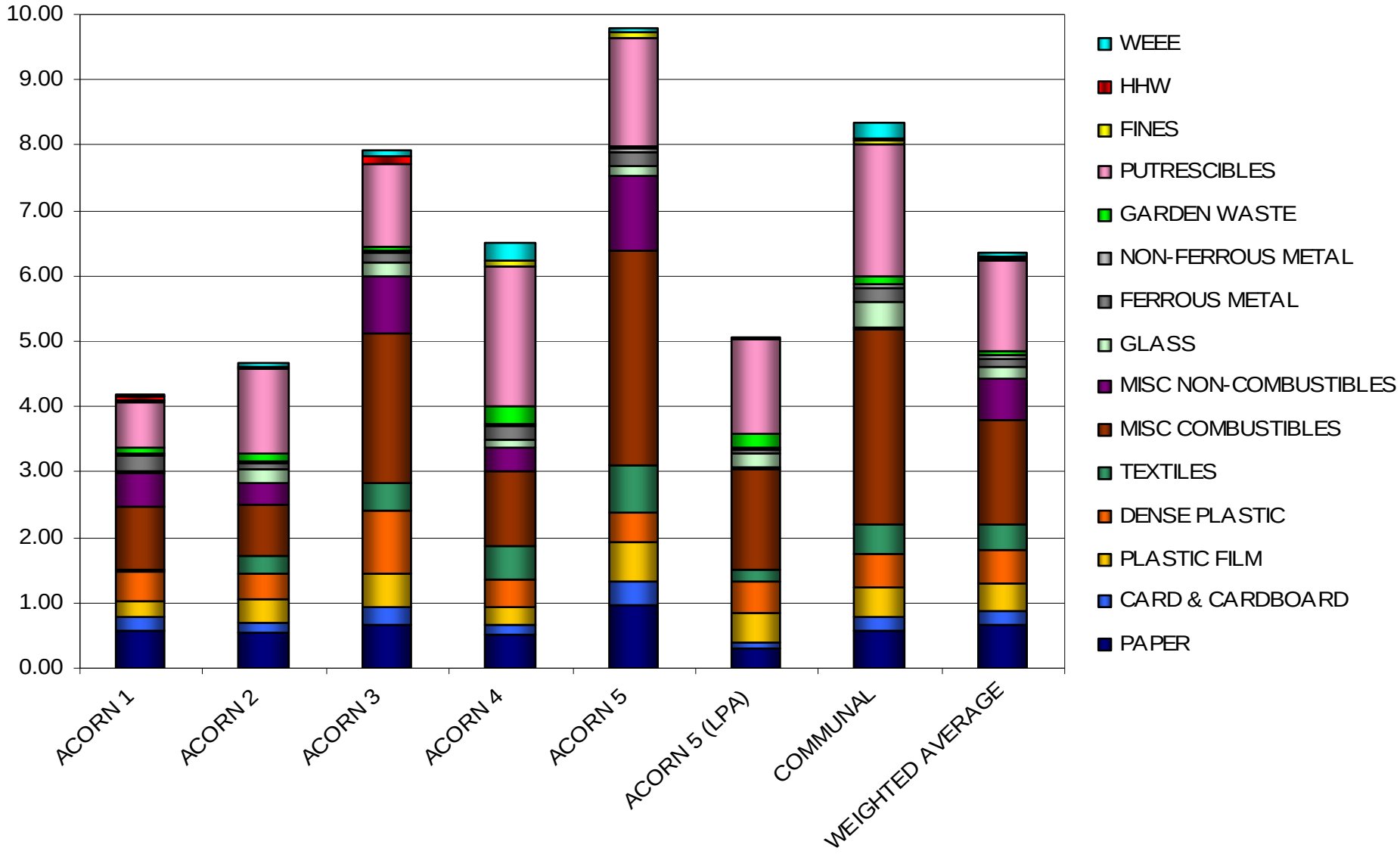


Figure 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)



4.2.1 Organic Waste

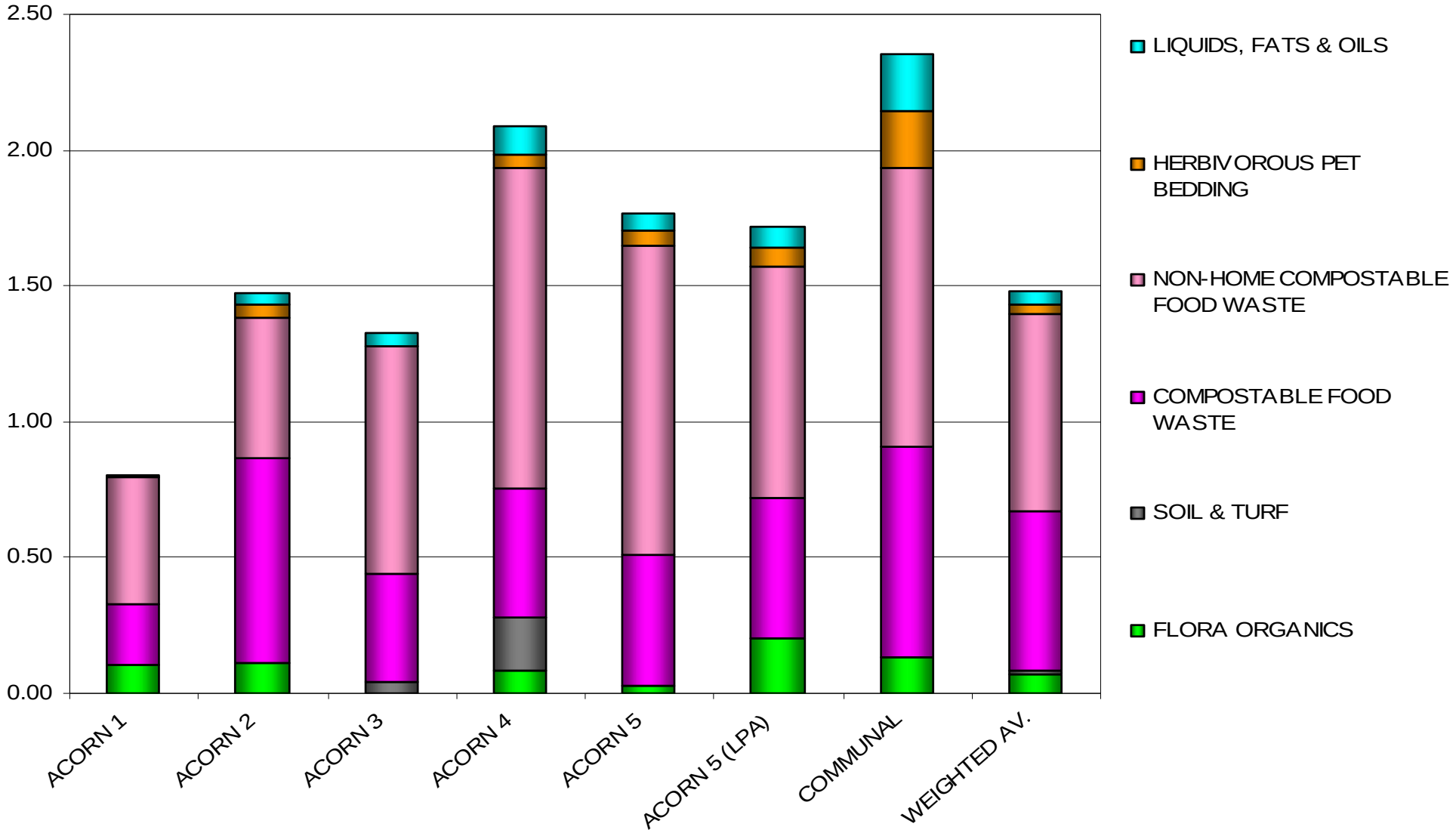
Organic waste, which includes garden and food waste (putrescibles), formed the greatest weight concentration of the primary waste categories for all Acorns. Ranges seen were from 16.7% from Acorn 3 households to 33.9% in Acorn 5 (LPA) households. Across the City as a whole around 23.3% of all residual waste (1.48kg/hh/wk) is classified as organic waste. Food waste accounted for between 15.6% (Acorn 3) and 27.4% (Acorn 2) of residual waste. Across the City as a whole around 20.6% of all residual waste (1.31kg/hh/wk) is classified as food waste. Currently Cambridge residents are able to recycle food waste at the kerbside using their green bin collection. Residents from Acorn 3 placed the most recyclable food into their residual bins at 2.81kg/hh/wk. Overall approximately 45% of this food waste (0.58kg/hh/wk) is potentially compostable in a general garden compost bin.

Residents throughout Cambridge can also utilise their green bins for the collection of general garden waste. In Acorns 3 and 5 levels of garden waste in residual bins were very low at 0.5% and 0.3% respectively. This equated to less than 0.05kg/hh/wk in total. In contrast the residual waste from Acorn 4 and Acorn 5(LPA) was over 4% garden waste; the equivalent of 0.28kg/hh/wk and 0.20kg/hh/wk respectively. Averaged for Cambridge it is seen that 17% of this garden waste consisted of soil and turf which is discouraged from the recycling collection. Across the City, recyclable forms of garden waste (i.e. garden clippings but not soil and turf) are responsible for an average of just 1.1%, or 0.07kg/hh/wk of residual waste. Table 4.2.1.1 and Figure 4.2.1.1 show the amounts of the different forms of organic waste found within the samples from each sample.

Table 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL ORGANICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
FLORA ORGANICS	0.10	0.11	0.00	0.08	0.03	0.20	0.13	0.07
SOIL & TURF	0.00	0.00	0.04	0.19	0.00	0.00	0.00	0.01
COMPOSTABLE FOOD WASTE	0.22	0.75	0.40	0.47	0.48	0.52	0.78	0.58
NON-HOME COMPOSTABLE FOOD WASTE	0.47	0.52	0.84	1.19	1.14	0.85	1.02	0.73
HERBIVOROUS PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	0.21	0.04
LIQUIDS, FATS & OILS	0.00	0.05	0.05	0.10	0.06	0.07	0.21	0.05
KG/HH/WK ORGANICS	0.80	1.48	1.33	2.09	1.77	1.72	2.35	1.48
% ORGANICS	19.08%	31.71%	16.71%	32.09%	18.06%	33.92%	28.22%	23.31%
KG/HH/WK FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	1.80	1.31
% FOOD WASTE	16.45%	27.37%	15.57%	25.53%	16.47%	27.00%	21.61%	20.59%

Figure 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)



4.2.2 Paper

On average, Acorn 1 residents had the highest concentrations of this type of waste (13.8%), with Acorn 5 disposing of the most at 0.96kg/hh/wk. In comparison just 5.9% (0.30kg/hh/wk) of residual waste from Acorn 5(LPA) was due to paper based materials. Across the City it was seen that around 10.2% or 0.65kg/hh/wk of residual waste consisted of discarded paper.

A proportion of this paper is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling higher grade white paper such as newspapers, junk mail, envelopes and directories. In addition to this higher grade paper, Cambridge residents are able to place shredded paper into their green organics bin. It was found that between 50.5% (Acorn 3 and Acorn 5(LPA) and 74.8% (Acorn 1) of paper could have been placed in either the blue or green bins as opposed to the residual bin.

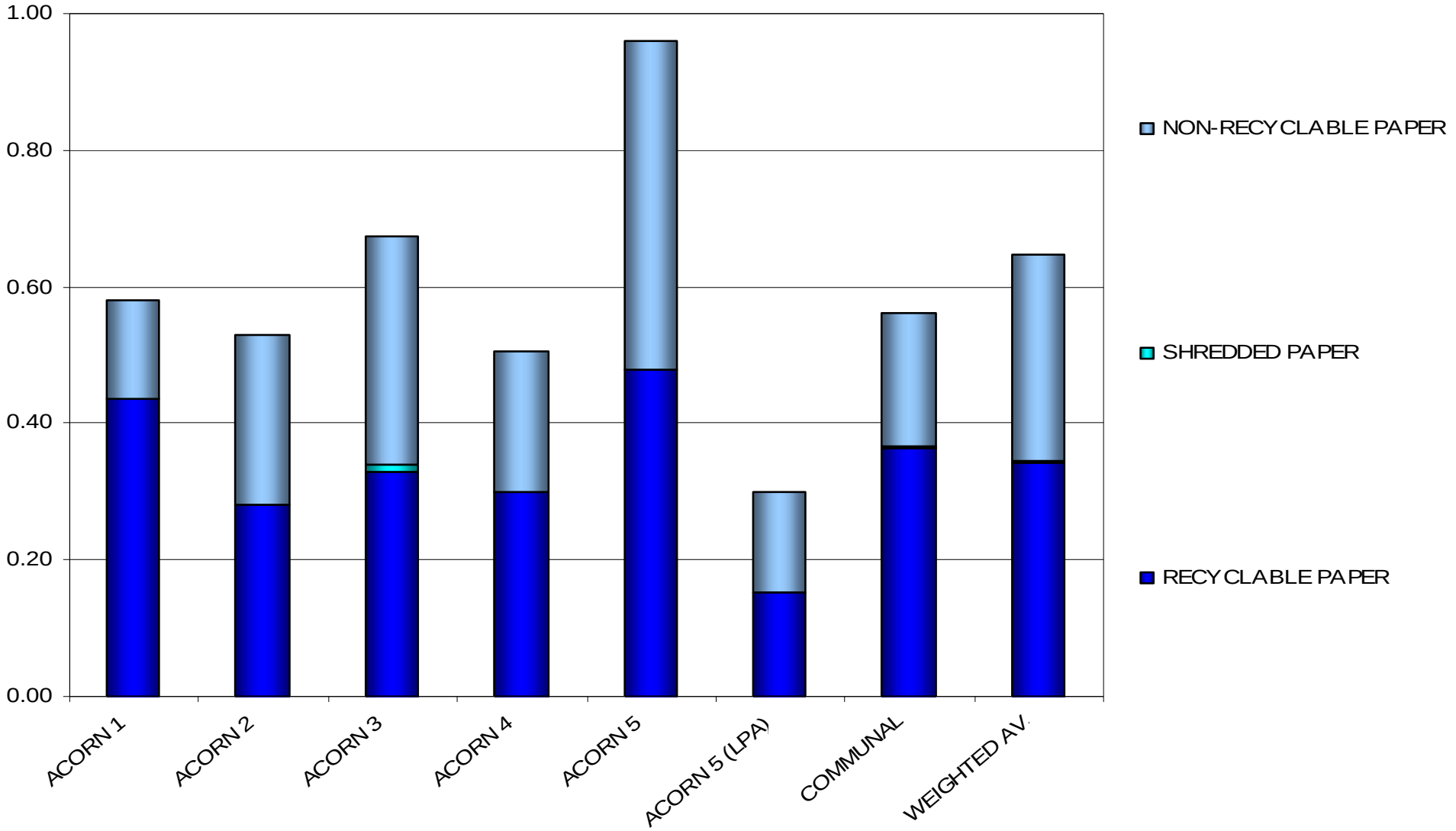
When accounting for all of the various types of paper within the residual waste, it is seen that 53.3% of residual paper was recyclable which accounted for 5.4% of all the residual waste or 0.35kg/hh/wk.

Table 4.2.2.1 and Figure 4.2.2.1 show the amounts of the different forms of paper waste for each Acorn.

Table 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PAPER	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.33	0.30	0.48	0.15	0.36	0.34
SHREDDED PAPER	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER	0.15	0.25	0.33	0.21	0.48	0.15	0.20	0.30
KG/HH/WK TOTAL PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
KG/HH/WK RECYCLABLE PAPER	0.43	0.28	0.34	0.30	0.48	0.15	0.37	0.35
% PAPER RECYCLABLE	74.77%	53.37%	50.52%	59.17%	49.83%	50.52%	65.29%	53.27%

Figure 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)



4.2.3 Card & Cardboard

On average, Acorn 1 residents had the highest concentrations of this type of waste (5%), with Acorn 5 disposing of the most at 0.36kg/hh/wk. In comparison just 1.9% (0.10kg/hh/wk) of residual waste from Acorn 5(LPA) was due to card and cardboard based materials. Across the City it was seen that around 3.5% or 0.22kg/hh/wk of residual waste consisted of discarded card and cardboard.

A proportion of this card & cardboard is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling thin card, corrugated cardboard and drinks cartons. It was found that between 65% (Acorn 1) and 94% (Acorn 5-LPA) of card and cardboard could have been placed in the blue bin as opposed to the residual bin. Across Cambridge, 84% of residual card and cardboard was compatible with recycling collections which accounted for 2.9% of all the residual waste or 0.18kg/hh/wk.

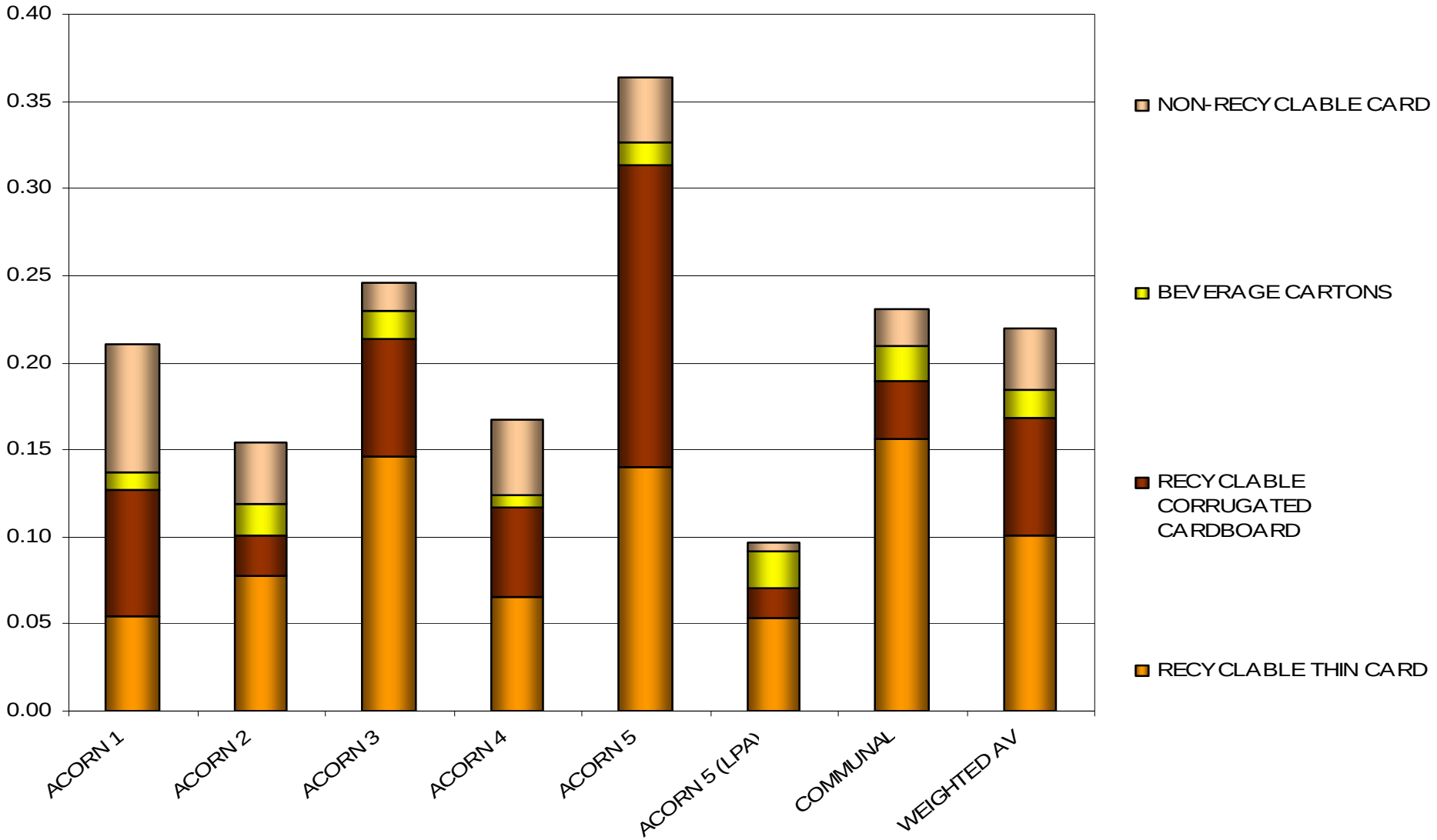
Table 4.2.3.1 and Figure 4.2.3.1 show the amounts of the different forms of card and cardboard waste for each Acorn.

When combining paper and card together it is estimated that 61% of that present in residual bins could have been recycled via kerbside recycling collections. This amounts to 8.3% of all the residual waste being collected – a total of 0.53kg/hh/wk.

Table 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL CARD	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE THIN CARD	0.05	0.08	0.15	0.07	0.14	0.05	0.16	0.10
RECYCLABLE CORRUGATED CARDBOARD	0.07	0.02	0.07	0.05	0.17	0.02	0.03	0.07
BEVERAGE CARTONS	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE CARD	0.07	0.04	0.02	0.04	0.04	0.01	0.02	0.04
KG/HH/WK TOTAL CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
KG/HH/WK RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	0.33	0.09	0.21	0.18
% CARD KERBSIDE RECYCLABLE	65.22%	77.15%	93.19%	74.50%	89.79%	94.04%	90.71%	83.93%

Figure 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)



4.2.4 Plastics

As a UK average approximately 12% of the waste disposed of by households is plastic. In this sampling campaign average ranges seen were 10.7% total plastic by weight from Acorn 4 households to 18.6% in the waste from Acorn 3 households. Cambridge residents currently recycle plastic bottles as part of their blue bin collections. Across the City as a whole, 14.9% of residual waste was classified as plastic which equates to 0.94kg/hh/wk. On the whole plastic waste, although not heavy in itself, can produce large volumes of waste.

Figure 4.2.4.1 clearly shows the levels of recyclable plastic bottles within the plastic portion of the residual waste. On average, around 46% of this plastic waste present in the residual was due to plastic film with the remainder being dense plastic. Up to 9.9% of residual dense plastic consisted of plastic bottles meaning that just 0.8% of residual waste (0.05kg/hh/wk) collected throughout Cambridge was made up of plastic bottles that could have been recycled. Up to 0.13kg/hh/wk of plastic bottles were seen in communal bins representing over a quarter of all the dense plastic present.

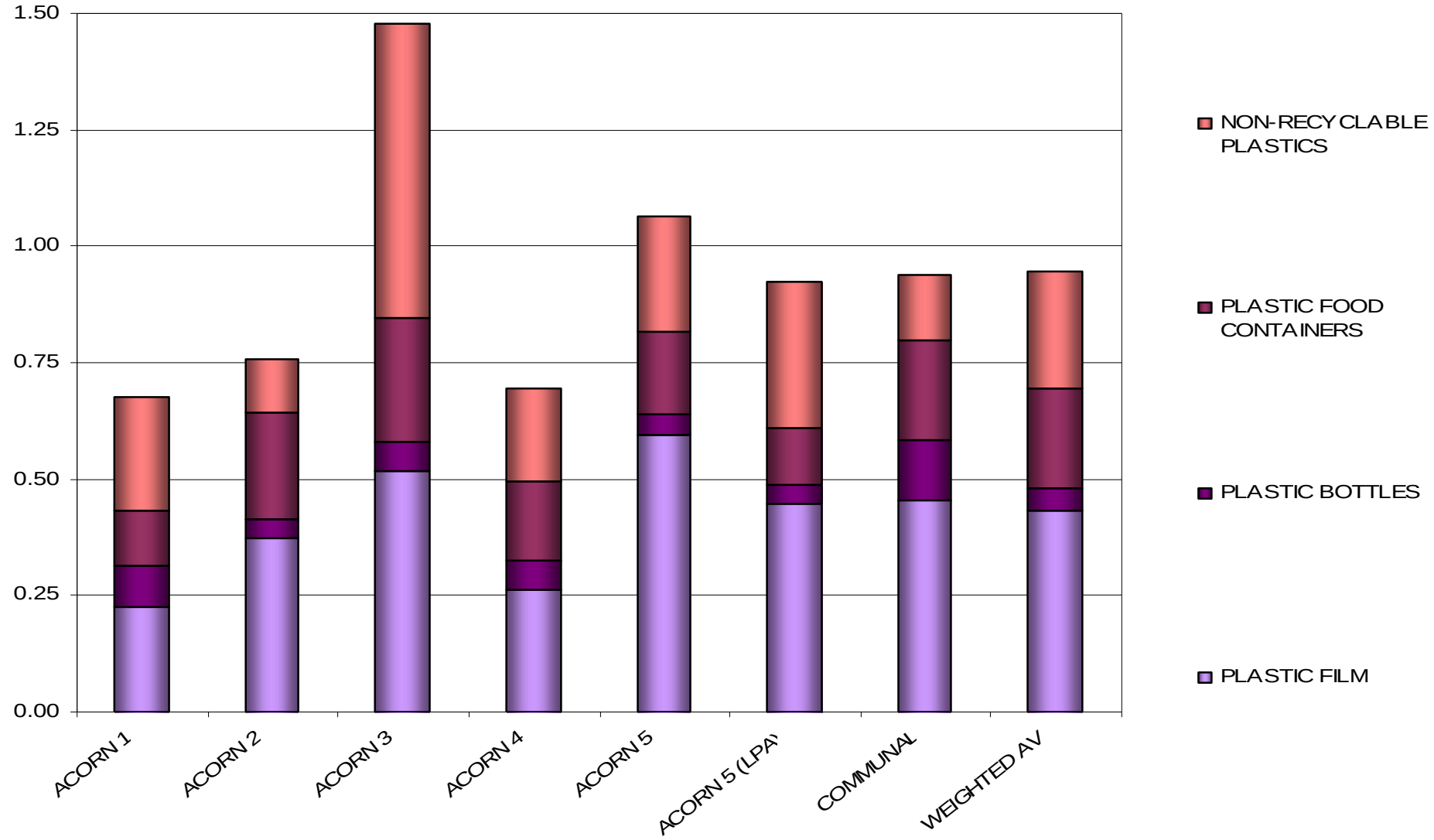
From July 2012 Cambridge households will be able to recycle plastic food containers in addition to plastic bottles. On average these formed 3.4% of the total residual waste equating to 0.21kg/hh/wk. This means that 0.27kg/hh/wk or 4.2% of the residual waste is due to recyclable plastic bottles and containers.

Table 4.2.4.1 and Figure 4.2.4.1 show the amounts of the different forms of plastic waste found within the residual samples from each Acorn.

Table 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PLASTICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	0.13	0.05
PLASTIC FOOD CONTAINERS	0.12	0.23	0.27	0.17	0.18	0.12	0.22	0.21
NON-RECYCLABLE PLASTICS	0.25	0.11	0.63	0.20	0.24	0.31	0.14	0.25
KG/HH/WK TOTAL PLASTIC	0.68	0.76	1.48	0.70	1.06	0.92	0.94	0.94
% DENSE PLASTIC RECYCLABLE	19.39%	11.04%	6.41%	14.22%	9.84%	9.18%	26.63%	9.85%

Figure 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)



4.2.5 Metals

In this sampling campaign average concentrations of residual metals were seen to be 1.9% total metal by weight from Acorn 5(LPA) households to 5.8% in the waste from Acorn 1 households, averaging 2.8% overall. Cambridge residents have access to a recycling collection of food and drink cans as well as empty aerosols and clean foil via their blue bin service. The average weight of metals in the residual waste from Acorn 5(LPA) was 0.09kg/hh/wk rising to 0.27kg/hh/wk in communal bins.

A proportion of this metal waste is available for recycling at the kerbside relative to the blue bin collection. It was found that just 13% of Acorn 1 metals were recyclable rising to 77% for the metals in Acorn 5(LPA) residual waste. Across the City an average of 52.5% or 0.09kg/hh/wk of residual metal is classified as recyclable, this equates to 1.5% of all collected residual waste.

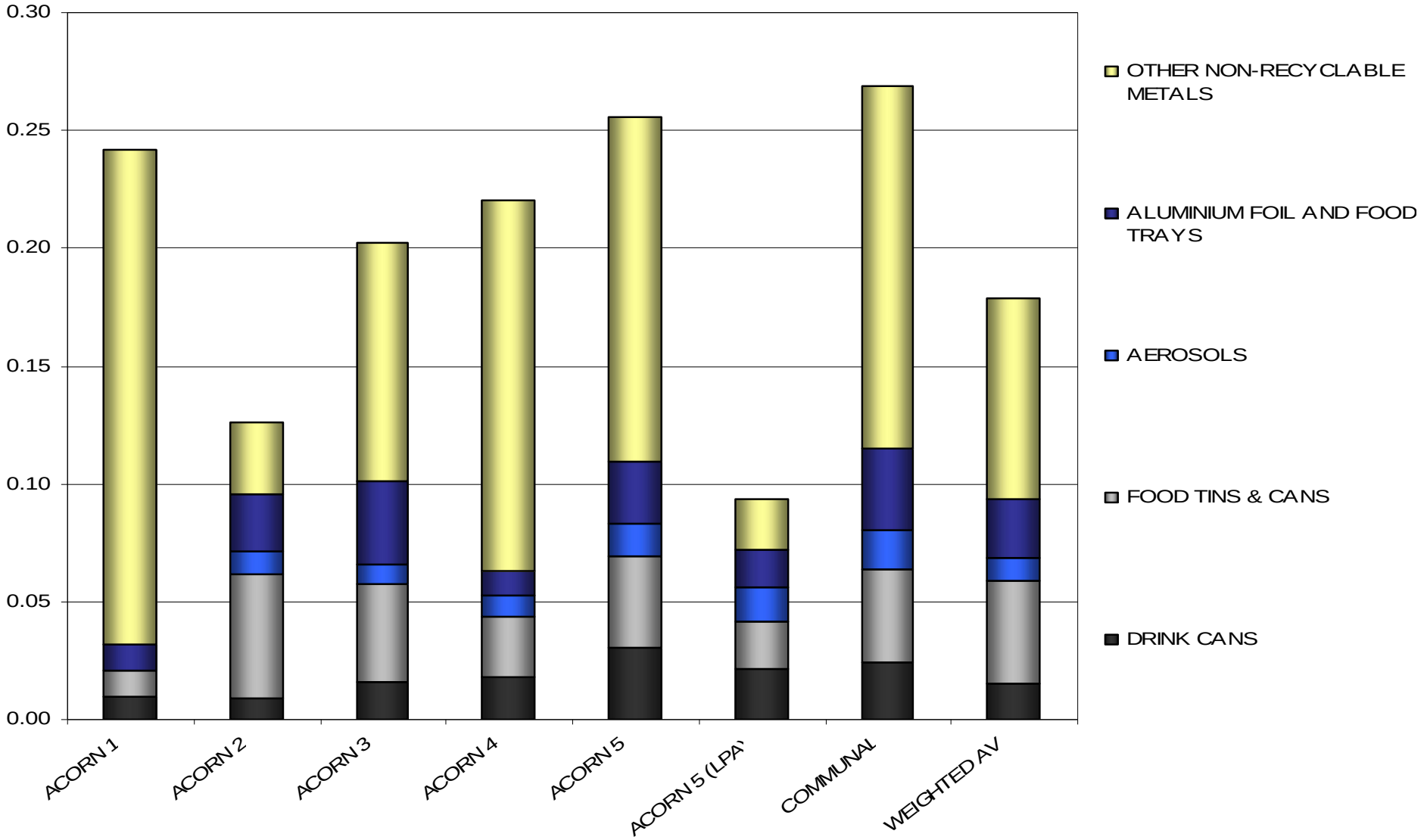
On the whole 78% of metals were ferrous accounting for 0.14kg/hh/wk with non-ferrous metals contributing 0.04kg/hh/wk. The majority of metallic waste present in all samples was seen to be ferrous.

Table 4.2.5.1 and Figure 4.2.5.1 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 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)

RESIDUAL METALS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
DRINK CANS	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01
FOOD TINS & CANS	0.01	0.05	0.04	0.03	0.04	0.02	0.04	0.04
AEROSOLS	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01
ALUMINIUM FOIL AND FOOD TRAYS	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.03
OTHER NON-RECYCLABLE METALS	0.21	0.03	0.10	0.16	0.15	0.02	0.15	0.08
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	0.12	0.09
TOTAL METALS	0.24	0.13	0.20	0.22	0.26	0.09	0.27	0.18
% FERROUS	90.16%	71.00%	79.19%	87.30%	78.93%	55.42%	77.02%	77.64%
% RECYCLABLE	13.31%	76.02%	49.78%	28.45%	42.69%	77.11%	42.82%	52.46%

Figure 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)



4.2.6 Glass

In this sampling campaign the average concentration of residual glass was seen to be 1% total glass by weight from Acorn 1 households rising to 4.6% in the waste from communal bins. Cambridge residents are able to recycle glass bottles and jars at the kerbside using their blue bin service. The weight of glass in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.38kg/hh/wk in communal bins. This represented a City wide average of 2.8% or 0.18kg/hh/wk.

A proportion of this glass consists of bottles and jars which could have been recycled at the kerbside. It was found that across Cambridge an average of 94% or 0.16kg/hh/wk of residual glass is classified as recyclable, this equates to 2.6% of all collected residual waste.

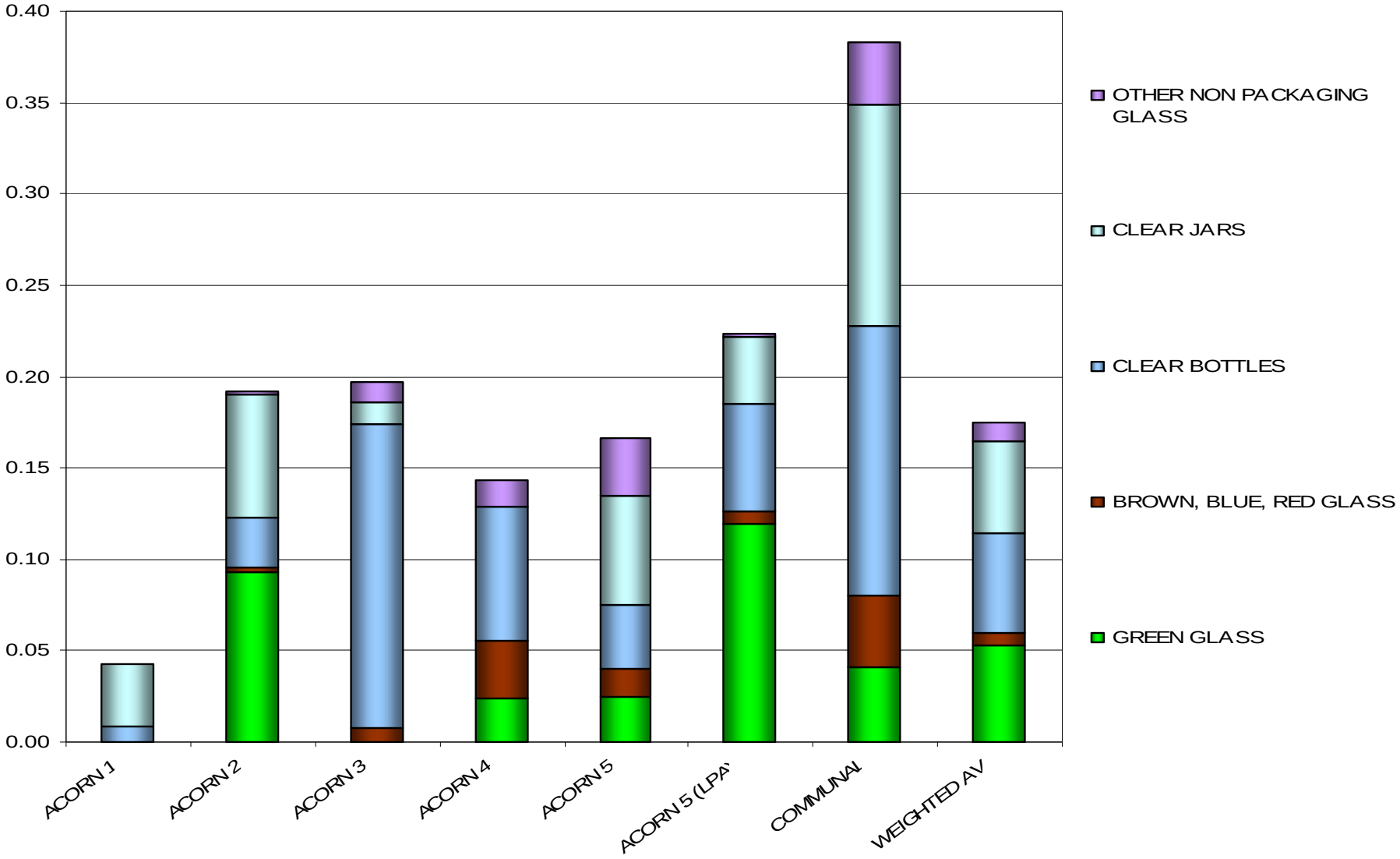
In most samples the majority of recyclable glass was seen to be higher grade clear glass, across Cambridge 64% of recyclable glass was clear, accounting for 0.11kg/hh/wk of residual waste. Around 52% of the clear glass was due to jars as opposed to bottles.

Table 4.2.6.1 and Figure 4.2.6.1 show the amounts of the different forms of glass waste found within the samples from each Acorn.

Table 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)

RESIDUAL GLASS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
GREEN GLASS	0.00	0.09	0.00	0.02	0.02	0.12	0.04	0.05
BROWN, BLUE, RED GLASS	0.00	0.00	0.01	0.03	0.02	0.01	0.04	0.01
CLEAR BOTTLES	0.01	0.03	0.17	0.07	0.03	0.06	0.15	0.05
CLEAR JARS	0.03	0.07	0.01	0.00	0.06	0.04	0.12	0.05
OTHER NON PACKAGING GLASS	0.00	0.00	0.01	0.01	0.03	0.00	0.03	0.01
KG/HH/WK TOTAL GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
KG/HH/WK RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	0.35	0.16
% RECYCLABLE	100%	98.99%	94.36%	89.99%	80.74%	99.24%	91.15%	94.17%
% OF RECYCLABLE GLASS - CLEAR	100%	49.56%	95.85%	57.08%	70.33%	42.98%	76.93%	63.76%

Figure 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)



4.2.7 Textiles

The concentration of residual textile waste was seen to be 1% textiles from Acorn 1 households to 7.7% in the waste from Acorn 4 households. Cambridge residents are currently not able to recycle textiles at the kerbside. The average weight of textile waste in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.71kg/hh/wk in Acorn 5. On average 6.2% or 0.39kg/hh/wk of residual waste is classified as textile waste.

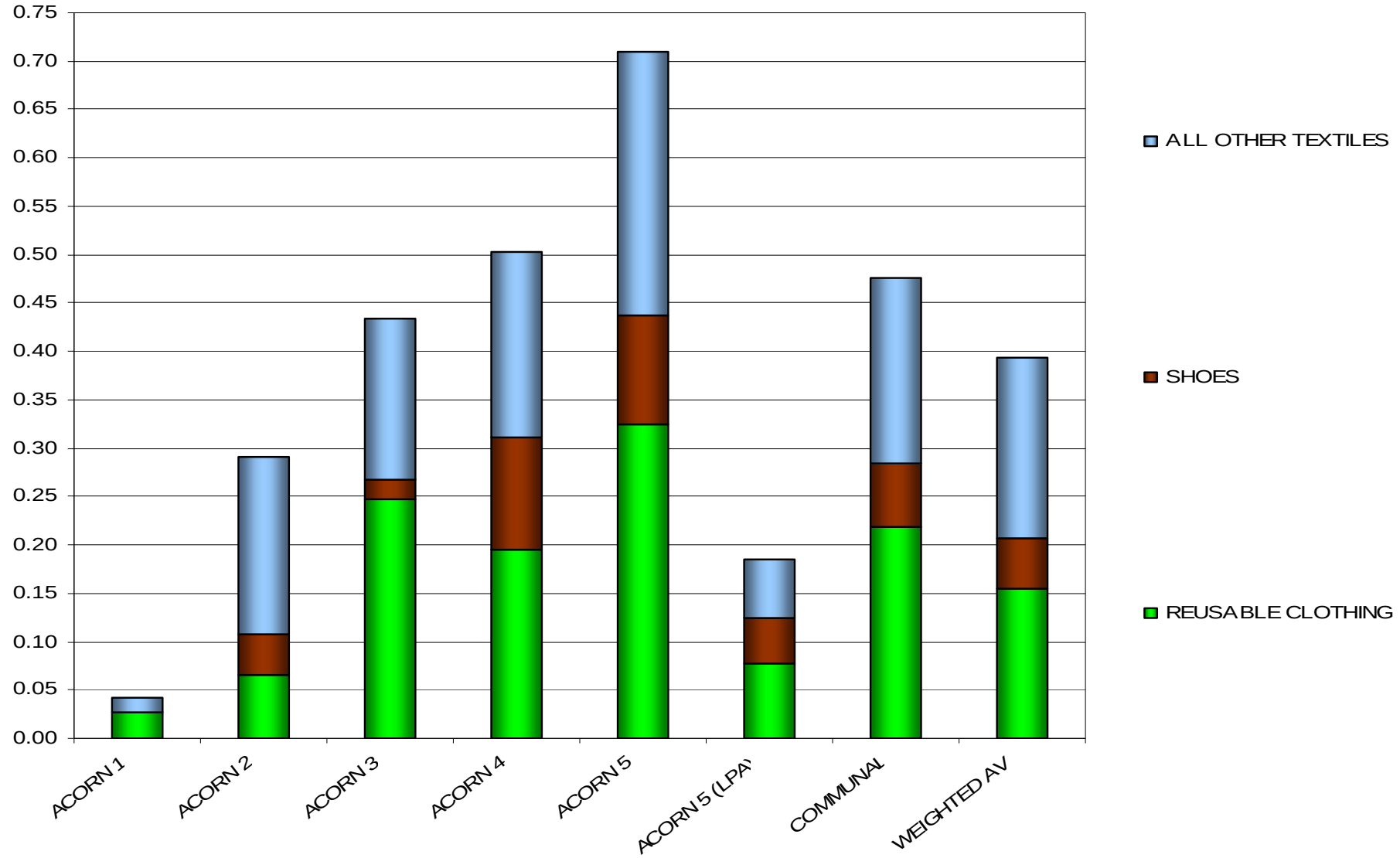
A proportion of this textile waste is available for recycling either at bring banks or charity outlets in the form of reusable clothes and shoes. It was found that between 37% (Acorn 2) and 67% of Acorn 5(LPA) of textile waste was of this potentially recyclable type. Up to 0.44kg/hh/wk (Acorn 5) of recyclable textiles are being placed into the residual waste by Cambridge householders. Across Cambridge an average of 52.5% or 0.21kg/hh/wk of residual textiles is classified as reusable, this equates to 3.3% of all collected residual waste.

Table 4.2.7.1 and Figure 4.2.7.1 show the amounts of the different forms of textile waste found within the samples from each Acorn.

Table 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)

RESIDUAL TEXTILES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
REUSABLE CLOTHING	0.03	0.07	0.25	0.20	0.33	0.08	0.22	0.15
SHOES	0.00	0.04	0.02	0.12	0.11	0.05	0.07	0.05
ALL OTHER TEXTILES	0.01	0.18	0.17	0.19	0.27	0.06	0.19	0.19
KG/HH/WK TOTAL TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
KG/HH/WK REUSABLE TEXTILES	0.03	0.11	0.27	0.31	0.44	0.12	0.28	0.21
% REUSABLE TEXTILES	66.10%	36.88%	61.45%	61.89%	61.69%	67.35%	59.77%	52.51%

Figure 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)



4.2.8 Hazardous Items (HHW) & WEEE

In this sampling campaign the average overall concentration of hazardous and WEEE waste was seen to be 1.6% which equates to around 0.10kg/hh/wk. Acorn 4 households disposed of the most HHW and WEEE waste, where it was responsible for 4.3% of collected waste or 0.28kg/hh/wk. Table 4.2.8.1 shows the amounts of HHW and WEEE within the samples from each Acorn.

Table 4.2.8.1: Levels of HHW and WEEE within each Acorn (kg/hh/wk)

RESIDUAL HHW & WEEE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	0.11	0.06	0.21	0.28	0.07	0.02	0.25	0.10
% HHW & WEEE	2.64%	1.40%	2.65%	4.27%	0.67%	0.44%	3.00%	1.61%

HHW	WEEE
PAINT	CHARGERS
HALOGEN BULB	GAME REMOTE
BATTERIES	XMAS LIGHTS
MEDICINES	THERMOSTAT
WEED KILLER	MOBILE PHONE
	TORCHES
	SMOKE ALARM
	SWITCH
	MODEM
	LAMPS
	KETTLES
	STEREO & SPEAKERS
	MOTOR
	TELEPHONE
	HAIR STRAIGHTENERS
	CABLES & LEADS
	SOCKERS
	DEEP FAT FRYER
	FAN
	BLENDER
	CALCULATOR

4.2.9 Disposable Nappies

The profile of this type of waste has increased in recent years. Levels of this waste within the residual bins of households with babies can be extremely high. In this survey the concentrations of disposable nappies ranged between 1.3% in Acorn 3 up to 33.5% in communal bins. Communal bins were seen to contain around 2.79kg/hh/wk of disposable nappies. Throughout Cambridge as a whole around 17% of collected residual waste consists of disposable nappies, which equates to 1.08kg/hh/wk.

4.3 Potential recyclability of the residual waste

The overall recyclability of the residual waste relates to all the items present that could have been accepted into the kerbside recycling schemes currently running in Cambridge. Results from the survey showed that the overall recyclability of the residual waste was highest in Acorn 2 households at 45.4%, and lowest in Acorn 3 at 27.2%. Across Cambridge it is expected that 35.1% of all residual waste being disposed of is recyclable at the kerbside.

The majority of the recyclable materials present within the residual waste were compatible with the green organics bin. On average 22% of residual waste could have been recycled in the green bin ranging from 15.7% of Acorn 3 waste up to 32.6% of Acorn 4 waste.

On average just over 13% of the residual waste throughout Cambridge was recyclable via the blue bin collection. Around 10 4% of the residual waste from Acorn 4 was compatible with blue bins compared with 17.5% of that from Acorn 1.

Table 4.3.1.1: Proportion of residual waste currently recyclable relative to current schemes (%)

% RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	17.47%	15.67%	11.43%	10.41%	11.16%	11.48%	14.01%	13.15%
GREEN BIN RECYCLABLE	18.94%	29.72%	15.72%	32.64%	16.78%	31.01%	23.21%	21.95%
TOTAL RECYCLABLE	36.41%	45.39%	27.15%	43.05%	27.94%	42.50%	37.21%	35.11%

In terms of the amount of recyclables disposed of it is seen that Acorn 1 householders place around 1.53kg/hh/wk of materials in residual bins that could either be placed into their blue or green recycling bins. For communal bins this amount was 3.1kg/hh/wk. Across Cambridge around 2.23kg/hh/wk of recyclable material is being disposed of in the residual waste.

Table 4.3.1.2: Kg/hh/wk of residual waste currently and potentially recyclable relative to current schemes

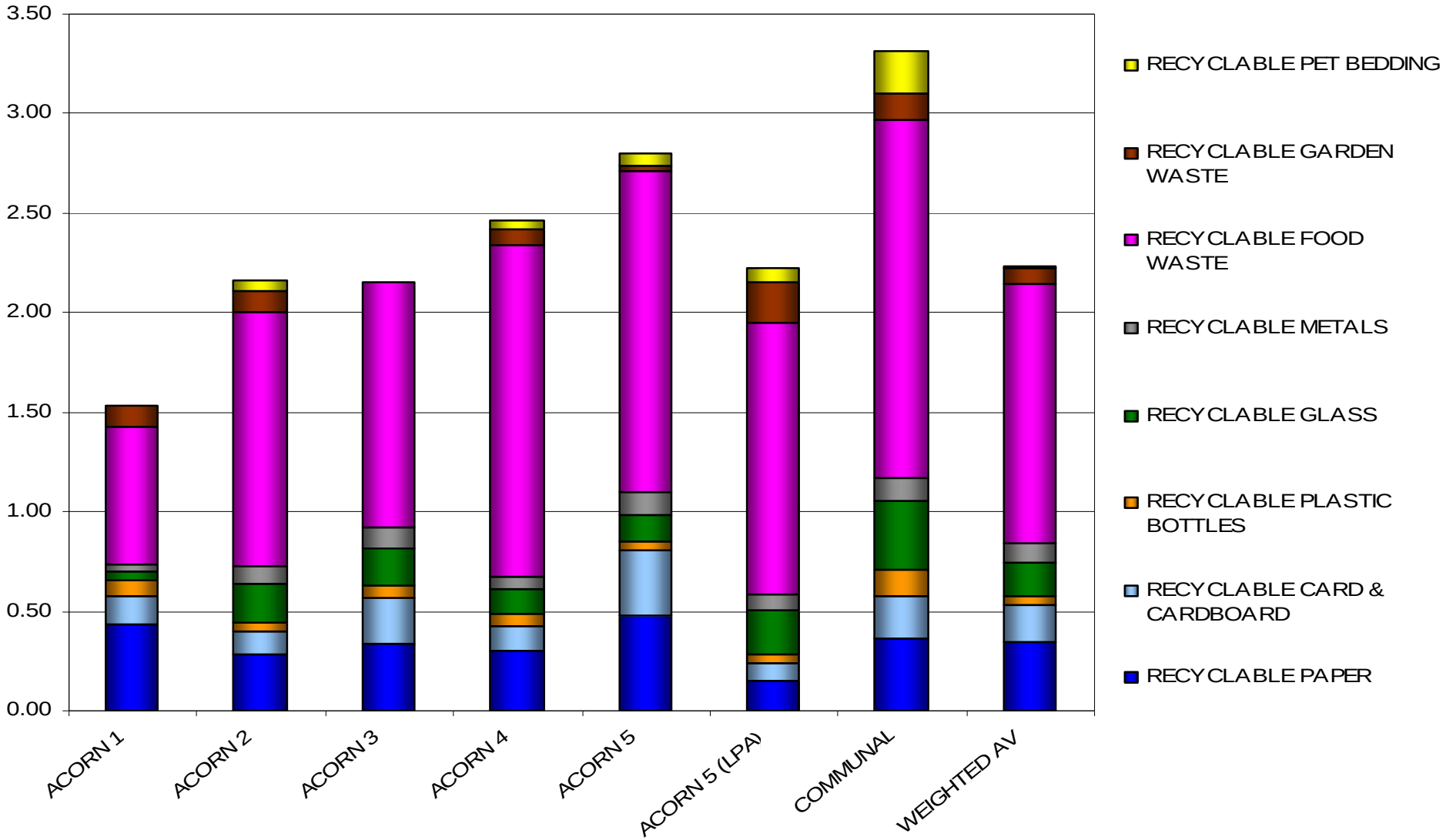
KG/HH/WK RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	0.73	0.73	0.91	0.68	1.09	0.58	1.17	0.84
GREEN BIN RECYCLABLE	0.80	1.38	1.25	2.12	1.64	1.57	1.93	1.40
TOTAL RECYCLABLE	1.53	2.11	2.15	2.80	2.74	2.15	3.10	2.23

Figure 4.3.1.1 clearly shows the levels of residual materials currently collectable in the recycling collections available in Cambridge. Different households were seen to dispose of differing levels of recyclable materials, both in terms of volume and composition (Table 4.3.1.3). Without exception it is seen that the two Acorn 5 samples and the waste from the communal bins contained the highest levels of each material compatible with kerbside recycling.

Table 4.3.1.3: Kg/hh/wk of residual waste potentially 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	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.34	0.30	**0.48**	0.15	0.37	0.35
RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	**0.33**	0.09	0.21	0.18
RECYCLABLE PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	**0.13**	0.05
RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	**0.35**	0.16
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	**0.12**	0.09
RECYCLABLE FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	**1.80**	1.31
RECYCLABLE GARDEN WASTE	0.10	0.11	0.00	0.08	0.03	**0.20**	0.13	0.07
RECYCLABLE PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	**0.21**	0.01
TOTAL RECYCLABLE	1.53	2.16	2.15	2.47	2.80	2.22	3.31	2.23

Figure 4.3.1.1: Kg/hh/wk of residual waste potentially recyclable relative to Acorn (Kg/hh/wk)



4.4 Biodegradable waste

These figures are useful when considering the proportion of biodegradable waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using the compositional data in accordance with the percentages outlined in previous reports. For example, only 50% of miscellaneous combustible materials are considered to be biodegradable whereas 100% of paper and card is considered to be biodegradable.

National average figures are around 68%; in this survey the biodegradability of residual waste weighted across Cambridge was well below this level at 50.7%. Acorn 4 residual waste displayed the highest concentration of biodegradable items at 59.4%, with Acorn 3 residual waste being just 44.4% biodegradable. On average, around 3.22kg/hh/wk of biodegradable material was being placed into residual containers by Cambridge residents.

Table 4.4.1: Percentage composition of residual waste per Acorn – biodegradable materials

BIODEGRADABLE CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	17.19%	12.94%	10.94%	9.61%	11.96%	7.39%	8.80%	12.25%
TEXTILES	0.50%	3.12%	2.74%	3.87%	3.62%	1.83%	2.85%	3.10%
MISC. COMBUSTIBLE*	11.26%	8.35%	14.36%	8.84%	16.80%	15.07%	17.84%	12.60%
	7.94%	5.73%	8.53%	4.78%	12.16%	12.51%	16.76%	8.51%
PUTRESCIBLES	18.98%	30.22%	16.40%	36.43%	17.10%	31.74%	24.44%	22.53%
FINES	0.26%	0.00%	0.00%	0.61%	0.46%	0.10%	0.49%	0.18%
TOTAL BIODEGRADABLE	48.18%	54.63%	44.44%	59.36%	49.94%	56.13%	54.42%	50.66%

* Disposable nappies are part of the miscellaneous combustible section. Their contribution to this section of biodegradable waste is highlighted in red.

4.5 Packaging Waste

These figures are useful when considering the proportion of packaging waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using a similar method to that used to calculate biodegradability.

Levels of packaging in the residual waste ranged from 12.3% in Acorn 5 residual waste to 22.1% in Acorn 2 residual waste. On average, around 1.08kg/hh/wk of packaging materials were being placed into residual containers by Cambridge residents, 17% of the total waste being disposed of.

Table 4.5.1: Percentage composition of residual waste per Acorn – packaging materials

PACKAGING CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	4.62%	4.43%	3.32%	2.98%	4.28%	2.41%	3.88%	4.09%
PLASTIC FILM	3.69%	5.06%	4.61%	2.62%	2.89%	5.53%	3.40%	4.11%
DENSE PLASTIC	7.36%	6.70%	4.88%	3.90%	2.81%	4.28%	4.41%	4.96%
GLASS	1.01%	4.08%	2.34%	1.99%	1.37%	4.39%	4.18%	2.59%
METALS	0.63%	1.79%	1.05%	0.89%	0.98%	1.27%	1.17%	1.27%
TOTAL PACKAGING	17.31%	22.06%	16.20%	12.37%	12.34%	17.87%	17.05%	17.02%

5) Mixed dry recycling waste

5.1 Set out rates and waste generation

Table 5.1.1 and Figure 5.1.1 highlight the set out rates for blue recycling bins observed at the time waste was collected for compositional analysis. Table 5.1.2 and Figure 5.1.2 show the amount of mixed recycling waste generated in kg/hh/wk. The same houses were visited that had their residual waste surveyed. It was possible to calculate the set out relating to the proportion of these households actively placing out their waste. The 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. Set out rates for mixed recycling waste ranged between 66% for Acorn 4 and 84% for Acorn 3. Across Cambridge it is estimated that around 78% of residents are placing out their blue bins for collection.

Table 5.1.1: Average Set Out for mixed recycling waste (%)

ACORN	% SET OUT
1	74%
2	75%
3	84%
4	66%
5	82%
5 (LPA)	78%
COMMUNAL	N/A
WEIGHTED AVERAGE	78%

In this survey the average amount of mixed recycling generated in blue bins ranged between 2.36kg/hh/wk from Acorn 1 to 3.83kg/hh/wk from Acorn 3. Across Cambridge around 3.16kg/hh/wk of blue bin recycling waste is being placed out for collection at the kerbside.

Table 5.1.2: Average Mixed Recycling waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	2.36
2	3.07
3	3.83
4	2.95
5	3.09
5 (LPA)	2.52
COMMUNAL	3.80
WEIGHTED AVERAGE	3.16

Figure 5.1.1: Average Set Out for mixed recycling waste (%)

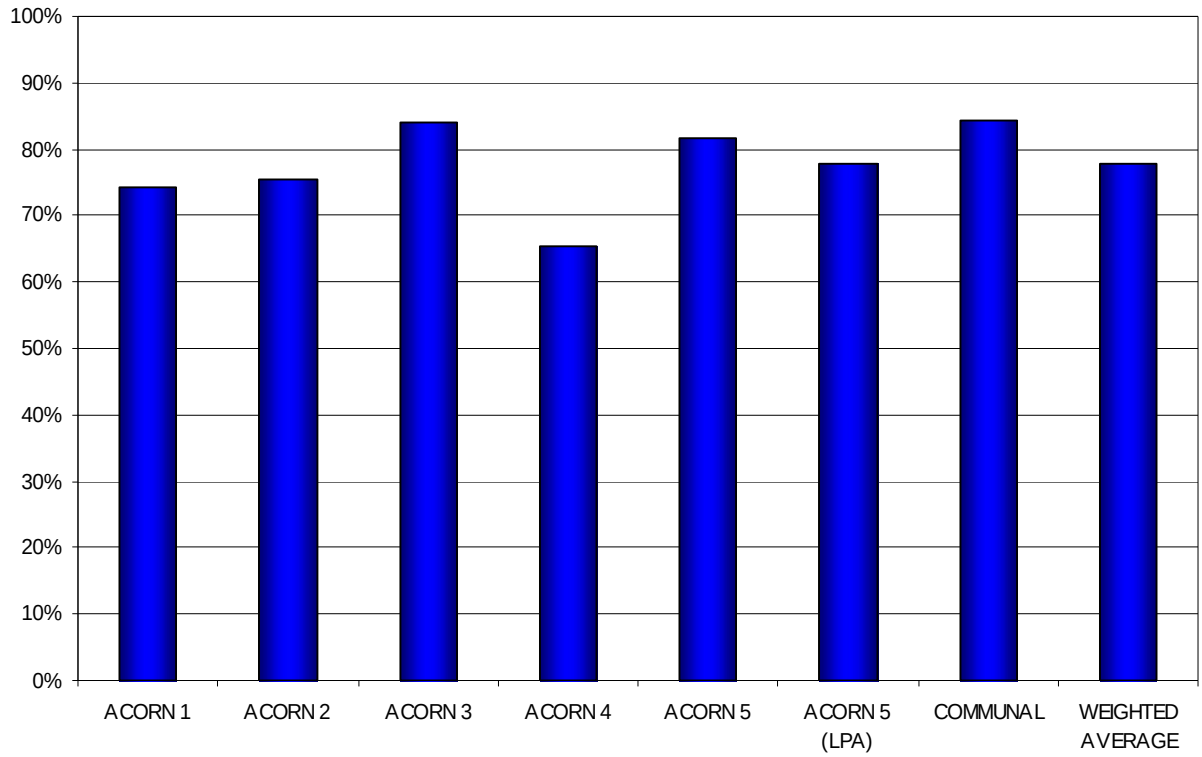
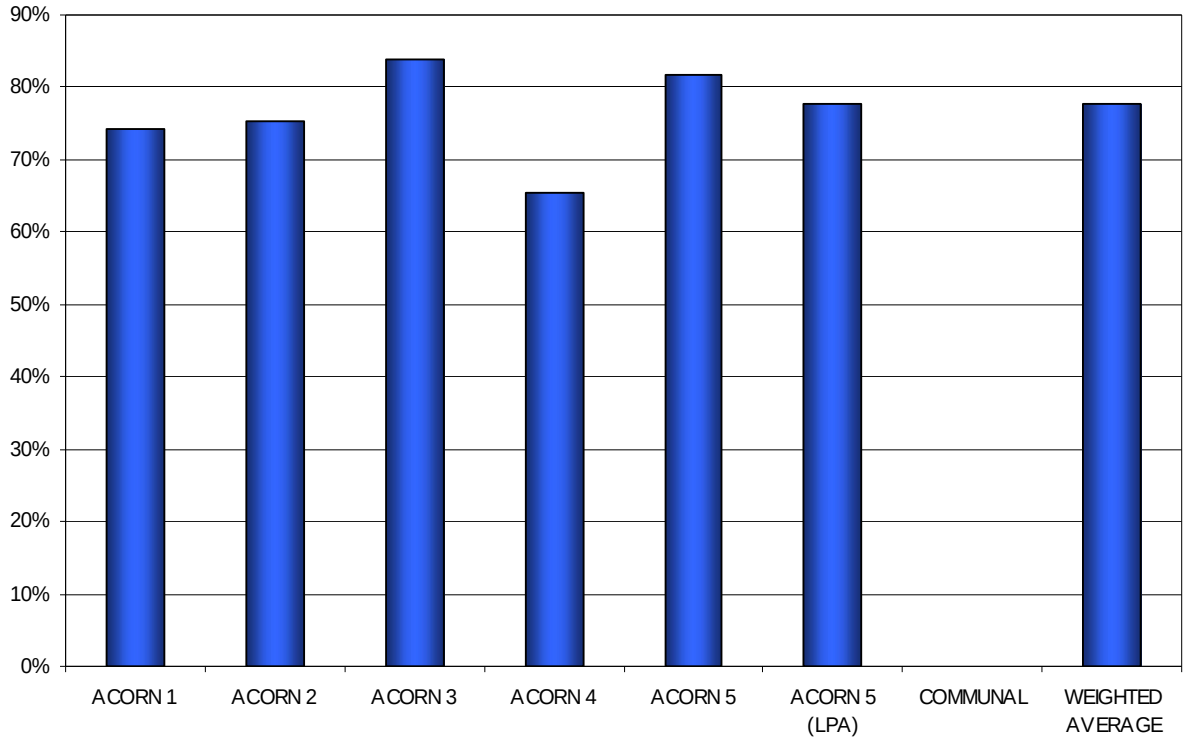


Figure 5.1.2: Average Mixed recycling waste generation rates (kg/hh/wk)



5.2 Compositional analysis of mixed recycling waste

This section looks at the average amount and composition of the mixed recycling waste presented by households sampled throughout Cambridge. 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 5.2.1 and Figure 5.2.1 show mixed recycling data in terms of percentage composition with Table 5.2.2 and Figure 5.2.2 showing generation rates for major materials in terms of kg/hh/wk for each sample taken from the blue recycling bins.

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

Table 5.2.1: Composition of mixed recycling (% concentration) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	50.89%	46.17%	23.96%	25.91%	23.28%	31.61%	32.48%	36.16%
RECYCLABLE CARD & CARDBOARD	12.80%	12.42%	14.12%	13.13%	17.38%	13.94%	14.95%	13.85%
RECYCLABLE PLASTIC BOTTLES	4.33%	4.28%	7.60%	5.74%	7.68%	8.58%	7.17%	5.76%
RECYCLABLE GLASS	18.59%	30.83%	41.13%	36.02%	35.39%	32.94%	25.61%	33.55%
RECYCLABLE METALS	5.08%	2.87%	6.02%	5.95%	5.12%	4.86%	5.56%	4.25%
CONTAMINATION MATERIALS	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%
TOTAL RECYCLING	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	1.20	1.42	0.92	0.76	0.72	0.80	1.24	1.14
RECYCLABLE CARD & CARDBOARD	0.30	0.38	0.54	0.39	0.54	0.35	0.57	0.44
RECYCLABLE PLASTIC BOTTLES	0.10	0.13	0.29	0.17	0.24	0.22	0.27	0.18
RECYCLABLE GLASS	0.44	0.95	1.58	1.06	1.09	0.83	0.97	1.06
RECYCLABLE METALS	0.12	0.09	0.23	0.18	0.16	0.12	0.21	0.13
CONTAMINATION MATERIALS	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20
TOTAL RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16

Figure 5.2.1: Composition of mixed recycling (%) by Acorn

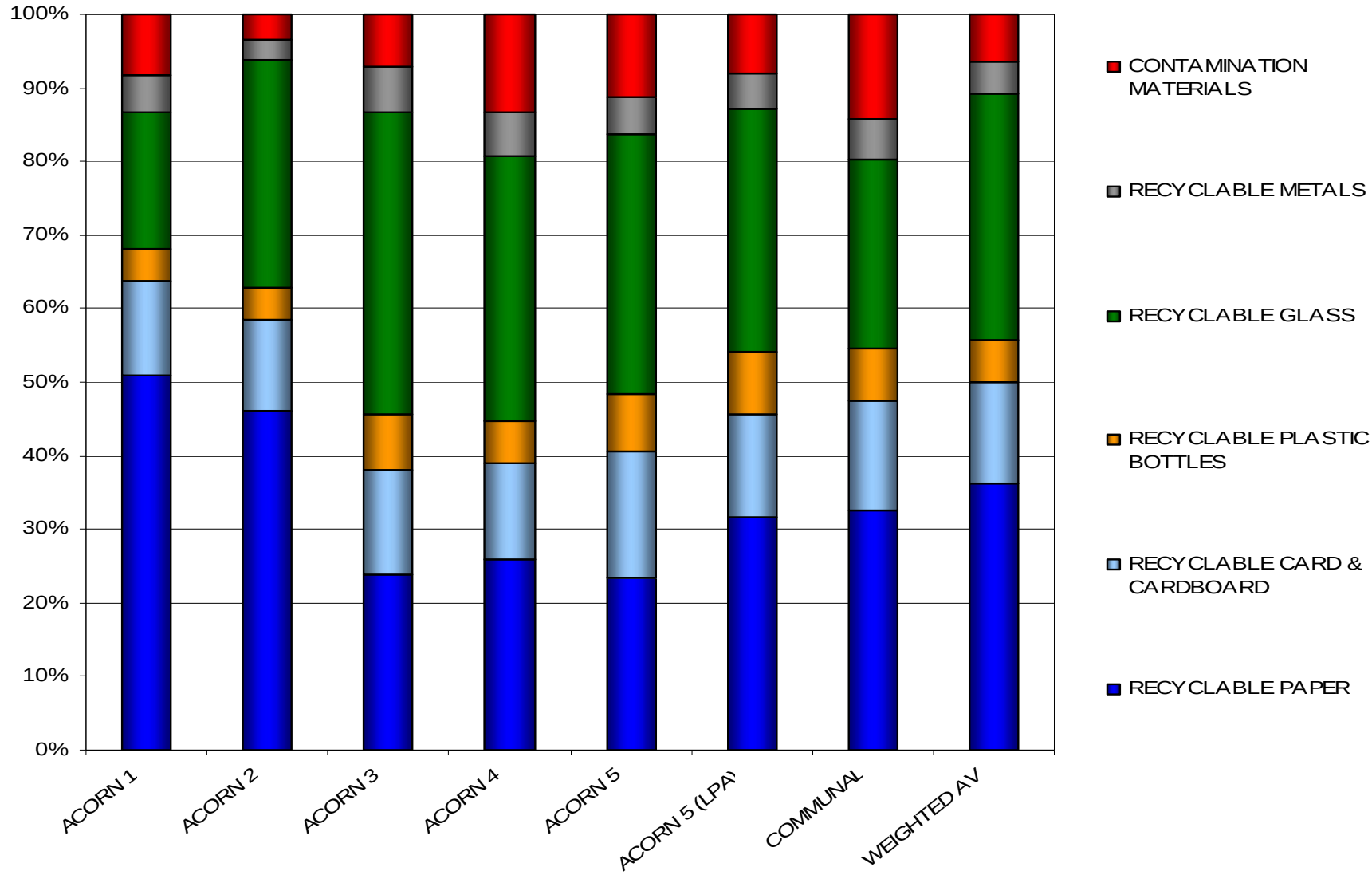
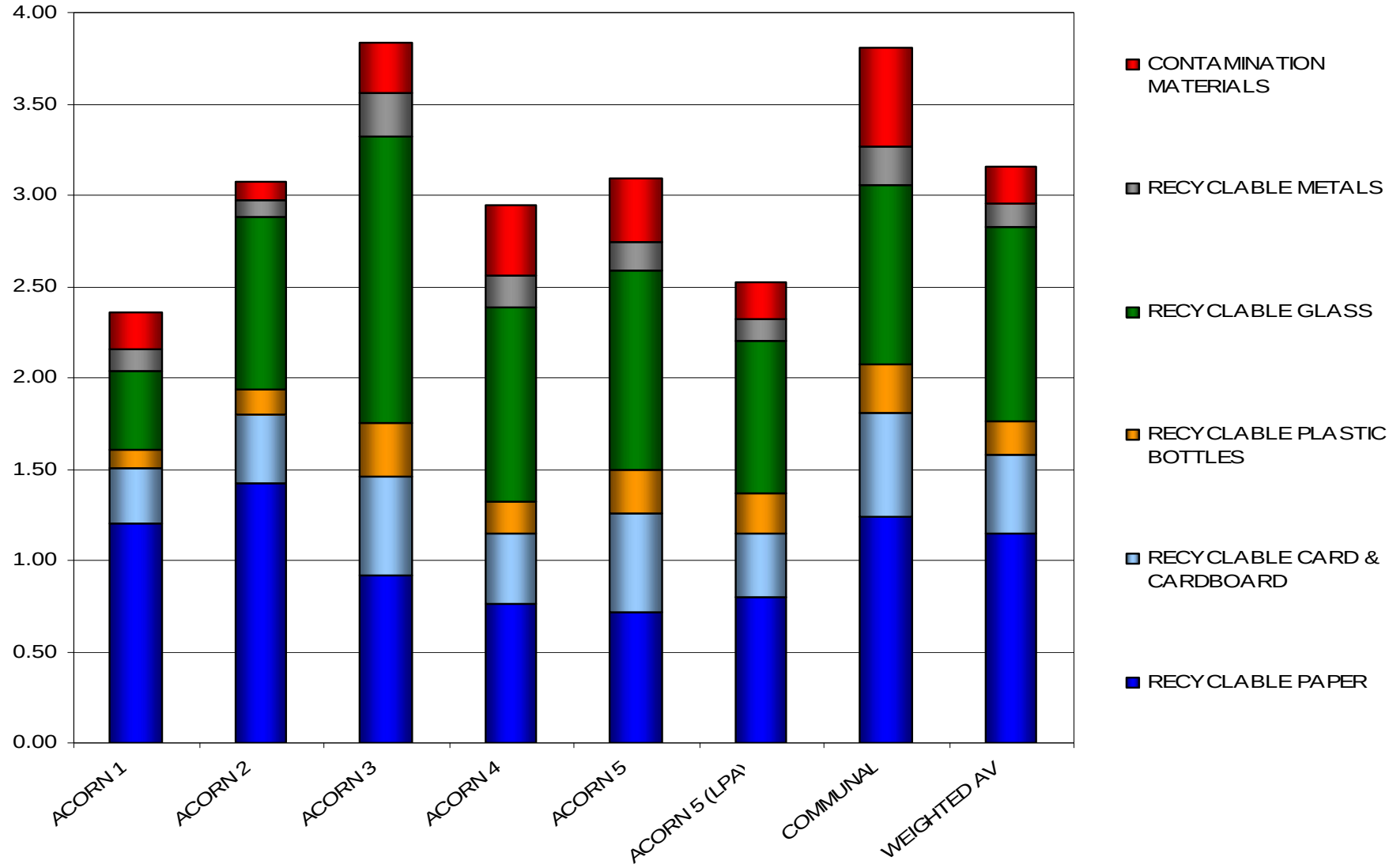


Figure 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn



5.3 Materials placed out for mixed recycling collections

This chapter looks in more detail at the individual materials placed out for blue bin recycling collections and highlights the effectiveness with which the mixed recycling scheme is capturing these items. Looking at the relationship between the residual and recycling waste streams presented will additionally give indications as to the overall diversion being achieved in the Cambridge samples.

Table 5.3.1 summarises the capture and diversion rates seen for the range of materials collected in the dry recycling collections. Recyclable paper, card & cardboard, plastics, glass and metals are collected in the blue bin.

Across Cambridge around 75.6% of all the materials currently collected in blue bins are being correctly recycled at the kerbside. Acorns 1 – 4 all recycled between 73% and 79% of their blue bin materials. In comparison Acorn 5 households recycled 69% whilst those using communal bins recycled just 58%. Overall it is estimated that 23.7% of kerbside waste throughout Cambridge is diverted through blue bin collections.

Table 5.3.1: Summary table for material capture and diversion rates (%) for mixed recycling

% CAPTURE RATES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	73.72%	83.14%	72.96%	72.49%	59.96%	84.58%	83.29%	76.73%
RECYCLABLE CARD & CARDBOARD	72.89%	77.28%	72.19%	77.83%	66.54%	82.21%	81.76%	72.67%
PLASTIC BOTTLES	53.80%	75.57%	82.58%	73.38%	83.76%	83.16%	62.63%	78.24%
COLOURED GLASS BOTTLES & JARS	100.00%	87.60%	99.09%	88.53%	93.66%	72.18%	80.07%	91.55%
CLEAR GLASS BOTTLES	91.08%	86.29%	70.26%	89.58%	90.54%	81.91%	74.03%	82.40%
CLEAR GLASS JARS	79.37%	60.32%	96.72%	N/A	74.00%	86.58%	65.68%	75.68%
ALL RECYCLABLE GLASS	91.20%	83.29%	89.45%	89.15%	89.05%	78.94%	73.64%	86.53%
DRINK CANS	67.43%	75.29%	75.31%	82.71%	63.14%	64.51%	68.55%	71.54%
FOOD TINS	88.57%	51.11%	78.10%	73.66%	70.06%	75.17%	65.10%	65.51%
AEROSOLS	100.00%	35.30%	71.44%	61.23%	46.61%	52.05%	43.96%	51.30%
OTHER RECYCLABLE METALS	19.96%	7.86%	25.61%	26.29%	12.14%	29.91%	63.26%	14.45%
ALL RECYCLABLE METALS	78.80%	47.98%	69.56%	73.66%	59.18%	62.96%	63.49%	58.87%
ALL BLUE BIN MATERIALS	72.69%	79.14%	78.60%	77.33%	69.48%	77.35%	58.45%	76.55%
% DIVERSION	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%

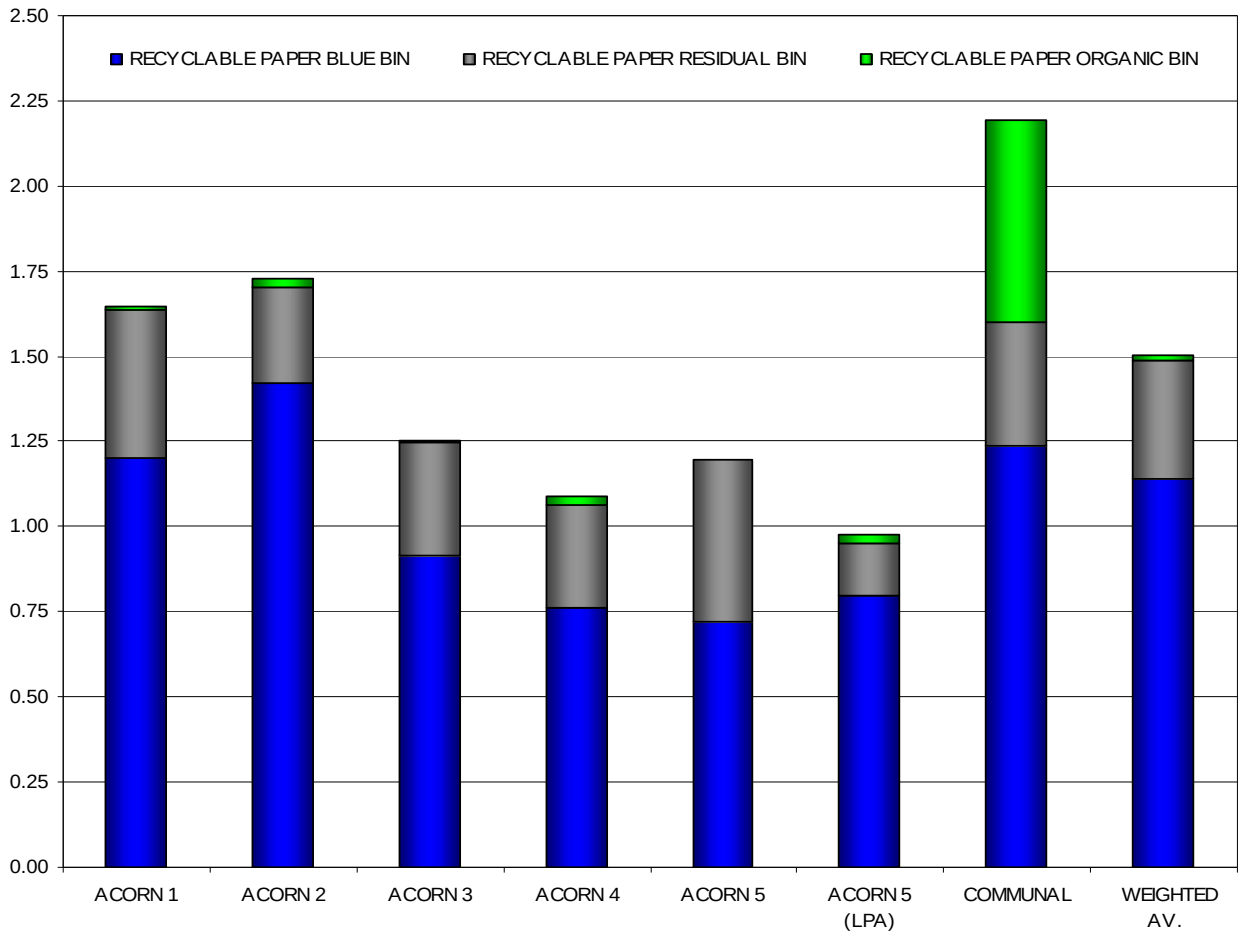
5.3.1 Paper Capture

Acorn 2 residents captured the highest proportion of their recyclable paper with 82% correctly being recycled; they generated 1.73kg/hh/wk of this material. Residents in communal bin areas captured the least recyclable paper at 56% additionally they also generated the most of this recyclable paper at 2.19kg/hh/wk.

Across Cambridge it is estimated that 1.50kg/hh/wk of recyclable paper is generated with around 76% being correctly placed into the blue bin*.

There are many different forms of paper and decisions have to be made by residents as to whether a particular piece of paper is to go into the recycling or residual waste. On average, the majority of all recyclable forms of paper are being correctly diverted by all the residents sampled although there is around 0.36kg/hh/wk of potentially recyclable paper not being placed into blue bins. On average 23% of recyclable paper is in the residual bin with 1% in the organic bin. Figure 5.3.2.1 shows the distribution of recyclable paper throughout the residual and recycling waste by Acorn category.

Figure 5.3.1.1: Distribution of recyclable paper within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes the paper disposed of in the organics bin. Although it is preferential that recyclable paper is put into the blue bin it is acceptable for the green bin. Shredded paper is only acceptable in green bins.

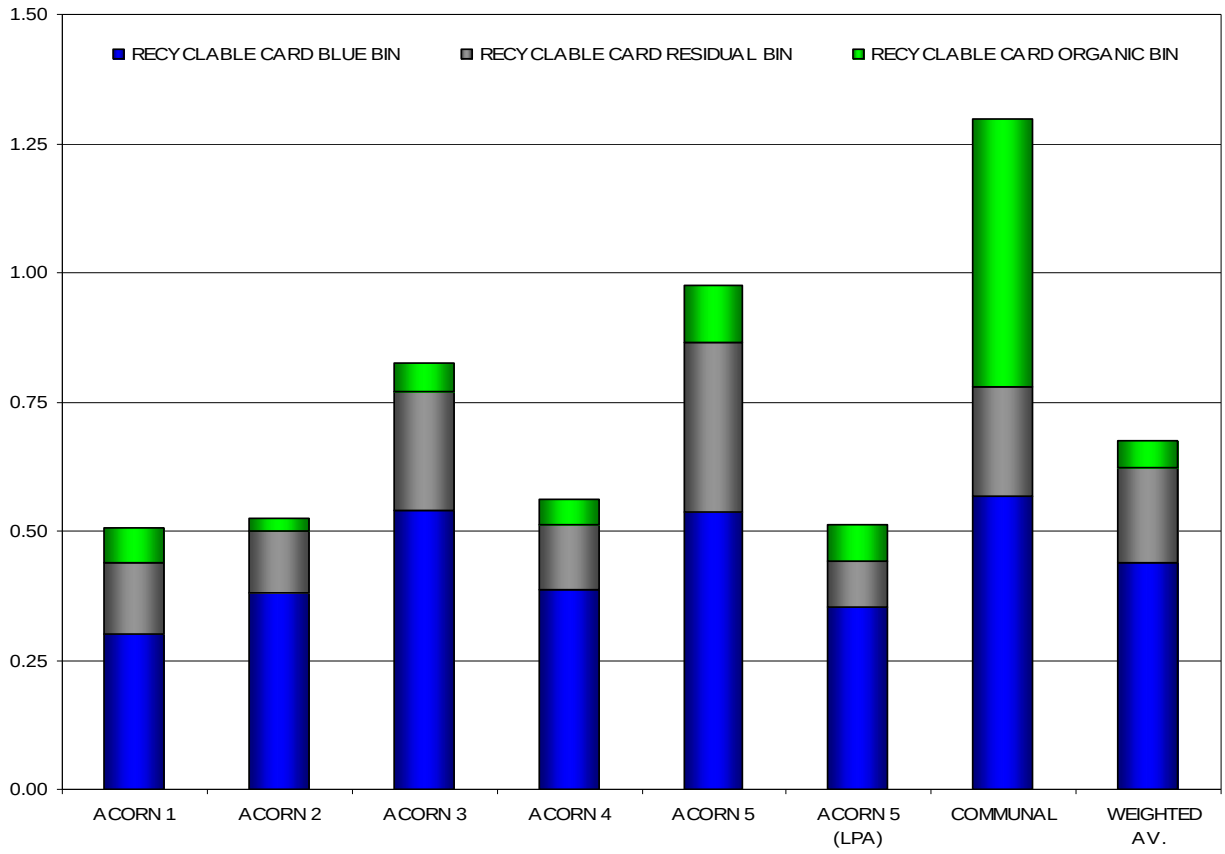
5.3.2 Card & Cardboard Capture

Acorn 2 residents captured the highest proportion of their recyclable card & cardboard with 73% correctly being recycled; they generated 0.52kg/hh/wk of this material. Residents in communal bin areas captured the least at less than 44% additionally they also generated the most of this recyclable card & cardboard at 1.30kg/hh/wk.

Across Cambridge it is estimated that 0.67kg/hh/wk of recyclable paper is generated with around 65% being correctly placed into the blue bin*.

As for paper, are many different forms of card & cardboard and decisions have to be made by residents as to whether a particular piece is to go into the recycling or residual waste. With the exception of residents in the communal bin sample, the majority of all recyclable forms of card & cardboard are being correctly diverted by all the residents surveyed although there is around 0.24kg/hh/wk of potentially recyclable card & cardboard not being placed into blue bins. On average 27% of recyclable card & cardboard is in the residual bin with 8% in the organic bin. Figure 5.3.3.1 shows the distribution of recyclable card & cardboard throughout the residual and recycling waste by Acorn category.

Figure 5.3.2.1: Distribution of recyclable card within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes certain card disposed of in the organics bin. Although it is preferential that recyclable card & cardboard is put into the blue bin it is acceptable for the green bin. Tetrapaks are only acceptable in blue bins.

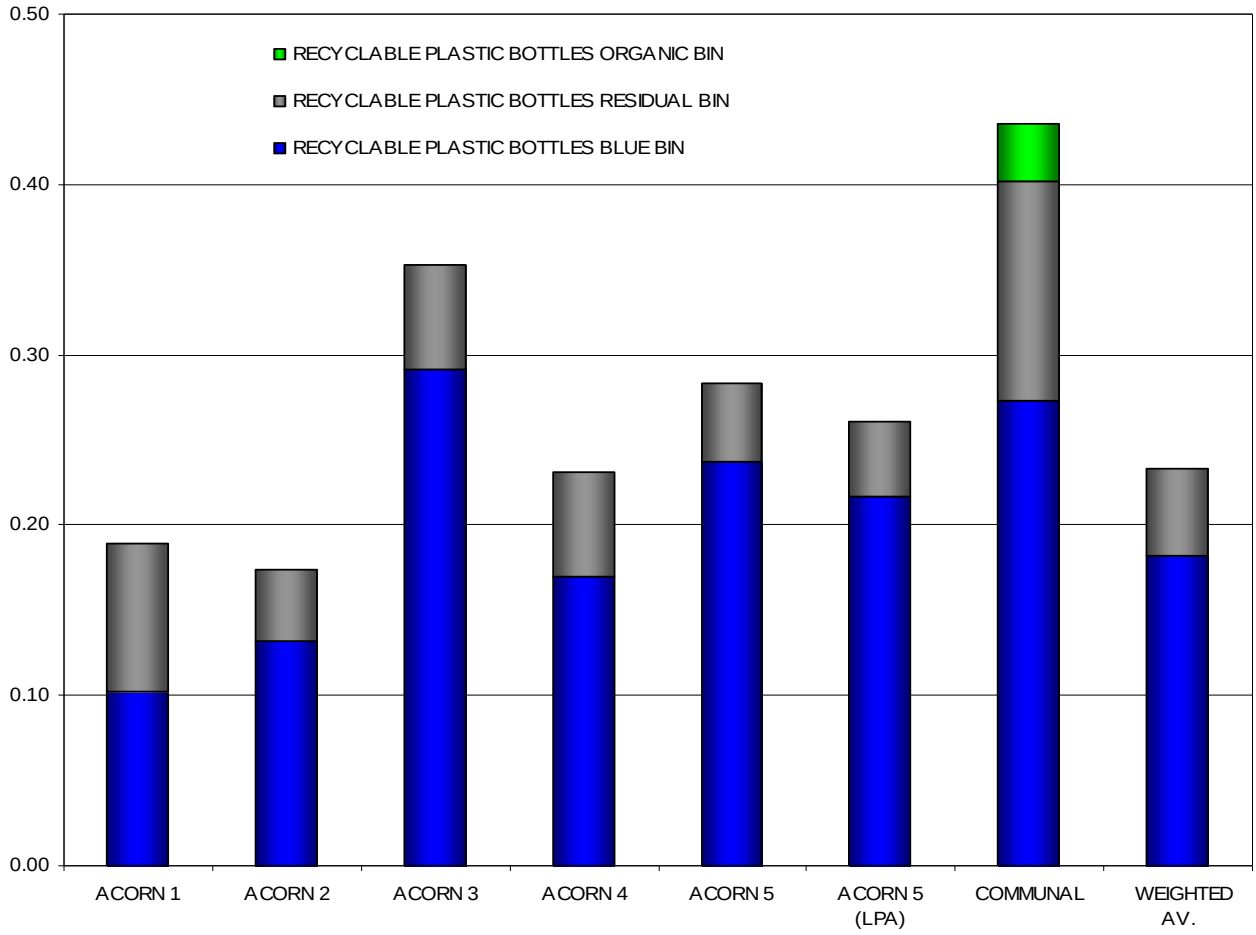
5.3.3 Plastic Bottles Capture

Acorn 5 residents captured the highest proportion of their recyclable plastic bottles with 84% correctly being recycled; they generated 0.26kg/hh/wk of this material. Residents in Acorn 1 areas captured the least recyclable paper at 54% additionally they generated 0.19kg/hh/wk.

Across Cambridge it is estimated that 0.23kg/hh/wk of recyclable plastic bottles are generated with around 78% being correctly placed into the blue bin.

Plastic bottles are easily identifiable when compared with other non-recyclable plastics. The majority of all recyclable plastic bottles are being correctly diverted by all the residents surveyed and there is just 0.05kg/hh/wk of these bottles not being placed into blue bins. On average 22% of recyclable plastic bottles are in the residual bin. Figure 5.3.3.1 shows the distribution of recyclable plastic bottles throughout the residual and recycling waste by Acorn category.

Figure 5.3.3.1: Distribution of recyclable plastic bottles within residual and mixed recycling samples (kg/hh/wk)

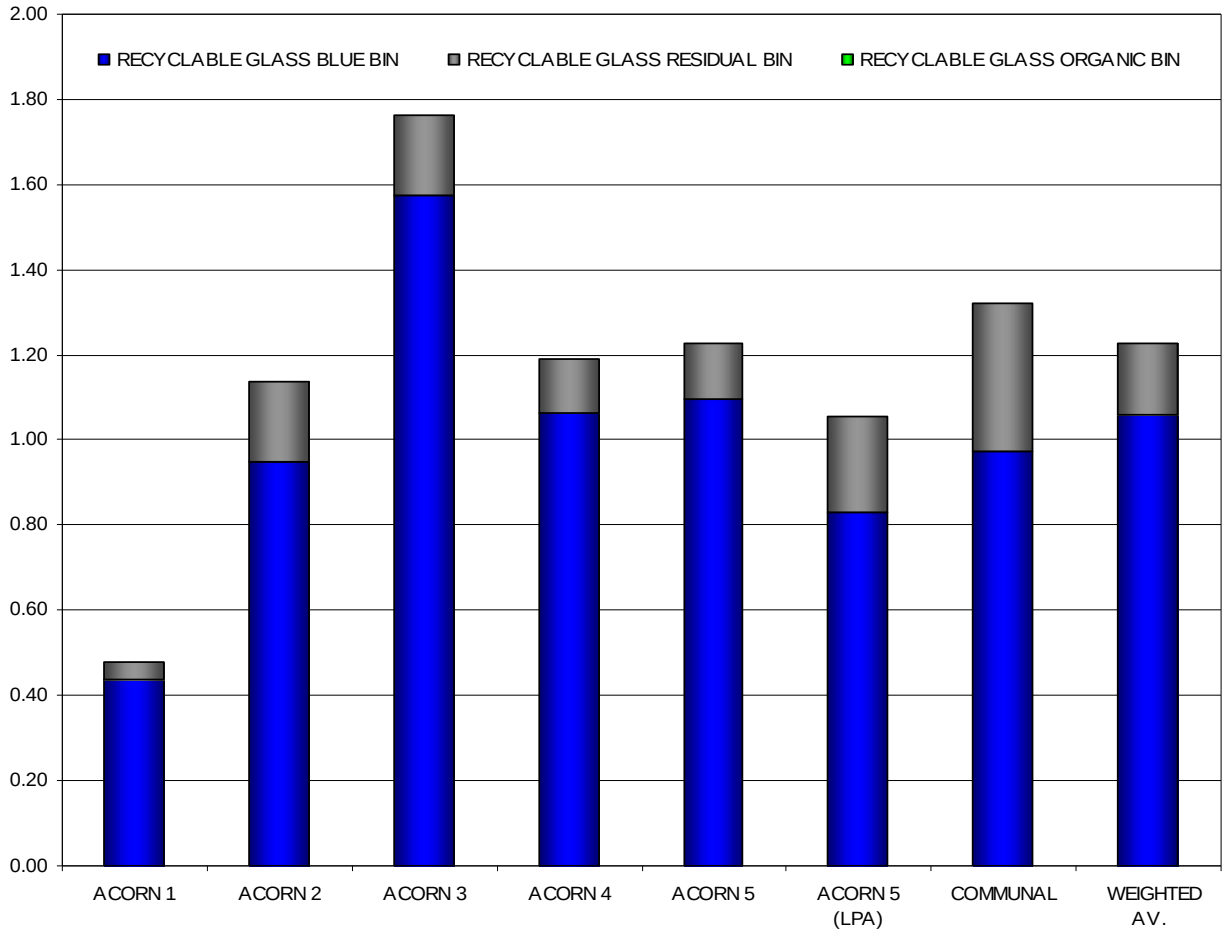


5.3.4 Glass Capture

Acorn 1 residents captured the highest proportion of their recyclable glass with 91% correctly being recycled, while residents from communal bin areas captured 74%. Acorn 3 residents produced the most recyclable glass in their combined kerbside waste at 1.76kg/hh/wk compared with 0.48kg/hh/wk from Acorn 1. On average, 87% of all recyclable glass is being correctly diverted by the Cambridge residents sampled with around 1.23kg/hh/wk being sampled.

Overall capture rates for coloured glass bottles were 92% with 82% of clear glass bottles similarly captured. Clear glass is generally considered to be more highly valued as a recyclate and it was seen that just 76% of glass jars were captured. It is often seen to be the case that empty jars are more messy than empty bottles and residents may not clean them for recycling, thus choosing to place them in the residual bins. On average, the vast majority of all recyclable forms of glass are being correctly diverted by the residents sampled although there is around 13% or 0.16kg/hh/wk of potentially recyclable glass not being placed into blue bins. Figure 5.3.4.1 shows the distribution of recyclable glass throughout the residual and mixed recycling waste.

Figure 5.3.4.1: Distribution of recyclable glass within residual and mixed recycling samples (kg/hh/wk)



5.3.5 Metals Capture

Acorn 1 residents captured the highest proportion of their recyclable metals with 79% correctly being recycled, while residents from Acorn 2 captured just 48%. Acorn 3 and communal bin users produced the most recyclable metals in their combined kerbside waste at 0.33kg/hh/wk compared with 0.15kg/hh/wk from Acorn 1. On average, 59% of all recyclable metals are being correctly diverted by Cambridge residents sampled with around 0.23kg/hh/wk being generated.

Overall capture rates for drinks cans were 72%, with 66% of food tins recycled. It is often seen to be the case that residents are unwilling to clean out food tins before recycling and this can lead to low capture rates when compared with cleaner drinks cans. Capture rates for empty aerosols were seen to be lower with just 51% of those available being placed into recycling containers. With the exception of Acorn 2 residents, the majority of all recyclable forms of metals are being correctly diverted, although there is around 0.09kg/hh/wk of potentially recyclable metal not being placed into blue bins. On average 41% of recyclable metal are in the residual bin. Figure 5.3.5.1 shows the distribution of recyclable metals throughout the residual and mixed recycling waste.

Figure 5.3.5.1: Distribution of recyclable metals within residual and mixed recycling samples (kg/hh/wk)

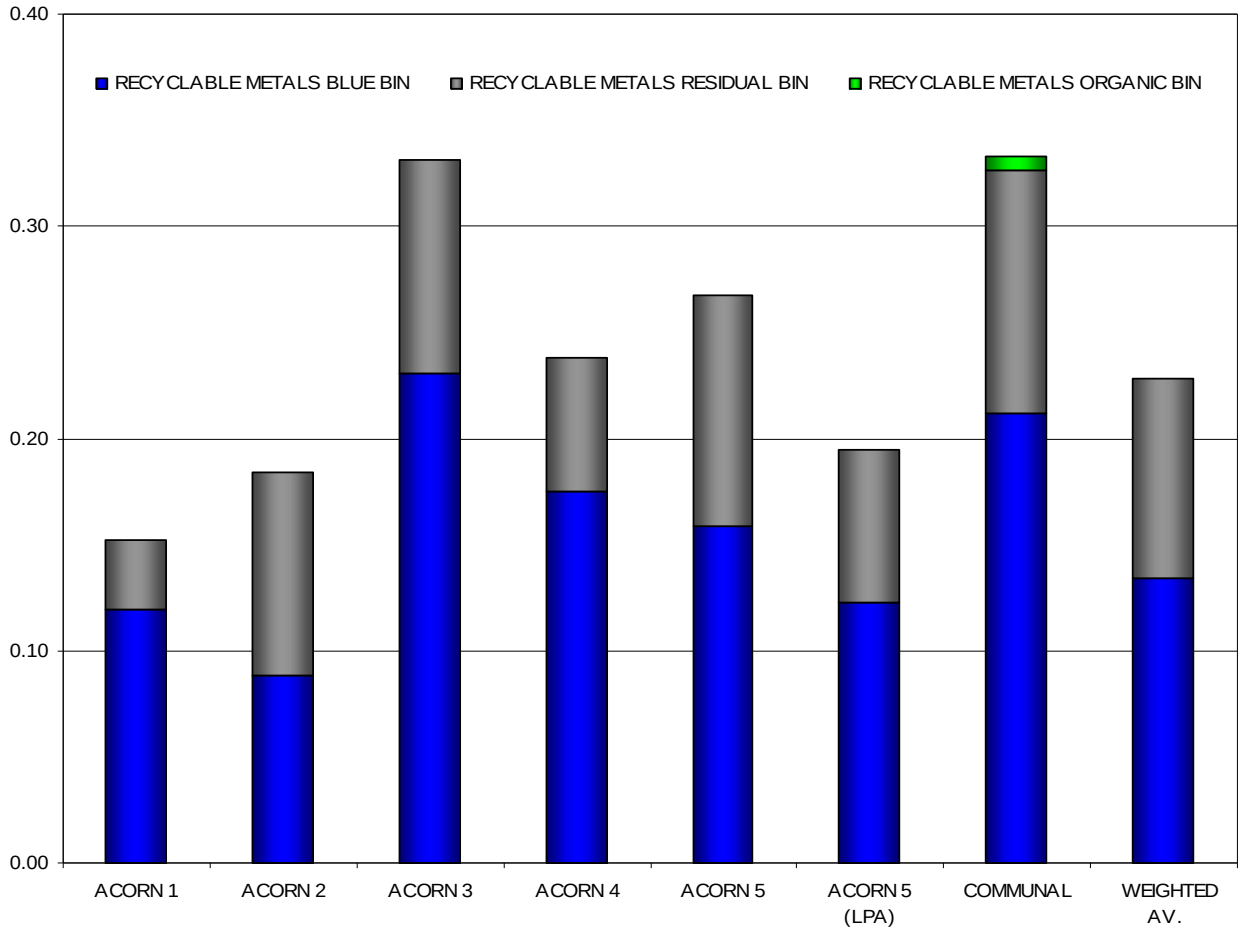
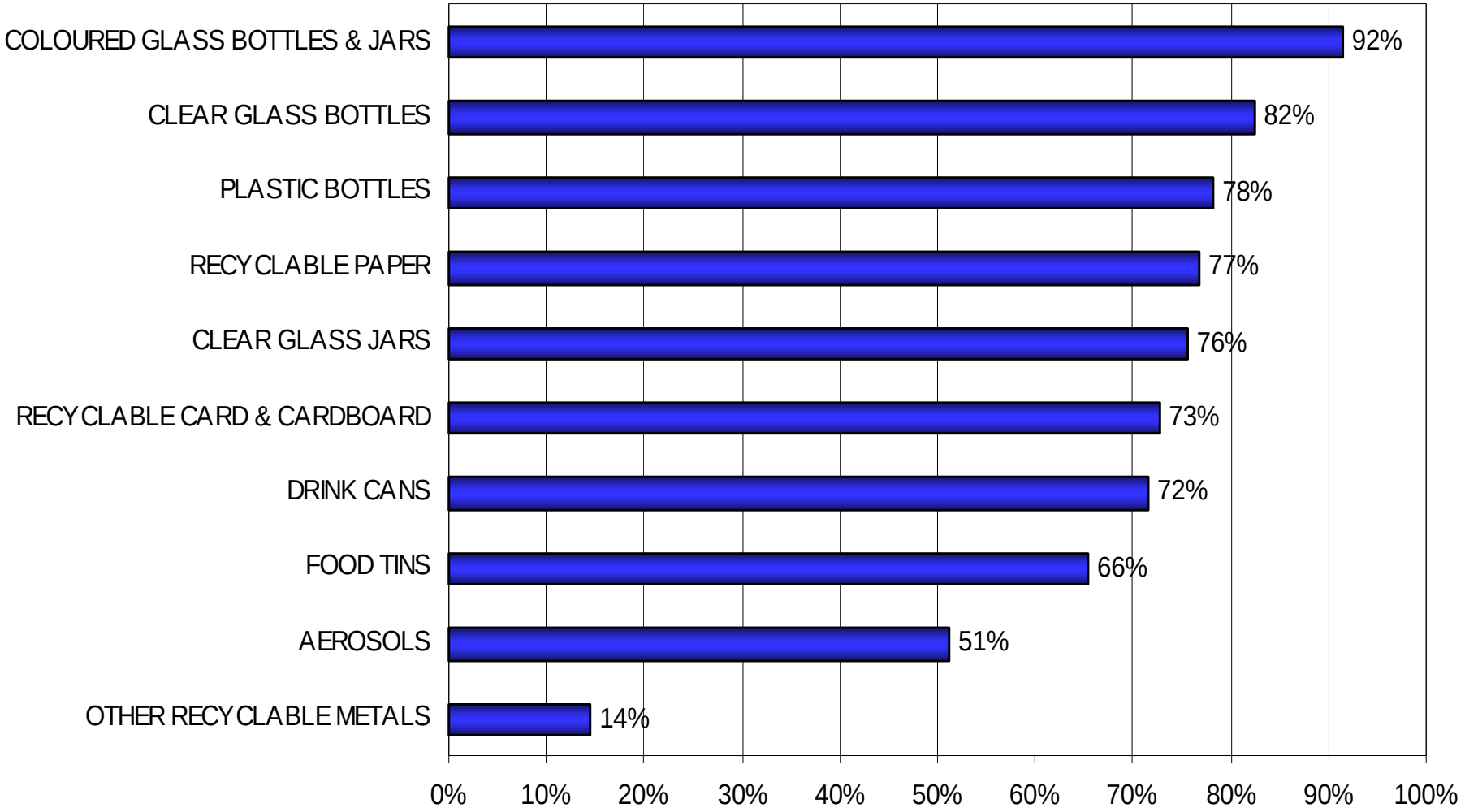


Figure 5.3.5.2: Summary chart of capture rates for blue bin recyclables.



5.4 Blue Bin Recycling Contamination

From Table 5.2.1 it has been shown that on average 6.4% of blue bin recycling is made up of contamination. This equates to around 0.20kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the recycling waste in Cambridge.

Some forms of contamination may be due to residents' lack of knowledge in relation to the recycling scheme. For example a householder may believe all plastic containers are accepted alongside recyclable plastic bottles. Other contamination will be formed from waste that is totally unrelated to the materials collected (i.e. disposable nappies, wood or bagged kitchen waste). Table 5.4.1 and Figure 5.4.1 show the amounts of contamination materials recovered from the blue bin.

The blue bin contained between 0.11kg/hh/wk (Acorn 2) and 0.54kg/hh/wk (communal bin households) of contamination.

Table 5.4.1: Breakdown of contamination materials in the blue bin recycling waste (kg/hh/wk)

BLUE BIN CONTAMINATION KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	0.04	0.03	0.06	0.04	0.13	0.04	0.06	0.06
PLASTIC FILM	0.01	0.01	0.04	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE PLASTICS	0.09	0.04	0.07	0.14	0.08	0.11	0.19	0.06
TEXTILES	0.00	0.01	0.03	0.06	0.00	0.00	0.00	0.01
NON-RECYCLABLE GLASS	0.00	0.01	0.00	0.00	0.00	0.01	0.00	<0.01
NON-RECYCLABLE METALS	0.04	0.00	0.00	0.00	0.00	0.01	0.01	<0.01
FOOD WASTE	0.00	0.01	0.02	0.10	0.08	0.01	0.07	0.03
LIQUIDS	0.01	0.00	0.01	0.04	0.00	0.00	0.02	<0.01
ALL OTHER CONTAMINATION	0.01	0.00	0.04	0.00	0.04	0.01	0.17	0.02
TOTAL CONTAMINATION	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20

Figure 5.4.1: Breakdown of contamination materials present within blue bin recycling containers (kg/hh/wk).

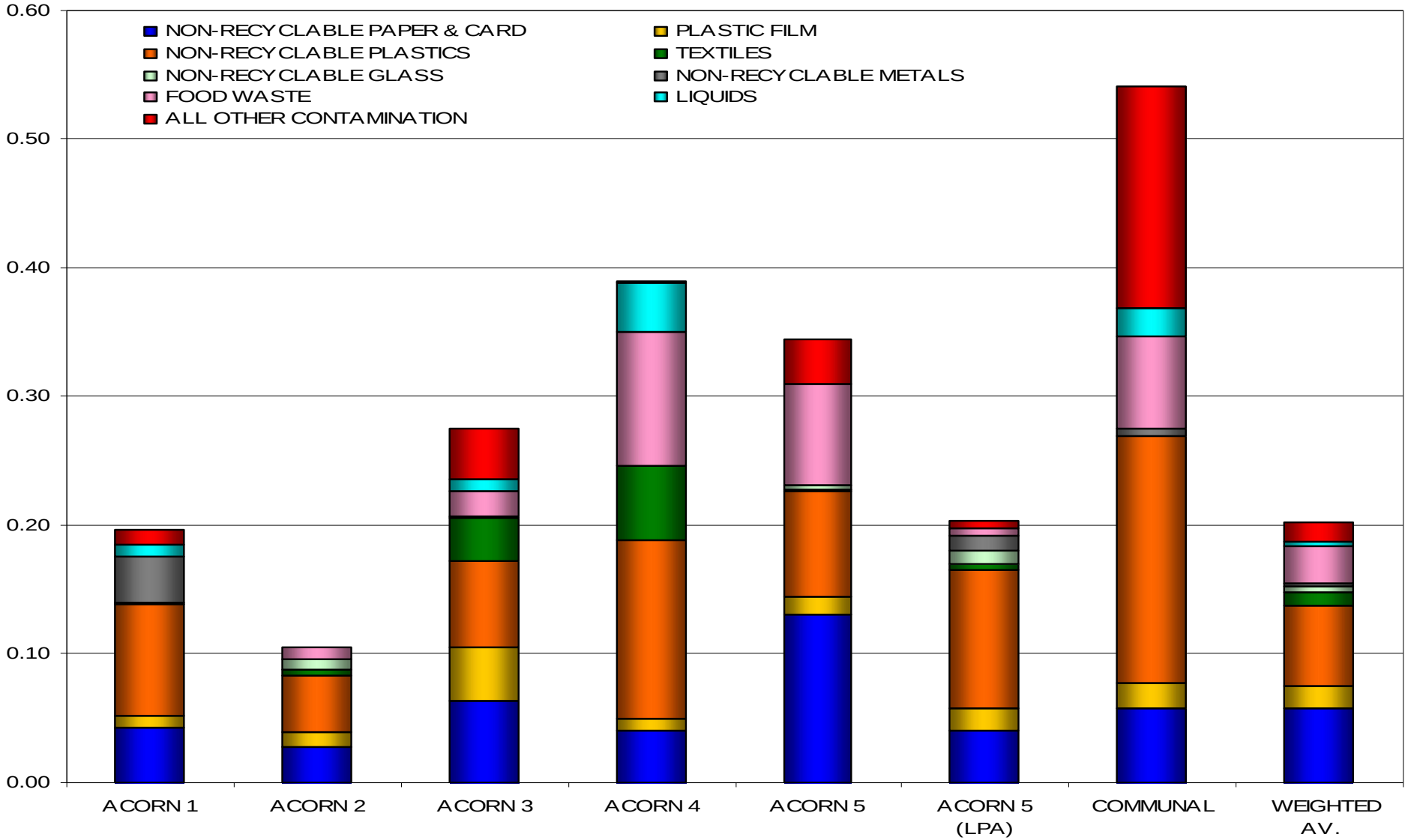


Table 5.4.2 shows the levels of contamination materials recovered from the blue bin as a percentage of the total. On average 6.4% of blue bin recycling is deemed to be contamination. Almost 4% of contamination is due to non-recyclable plastic containers, paper and card. Just over 3% of Acorn 2 recycling was classed as contamination compared with over 14% of that from households on communal bins.

Table 5.4.2: Levels of contamination within the blue bin recycling waste (% of total)

BLUE BIN CONTAMINATION %	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	1.84%	0.90%	1.67%	1.35%	4.23%	1.61%	1.52%	1.82%
PLASTIC FILM	0.39%	0.39%	1.07%	0.33%	0.43%	0.70%	0.53%	0.54%
NON-RECYCLABLE PLASTICS	3.65%	1.42%	1.75%	4.71%	2.68%	4.25%	5.04%	1.98%
TEXTILES	0.00%	0.17%	0.88%	1.96%	0.02%	0.17%	0.00%	0.35%
NON-RECYCLABLE GLASS	0.05%	0.25%	0.04%	0.00%	0.10%	0.40%	0.00%	0.16%
NON-RECYCLABLE METALS	1.52%	0.00%	0.00%	0.00%	0.00%	0.50%	0.13%	0.08%
FOOD WASTE	0.00%	0.31%	0.49%	3.54%	2.54%	0.23%	1.90%	0.89%
LIQUIDS	0.42%	0.00%	0.26%	1.27%	0.00%	0.00%	0.57%	0.12%
ALL OTHER CONTAMINATION	0.44%	0.00%	1.01%	0.07%	1.14%	0.21%	4.53%	0.48%
TOTAL CONTAMINATION	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%

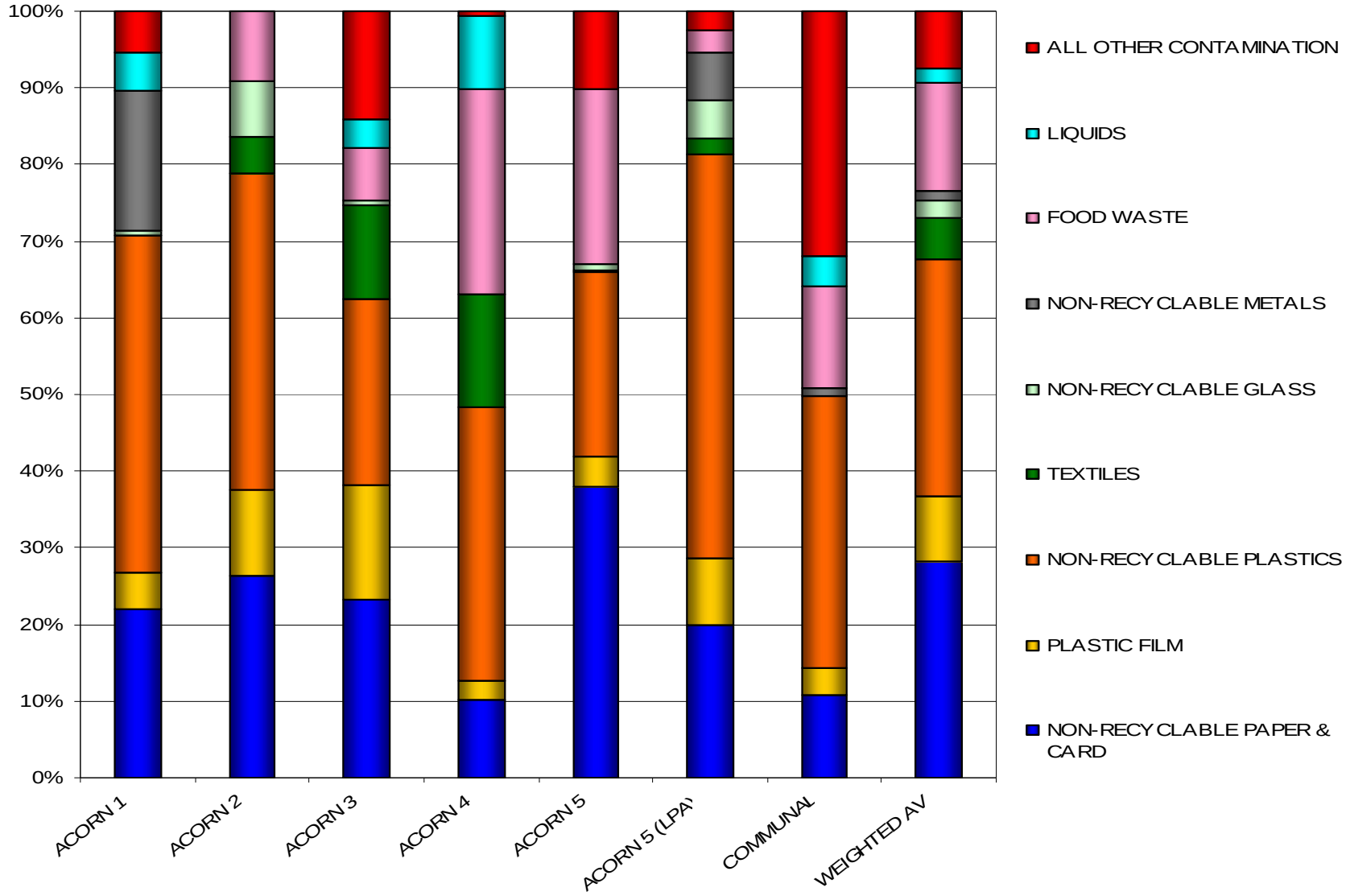
Table 5.4.3 and Figure 5.4.2 show a breakdown of the contaminants to highlight materials causing the greatest contribution to the overall contamination levels within blue bins. Around 31% of the contamination was due to non-recyclable dense plastics, these formed over half of the contamination from Acorn 5(LPA) households. Over 28% of contamination was due to non-recyclable paper and card; this formed almost 40% of Acorn 5 contamination. Up to 14% of contamination was formed from food waste and this material represented a quarter of the overall contamination from Acorn 4 and 5 households.

Blue bins from communal households had very high levels of miscellaneous contamination at 32% of the total. These items are typical of general residual waste being placed into recycling bins.

Table 5.4.3: Proportional breakdown of blue bin contaminants (% of contamination).

% OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	22.09%	26.25%	23.24%	10.23%	37.98%	19.92%	10.70%	28.31%
PLASTIC FILM	4.74%	11.25%	14.85%	2.49%	3.87%	8.66%	3.70%	8.48%
NON-RECYCLABLE PLASTICS	43.90%	41.25%	24.42%	35.58%	24.04%	52.71%	35.46%	30.78%
TEXTILES	0.00%	4.86%	12.28%	14.84%	0.21%	2.16%	0.00%	5.38%
NON-RECYCLABLE GLASS	0.64%	7.36%	0.62%	0.00%	0.88%	4.96%	0.00%	2.43%
NON-RECYCLABLE METALS	18.22%	0.00%	0.00%	0.00%	0.00%	6.17%	0.92%	1.27%
FOOD WASTE	0.00%	9.03%	6.80%	26.73%	22.82%	2.86%	13.33%	13.94%
LIQUIDS	5.09%	0.00%	3.68%	9.59%	0.00%	0.00%	4.04%	1.91%
ALL OTHER CONTAMINATION	5.32%	0.00%	14.12%	0.55%	10.19%	2.55%	31.86%	7.52%
TOTAL CONTAMINATION	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5.4.2: Proportional breakdown of blue bin contaminants (% of contamination).



6) Green Bin Organic Recycling Waste

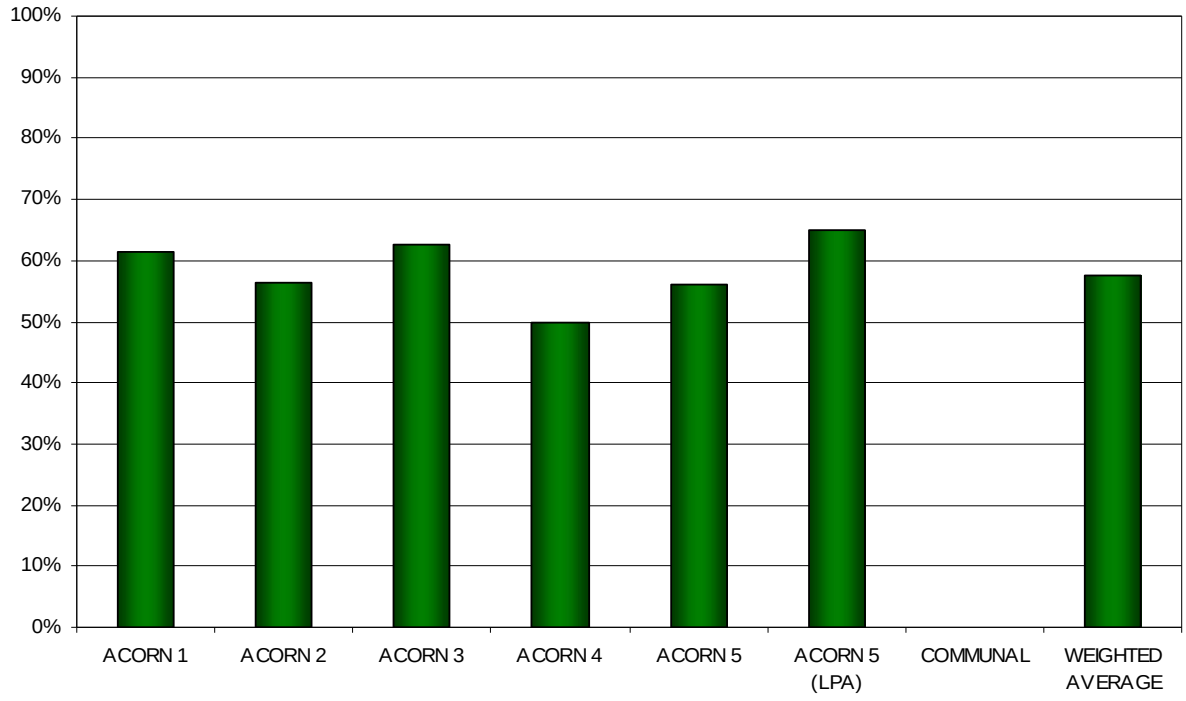
6.1 Set out rates and waste generation

Table 6.1.1 and Figure 6.1.1 highlight the average set out rates for green bin organic recycling waste observed during the compositional analysis. Table 6.1.2 and Figure 6.1.2 show the average amounts of this recycling waste generated in kg/hh/wk. Set out rates ranged between 50% for Acorn 4 and 65% for Acorn 5(LPA) were observed. Across Cambridge around 58% of residents are opting to place out organic waste containers for collection.

Table 6.1.1: Average Set Out For Green Bin Waste (%)

ACORN	% SET OUT
1	61%
2	57%
3	63%
4	50%
5	56%
5 (LPA)	65%
COMMUNAL	N/A
WEIGHTED AVERAGE	58%

Figure 6.1.1: Average Set Out For Green Bin Waste (%)

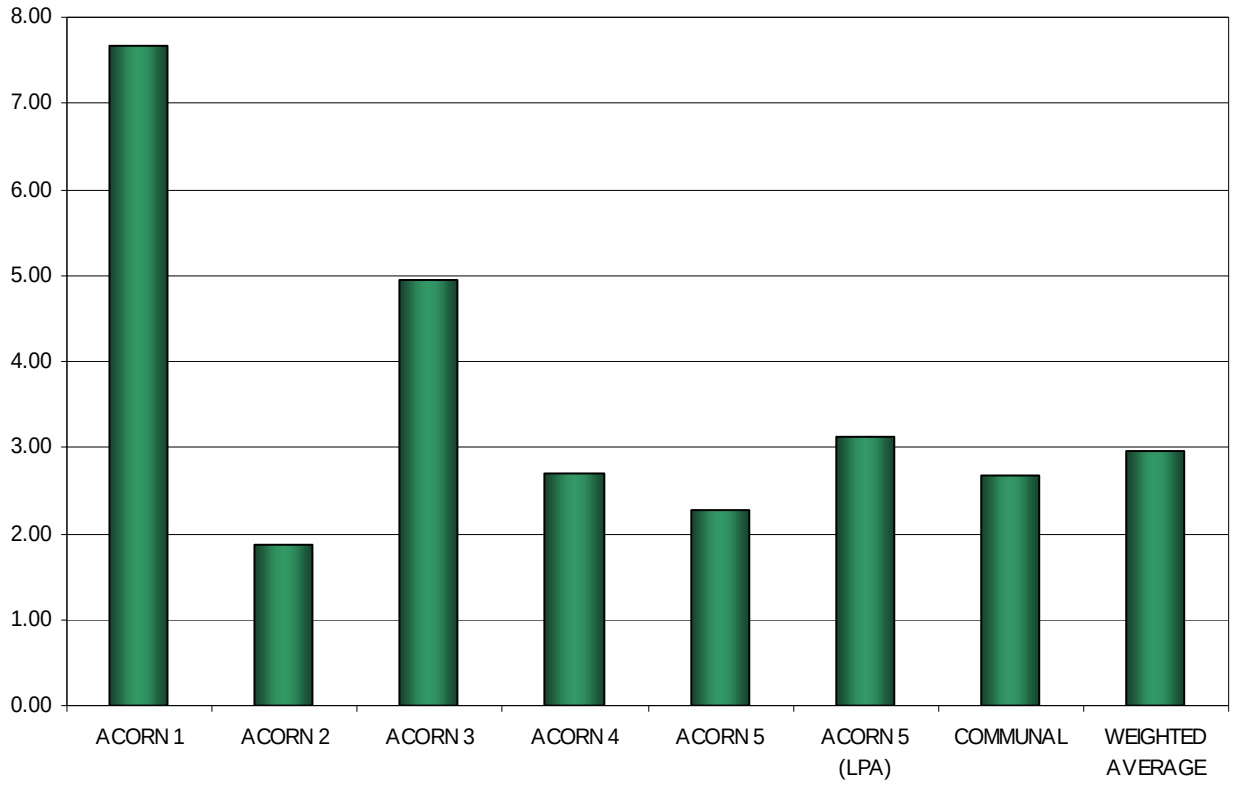


In this survey the amount of green bin recycling generated ranged between 1.86kg/hh/wk from Acorn 2 to 7.66kg/hh/wk from Acorn 1. Across Cambridge around 2.96kg/hh/wk organically recycled waste is being collected from the kerbside.

Table 6.1.2: Average green bin waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	7.66
2	1.86
3	4.95
4	2.71
5	2.27
5 (LPA)	3.13
COMMUNAL	2.69
WEIGHTED AVERAGE	2.96

Figure 6.1.2: Average green bin waste generation rates (kg/hh/wk)



6.2 Compositional analysis of green recycling bins

This section looks at the average amount and composition of the green bin organic recycling waste presented by participating households sampled throughout Cambridge. Results can again be expressed in terms of percentage concentration and kg/hh/wk for individual samples and in relation to the household Acorn surveyed.

Table 6.2.1 and Figure 6.2.1 show green bin recycling data in terms of percentage composition with Table 6.2.2 and Figure 6.2.2 showing average generation rates for major materials in terms of kg/hh/wk. As residual waste will contain a proportion that is classified as potentially recyclable; then recycling waste will contain a faction that is deemed to be contamination. That is to say that it is not compatible with the materials currently acceptable to the green bin recycling scheme.

Table 6.2.1: Average Composition of organic recycling (% concentration) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	2.50%	1.99%	11.17%	10.82%	6.71%	2.90%	25.30%	5.93%
NON-HOME COMPOSTABLE FOODS	0.66%	15.64%	3.09%	7.53%	0.88%	9.13%	1.41%	6.38%
FLORA ORGANICS	92.93%	79.43%	81.99%	74.25%	77.77%	72.68%	0.39%	82.30%
OTHER ACCEPTABLE ORGANICS	3.67%	2.83%	1.24%	2.73%	4.95%	13.64%	41.62%	2.84%
SOIL & TURF	0.00%	0.00%	0.00%	4.22%	0.00%	0.00%	0.00%	0.13%
NON-RECYCLABLE PAPER & CARD	0.00%	0.11%	0.02%	0.08%	0.13%	1.01%	8.60%	0.06%
PLASTICS	0.00%	0.00%	0.02%	0.00%	0.07%	0.00%	6.17%	0.02%
TEXTILES	0.24%	0.00%	0.00%	0.00%	3.37%	0.00%	2.21%	0.59%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.00%
ALL OTHER WASTE	0.00%	0.00%	2.47%	0.36%	6.13%	0.64%	13.52%	1.75%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6.2.2: Average Composition of organic recycling (kg/hh/wk) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	0.19	0.04	0.55	0.29	0.15	0.09	0.68	0.18
NON-HOME COMPOSTABLE FOODS	0.05	0.29	0.15	0.20	0.02	0.29	0.04	0.19
FLORA ORGANICS	7.12	1.48	4.06	2.01	1.77	2.28	0.01	2.43
OTHER ACCEPTABLE ORGANICS	0.28	0.05	0.06	0.07	0.11	0.43	1.12	0.08
SOIL & TURF	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER & CARD	0.00	0.00	0.00	0.00	0.00	0.03	0.23	0.00
PLASTICS	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00
TEXTILES	0.02	0.00	0.00	0.00	0.08	0.00	0.06	0.02
GLASS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
ALL OTHER WASTE	0.00	0.00	0.12	0.01	0.14	0.02	0.36	0.05
TOTAL	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96

Figure 6.2.1: Average Composition of organic recycling (% by weight) by Acorn

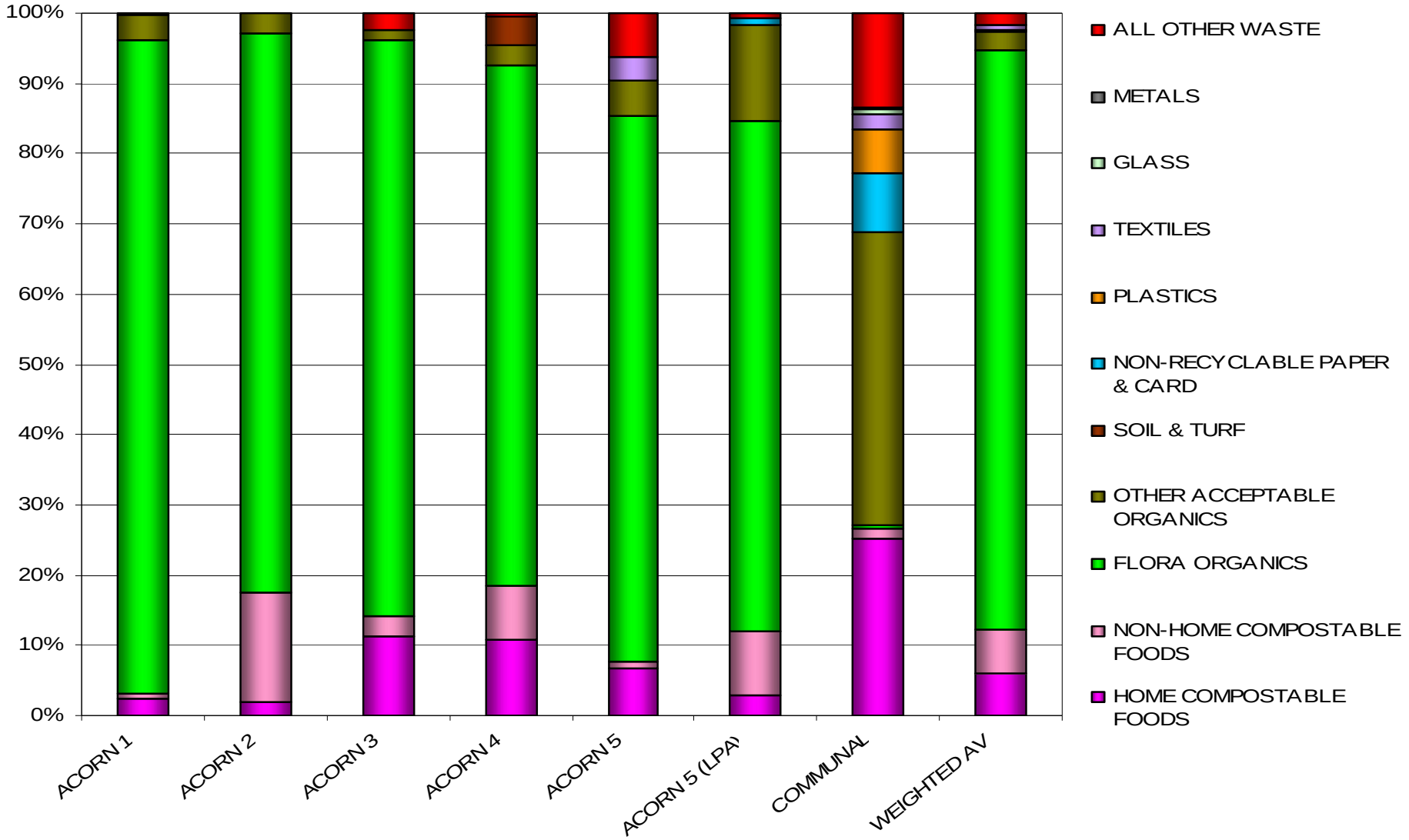
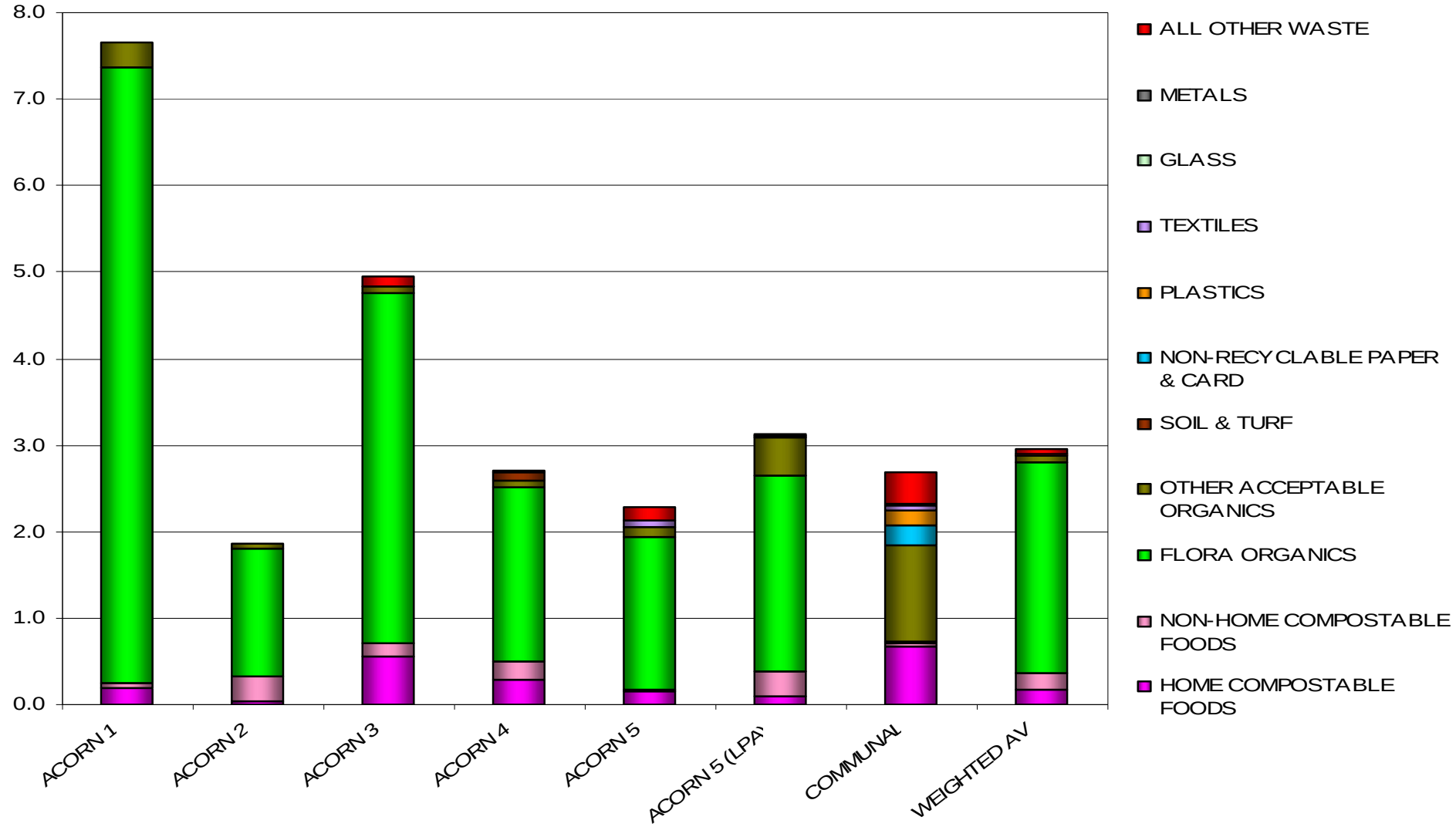


Figure 6.2.2: Composition of organic recycling (kg/hh/wk) by Acorn



6.3 Materials placed out for green bin recycling collections

This chapter looks in more detail at the individual materials placed out for green bin recycling collections and highlights the effectiveness with which this scheme is capturing these items. Looking at the relationship between the residual, dry recycling and green bin recycling waste presented will additionally give indications as to the overall diversion being achieved throughout Cambridge.

Table 6.3.1: Summary table for material capture and diversion rates (%) for green bin recycling

CAPTURE & DIVERSION RATES (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	46.37%	4.67%	58.24%	38.15%	24.18%	14.92%	46.36%	23.12%
NON-HOME COMPOSTABLE FOODS*	9.71%	35.45%	15.16%	13.65%	1.61%	25.11%	3.37%	20.00%
ALL FOOD WASTE	25.96%	20.33%	36.04%	21.97%	9.25%	21.56%	27.69%	21.39%
FLORA ORGANICS	98.55%	93.12%	100.00%	96.06%	98.29%	91.73%	7.40%	97.15%
PET BEDDING & UNTREATED WOOD	100.00%	N/A	N/A	0.00%	N/A	100.00%	100.00%	75.69%
ACCEPTABLE PAPER & CARD	4.14%	2.37%	3.07%	4.56%	5.27%	7.22%	32.03%	3.28%
ALL ORGANICS	90.49%	56.22%	79.01%	52.97%	52.93%	65.41%	27.50%	66.27%
% DIVERSION	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%

* Contains all unidentifiable and unsortable composite food waste. Some of this will be home compostable fragments, however, due to a significant proportion being non fruit and vegetable waste; this faction is deemed non-home compostable.

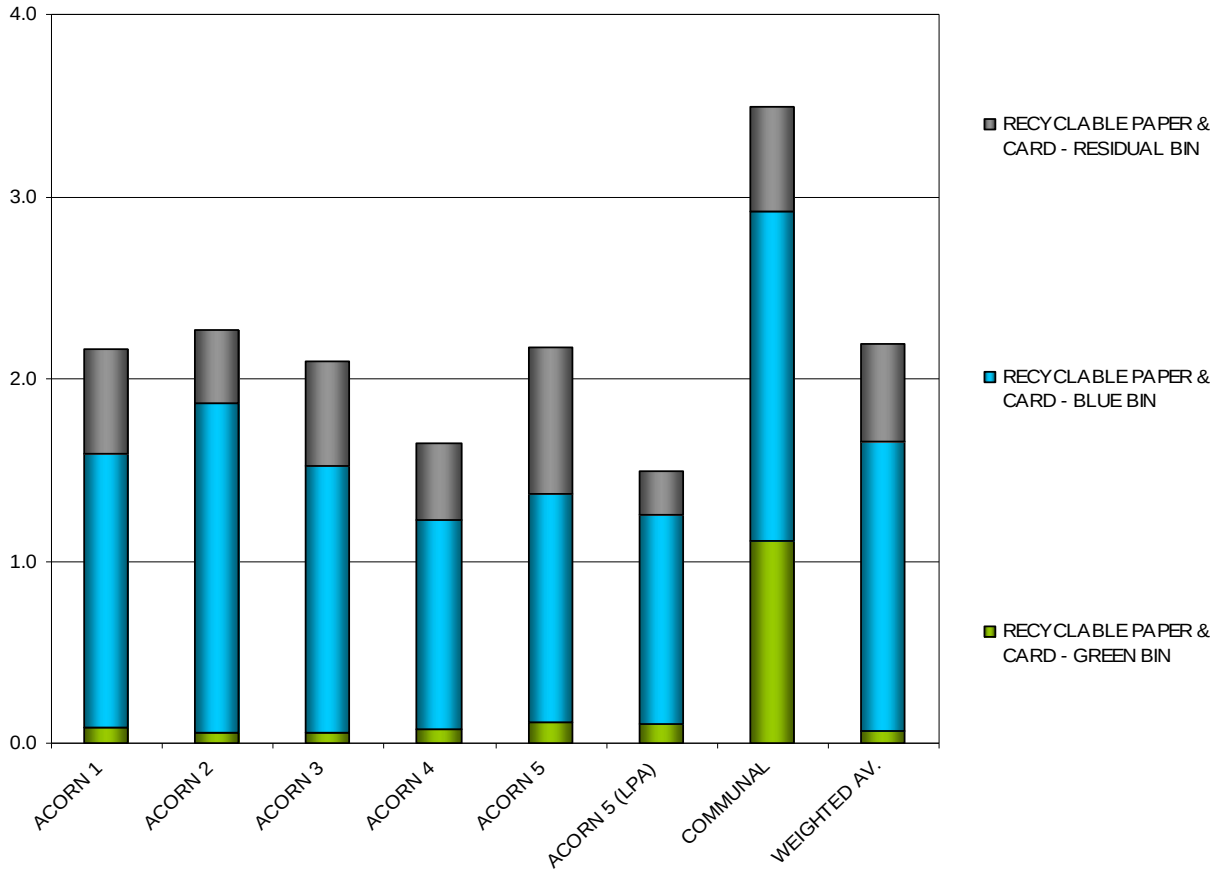
Table 6.3.1 summarises the average capture and diversion rates seen for materials achieved for the green bin organic recycling collections. By far the most efficient recyclers of organic waste were Acorn 1 households who recycled over 90% of that being generated. Acorn 3 households captured over 79% of their organics whilst the rate for Acorns 2, 4 and 5 was between 53% and 56%. IN contrast it was seen that residents in communal bin areas only managed to capture 27.5% of the organic waste that they were disposing of. Across Cambridge, 66.3% of the organics available for green bin recycling were correctly captured by participating households.

6.3.1 Paper & Card Capture

Residents are able to recycle paper, thin card and corrugated cardboard in their green bins. It is however the case that with the exception of shredded paper, it is preferable for these recyclables to be placed into blue recycling bins.

Figure 6.3.1.1. shows the distribution of recyclable paper, card and cardboard throughout the three kerbside schemes by Acorn category. It is clear that residents using communal bins not only generate the most recyclable paper and card; they also place by far the highest proportion in their green bins at 32%. Typically between 2% and 5% of all recyclable paper and card was present in green bins for Acorns 1 – 5 with just over 7% seen for the Acorn 5(LPA) sample.

Figure 6.3.1.1 Distribution of recyclable paper & card within residual and recycling samples (kg/hh/wk)



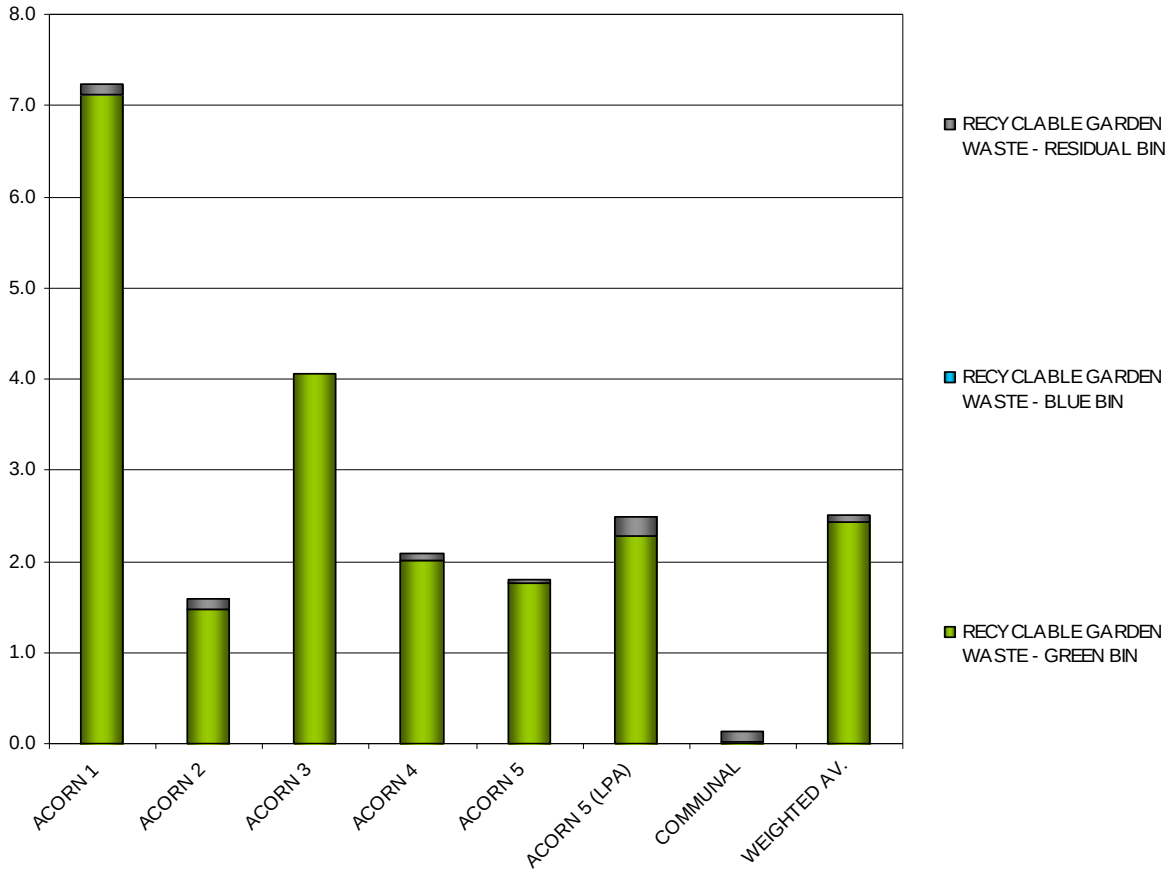
6.3.2 Garden Waste Capture

Residents are able to recycle garden clippings in their green bins. With the exception of the communal bin residents it was seen that garden waste was by far the greatest constituent of the presented organic recycling. Just 7% of garden waste was captured in communal bins areas although very little of this type of waste is actually generated. On average it is seen that over 97% of the available garden waste is recycled by Cambridge residents. All Acorns recorded capture rates of between 92% and 100%.

It is seen that communal bin households generated just 0.13kg/hh/wk of recyclable garden waste compared with 7.23kg/hh/wk from Acorn 1 households. On average residents throughout Cambridge create 2.51kg/hh/wk of recyclable garden waste.

Soil and turf are also classed as garden waste but are not allowable in green bins. This waste was only generated in low amounts across Cambridge (0.02kg/hh/wk) with around 22% ending up in green bins.

Figure 6.3.2.1. Distribution of garden waste within residual and recycling samples (kg/hh/wk)



6.3.3 Food Waste Capture

Residents are able to all forms of food waste in their green bins. Capture rates were seen to vary greatly across the samples taken. Food waste can broadly be divided into two types. Firstly 'home-compostable' which covers things like raw fruit and vegetable waste, egg shells, tea bags etc which could potentially be composted in standard compost bins. Non-home compostable food are generally cooked and prepared foods and plate scrapings which residents would not normally compost with their garden, fruit and vegetable wastes.

Overall capture rates for all food waste varied at between 9.3% in Acorn 5 up to 36% in Acorn 3. This represented an average figure of 21.4% for Cambridge. Acorn 1 households produced just 0.93kg/hh/wk of total food waste compared with 2.59kg/hh/wk from communal bin households. On average Cambridge residents are producing of 1.70kg/hh/wk of food waste.

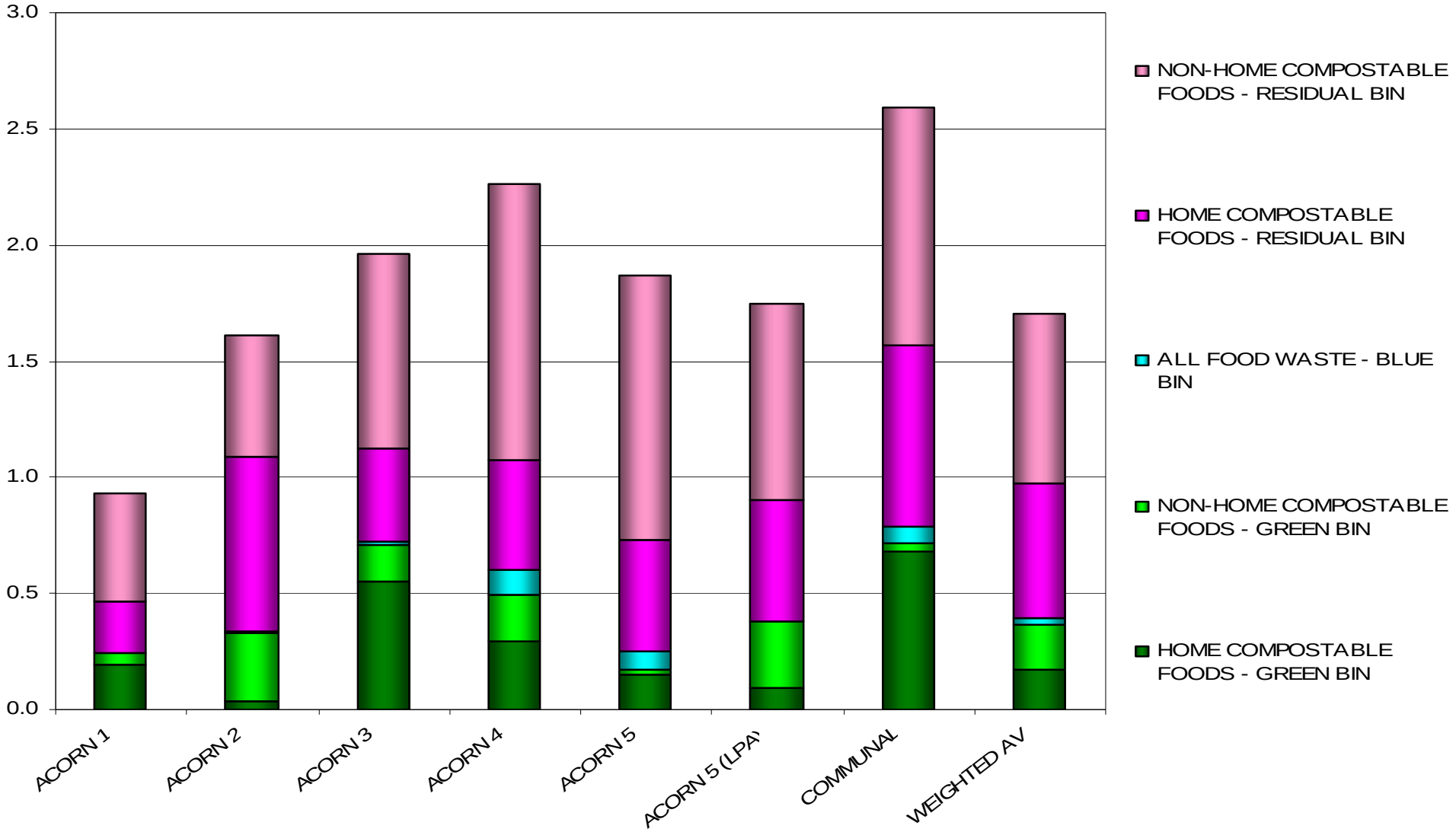
As well as differences in the levels and capture rates for food waste between the Acorn samples, there was a significant difference between the types of food being recycled. Home compostable food waste is generally less 'messy' than non-home compostable food waste and was seen to have capture rates of between 4.7% (Acorn 2) and 58.2% (Acorn 3) at an average of 23.1%. Conversely capture rates for non-home compostable food waste were lower at between 1.6% (Acorn 5) and 35.5% (Acorn 2); an average of 20%.

In terms of diversion solely through the green bin recycling it is seen that just 12.5% diversion is achieved by communal bin users compared with almost 54% for Acorn 1. Overall this is an average diversion of 23.1% which is very similar to that recorded for blue bins. Total diversion rates for the combined recycling collections are shown in section 7.

With the exception of communal bin users, all sample areas were seen to generate more non-home compostable food waste than home compostable food waste at average figures of 0.94kg/hh/wk and 0.76kg/hh/wk respectively. During the sorting of the waste it is the method to class some of the food waste as unidentifiable or unsortable. This is basically a degraded mixture of foods which are recyclable and are classified as non-compostable as will contain waste other than fruit and vegetable matter.

Figure 6.3.3.1 shows the distribution and levels of food waste throughout the residual and green bin containers. Overall, 0.58kg/hh/wk of home compostable and 0.75kg/hh/wk of non-home composable food waste is not being recycled in the green bins. This represents a total of 1.34kg/hh/wk of potentially recyclable material.

Figure 6.3.2.1. Distribution of food waste within residual and recycling samples (kg/hh/wk)



6.4 Green Bin Recycling Contamination

From Table 6.2.1 it has been shown that between 0.1% (Acorn 2) and 31.3% (communal bin users) of collected green bin recycling is due to contamination. Across Cambridge approximately 2.6% of green bin recycling waste was not compatible with the accepted materials, equating to 0.08kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the green bin recycling waste in Cambridge.

Table 6.4.1 and Figures 6.4.1 and 6.4.2 show the proportions of contamination materials in each area.

Table 6.4.1: Percentage breakdown of contamination in green bin waste

% BREAKDOWN OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
SOIL & TURF	0.00%	0.00%	0.00%	90.45%	0.00%	0.00%	0.00%	5.28%
NON-RECYCLABLE PAPER & CARD	0.00%	100.00%	0.65%	1.77%	1.31%	61.27%	27.50%	2.47%
PLASTICS	0.00%	0.00%	0.65%	0.00%	0.76%	0.00%	19.71%	0.66%
TEXTILES	100.00%	0.00%	0.00%	0.00%	34.71%	0.00%	7.07%	22.96%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.70%	<0.01%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.79%	<0.01%
ALL OTHER WASTE	0.00%	0.00%	98.70%	7.78%	63.22%	38.73%	43.22%	68.63%
TOTAL CONTAMINATION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
CONTAMINATION KG/HH/WK	0.02	0.00	0.12	0.13	0.22	0.05	0.84	0.08
% CONTAMINATION	0.24%	0.11%	2.50%	4.67%	9.70%	1.64%	31.28%	2.55%

Figure 6.4.1: Contamination materials in green bin recycling

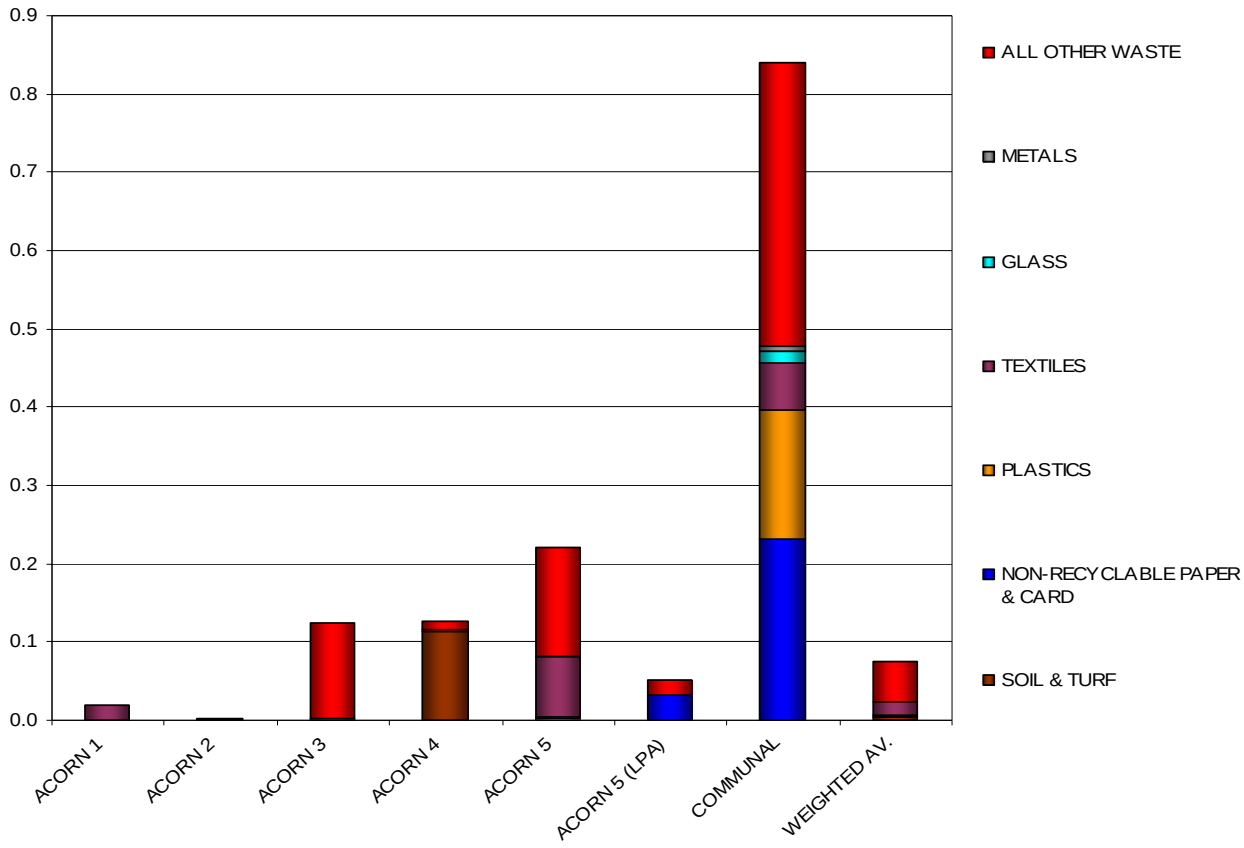
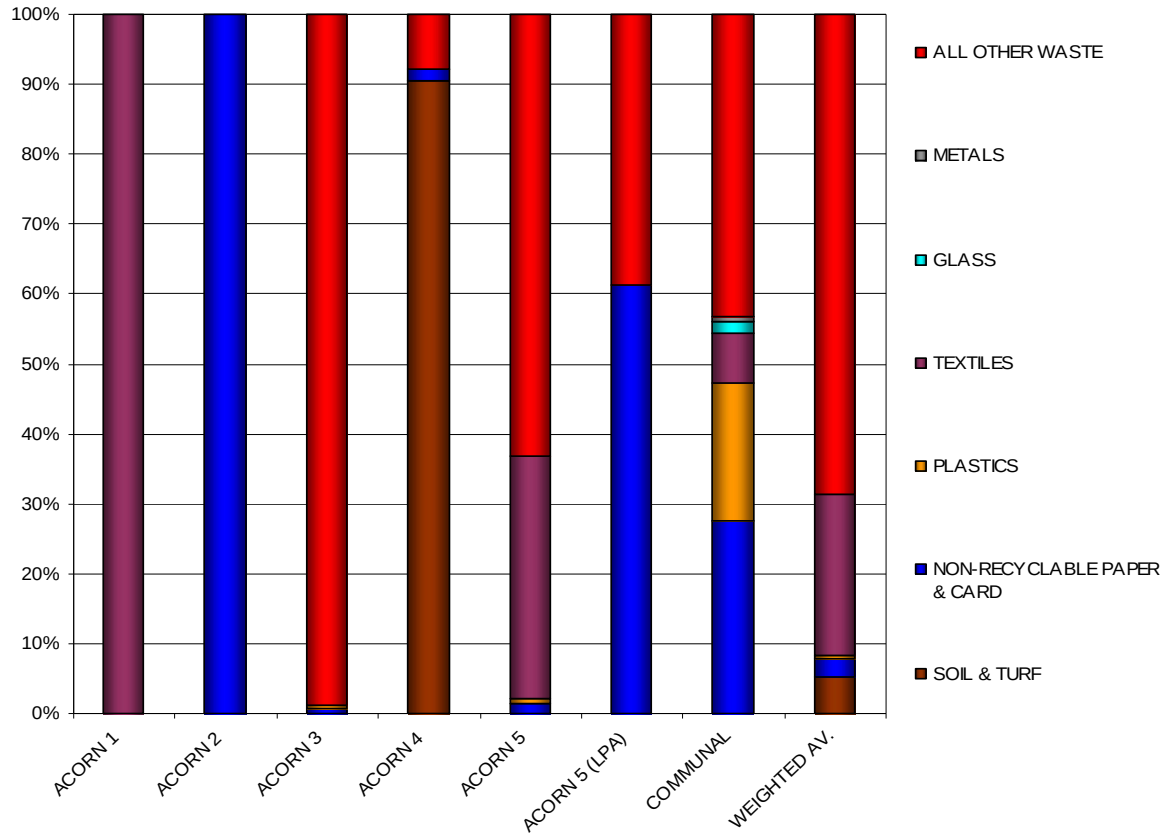


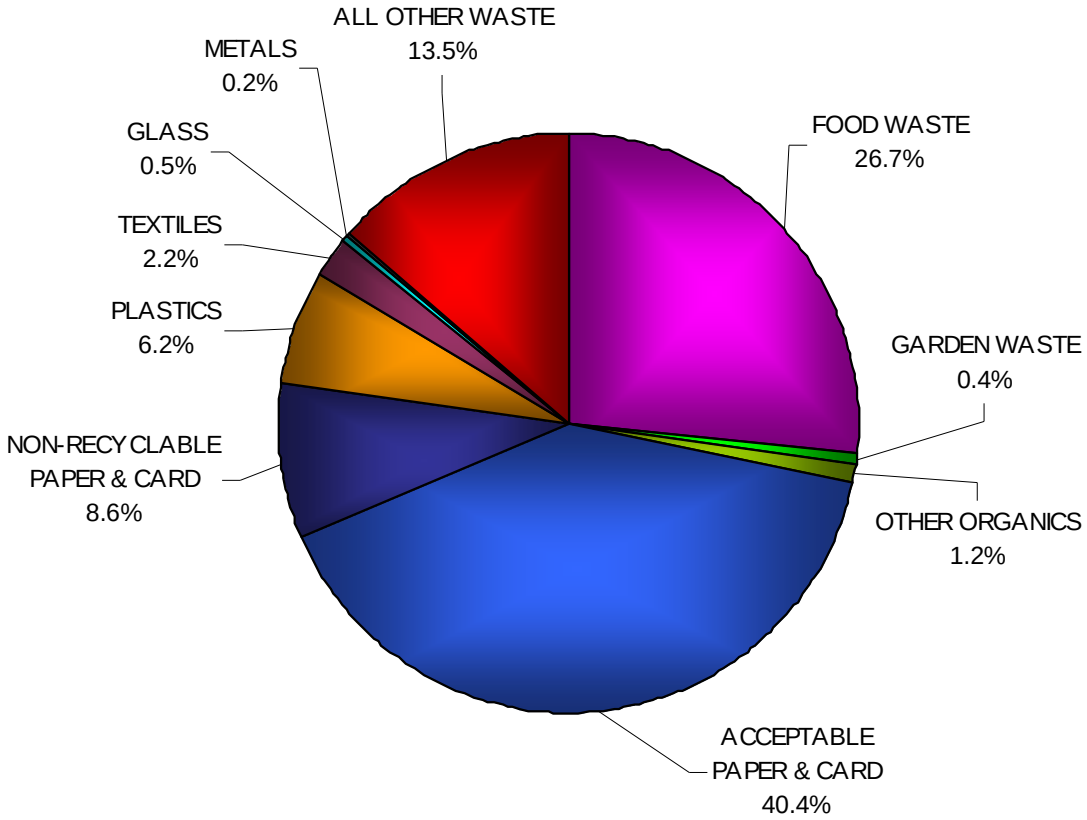
Figure 6.4.2: % breakdown of contaminants within green recycling bins



Overall it was seen that 68.8% of the contamination was due to miscellaneous other waste. This would be a mixture of general waste that can generally be considered to be residual waste. This material formed up to 99% of the contamination seen in Acorn 3 green bins. Up to 23% of contamination was due to textile waste. Around 35% of Acorn 5 green bin contamination was due to waste textiles. All of the contamination in Acorn 2 green bins was due to non-recyclable paper and card and over 90% of the contamination in Acorn 4 was due to soil and turf. Combined these wastes formed just under 8% of the contamination.

The composition of the organic recycling collected from households using communal bins was markedly different from all of the other samples. Of the 2.69kg/hh/wk presented up to 0.84kg/hh/wk or 31.3% was due to contaminants; this was far greater than any of the other samples. A wide range of contaminants including general residual waste, glass, metal and plastic were seen in these recycling bins and they appear to be used by residents as general waste disposal containers. These bins also contain significantly more paper and cardboard waste than other sample surveyed.

Figure 6.4.3 % breakdown of contaminants within green recycling bins from communal users



7) Overall Diversion through Recycling Collections

7.1 Total waste generation levels & diversion

Capture rates determine how much of a material that should be recycled actually is being recycled. Diversion rates show the percentage of total generated waste produced from an area that is being 'Diverted' via the available recycling stream(s).

Table 7.1.1 and Figure 7.1.1 show the total waste generation (residual, blue bin and green bin recycling) for each of areas sampled. Acorn 2 produced the lowest levels of total waste at 9.59kg/hh/wk with the households from Acorn 3 generating the most at 16.71kg/hh/wk. Across Cambridge it is estimated that the weekly output of kerbside waste is 12.48kg/hh/wk.

Table 7.1.2 and Figure 7.1.2 show the proportion of this total waste that is being diverted through the various kerbside recycling collections. Using the blue and green recycling bins, Cambridge residents are diverting an average of 46.8% of all waste generated at the kerbside. Residents from Acorn 1 were managing to divert almost 69% of their waste compared with 50% for Acorns 2 and 3, 42% for Acorn 4 and 32% for Acorn 5. The low performing Acorn 5 area residents also diverted around 50% of their waste with households using communal bins diverting around 34.5%.

Table 7.1.1: Average annual waste generation levels by Acorn (kg/hh/wk)

TOTAL KERBSIDE WASTE (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RESIDUAL WASTE	4.20	4.66	7.93	6.50	9.80	5.06	8.33	6.36
BLUE BIN RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16
GREEN BIN RECYCLING	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96
TOTAL WASTE	14.22	9.59	16.71	12.16	15.17	10.71	14.82	12.48

Figure 7.1.1: Total waste generation levels by Acorn (kg/hh/wk)

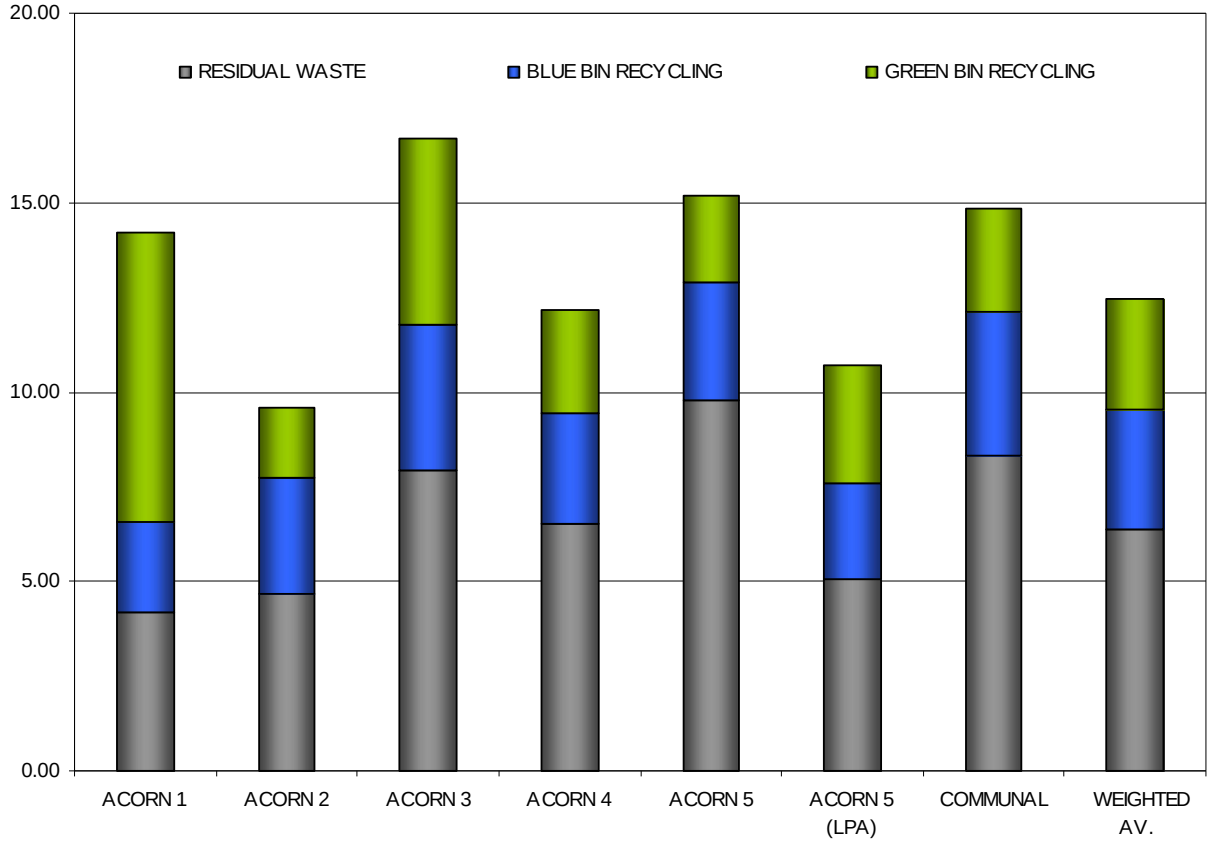
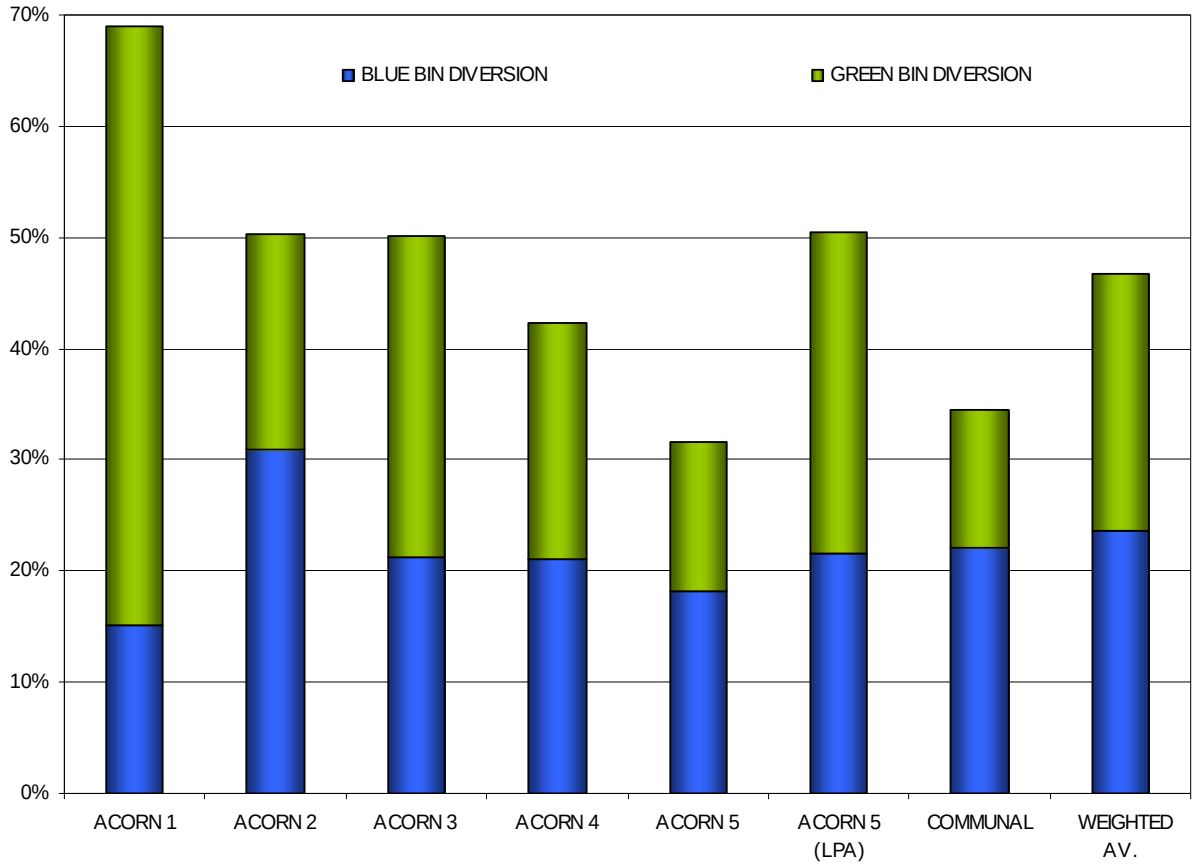


Table 7.1.2: Diversion rates (%) for individual recycling collections and overall

% DIVERSION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE RECYCLING BINS	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%
GREEN RECYCLING BINS	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%
TOTAL DIVERSION	68.96%	50.32%	50.16%	42.27%	31.65%	50.41%	34.46%	46.79%

Figure 7.1.2: Diversion rates (%) for individual recycling collections and overall



Current recycling figures for Cambridge suggest a waste diversion rate of 43.7%. Therefore weighted figures for the City during this survey show a level of around 3% above this rate and 1.8% above the aspirational target of 45% for 2012.

Data from this survey suggests a level of 331.9kg/hh/yr for residual waste and 651.1kg/hh/yr for total kerbside waste.

Were all of the currently recyclable materials being disposed of at the kerbside placed into the correct recycling bin then the maximum achievable diversion rate for Cambridge would be 65%.

Appendix 1: ACORN Category Classification[1].

ACORN 1 – WEALTHY ACHIEVERS – U.K. AVERAGE 23.3%
These are some of the most successful and affluent people in the UK. They live in wealthy, high status rural, semi-rural and suburban areas of the country. Middle-aged or older people predominate, with many empty nesters and wealthy retired. Some neighbourhoods contain large numbers of well-off families with school age children, particularly in the more suburban locations. These people live in large houses, which are usually detached with four or more bedrooms. Almost 90% are owner occupiers, with half of those owning their home outright. They are very well educated and most are employed in managerial and professional occupations. Many own their own business. Car ownership is high, with many households running two or more cars. Incomes are high, as are levels of savings and investments. These people are well established at the top of the social ladder. They enjoy all the advantages of being healthy, wealthy and confident consumers.
ACORN 2 – URBAN PROSPERITY – U.K. AVERAGE 13.3%
These are well educated and mostly prosperous people living in our major towns and cities. They include both older wealthy people living in the most exclusive parts of London and other cities, and highly educated younger professionals moving up the corporate ladder. This category also includes some well educated but less affluent individuals, such as students and graduates in their first jobs. The wealthier people tend to be in senior managerial or professional careers, and often live in large terraced or detached houses with four or more bedrooms. Some of the younger professionals may be buying or renting flats. The less affluent will be privately renting. These people have a cosmopolitan outlook and enjoy their urban lifestyle. They like to eat out in restaurants, go to the theatre and cinema and make the most of the culture and nightlife of the big city.
ACORN 3 – COMFORTABLY OFF – U.K. AVERAGE 28.1%
This category contains much of 'middle-of-the-road' Britain. Most people are comfortably off. They may not be wealthy, but they have few major financial worries. All life stages are represented in this category. Younger singles and couples, just starting out on their careers, are the dominant group in some areas. Other areas have mostly stable families and empty nesters, especially in suburban or semi-rural locations. Comfortably off pensioners, living in retirement areas around the coast or in the countryside, form the other main group in this category. Most people own their own home, with owner occupation exceeding 80%. Most houses are semidetached or detached. Employment is in a mix of professional and managerial, clerical and skilled occupations. Educational qualifications tend to be in line with the national average. This category incorporates the home-owning, stable and fairly comfortable backbone of modern Britain.
ACORN 4 – MODERATE MEANS – U.K. AVERAGE 13.2%
This category contains much of what used to be the country's industrial heartlands. Many people are still employed in traditional, blue-collar occupations. Others have become employed in service and retail jobs as the employment landscape has changed. In the better off areas, incomes are in line with the national average and people have reasonable standards of living. However, in other areas, where levels of qualifications are low, incomes can fall below the national average. There are also some isolated pockets of unemployment and long-term illness. This category also includes some neighbourhoods with very high concentrations of Asian families on low incomes. Most housing is terraced, with two or three bedrooms, and largely owner occupied. It includes many former council houses, bought by their tenants in the 1980s. Overall, the people in this category have modest lifestyles, but are able to get by.
ACORN 5 – HARD PRESSED – U.K. AVERAGE 21.7%
This category contains the poorest areas of the UK. Unemployment is well above the national average. Levels of qualifications are low and those in work are likely to be employed in unskilled occupations. Household incomes are low and there are high levels of long-term illness in some areas. Housing is a mix of low-rise estates, with terraced or semi-detached houses, and purpose built flats, including high-rise blocks. Properties tend to be small and there is much overcrowding. Over 50% of the housing is rented from the local Council or a housing association. There are a large number of single adult households, including many single Pensioners and lone parents. In some neighbourhoods, there are high numbers of black and Asian residents. These people are experiencing the most difficult social and economic conditions in the whole country, and appear to have limited opportunity to improve their circumstances.

[1] http://www.caci.co.uk/download.aspx?path=/libraries/document/394.pdf

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Cambridge City Waste Composition Analysis

Cambridge Council

May / June 2012

FINAL REPORT

Measurement ◆ Evaluation ◆ Learning

Contents Page

1) Project details and acknowledgements

Title	Cambridge City Waste Composition Analysis.
Client	Cambridge City
Project number	12012
Client reference	Final Report_Version_1
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Measurement Evaluation Learning

2) Introduction

Background

Cambridge City Council currently has a combined recycling and composting rate of 43.7% (2010/11). The Authority now wishes to study the composition of domestic kerbside collected residual and recycling waste streams to provide current baseline data and to help inform future communication campaigns. As well as giving indications as to the current levels of waste and recycling being generated, observations will be made showing the levels of materials that are currently recyclable at the kerbside and those which could potentially be recyclable via future schemes. The Council hopes to achieve 45% by the end of 2012 with a future target for 2015-16 of 50-55%.

This report presents results from the analysis of kerbside collected residual and recycling waste collected during a two week period in May / June 2012. The survey focused on the levels and composition of all waste containers that are currently available for residents to place for collection at the kerbside. The sampling regime involved the direct collection and compositional analysis of residual waste from a target of 300 properties representing each of the five main socio-demographic categories (Acorns). Results could therefore be weighted to give an even better picture of the waste being collected by the authority as a whole. Additionally around 120 properties were highlighted from a low performing area and a group of properties using communal bins. Knowledge of the waste in these differing areas will help the City Council develop strategies to increase the efficiency with which its residents are recycling their waste. The overall findings of this project will highlight several factors important for improving the recycling rate and directing future strategy and communication campaigns:

Objectives

Specific aims of the work were to:

- Understand, using socio-demographic profiling which sectors of the community are producing which types of waste and which are using the recycling provision most effectively
- Detect capture rates for individual materials which are already collected separately for recycling
- Evaluate the amount of specific materials collected in the residual bin that could potentially be collected separately for recycling
- Evaluate the use of the receptacles used for collecting waste and recycling
- Detect the amount of packaging and biodegradable material present
- Assess the amount of contamination in receptacles meant for recycling material
- Assess the amount of recyclable material being placed in the residual bin

This report will highlight key results recorded for Cambridge City showing data for individual socio-demographics as well as weighted for the City as a whole.

Acknowledgements

M·E·L Research would like to thank the collection authority and their staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results, presents the results in tables and charts and discusses the findings. The views and opinions expressed in this report are those of M.E.L Research Ltd. and are not necessarily shared by officers from Cambridge City Council.

Accuracy Statement

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

3) Executive Summary

Key findings

Kerbside residual waste

- Weighted across all Acorn samples, 84% of households sampled throughout Cambridge presented residual waste bins for collection.
- In terms of waste generation, households were setting out an average of 6.36kg/hh/wk.
- Food waste was seen to be the major component of residual waste forming 20.6% of the total, equating to 1.31kg/hh/wk – 45% of this is potentially home compostable
- Paper items made up 10.2% of the residual waste; 53% of this (0.35kg/hh/wk) was alternatively recyclable at the kerbside.
- Card and cardboard made up around 3.5% of collected residual waste; 84% of this (0.18kg/hh/wk) was alternatively recyclable at the kerbside.
- Plastics formed 14.9% of the residual waste; 10% of dense plastic waste (0.05kg/hh/wk) was due to recyclable plastic bottles with a further 0.21kg/hh/wk formed from the types of plastic containers that will be recyclable from July 2012.
- Just under 3% of residual waste was metallic; 53% of this (0.09kg/hh/wk) was recyclable in blue bins.
- Around 3% of residual waste was seen to be glass; 94% of this (0.16kg/hh/wk) was recyclable in blue bins.
- Over 6% of residual waste was due to textiles; 53% of these items (0.21kg/hh/wk) were seen to consist of reusable clothing and shoes
- Just under 1.6% of residual waste was deemed to be either Hazardous or WEEE. An additional 17% consisted of disposable nappies
- Just over 1.3% of residual waste was found to be garden waste. Around 17% of this was non-recyclable soil and turf, with the remainder consisting of recyclable garden trimmings
- Overall just over 13% of collected residual waste could have been placed into the blue recycling containers available– the equivalent of 0.84kg/hh/wk.
- Just under 22% of collected residual waste could have been placed into the green recycling containers available– the equivalent of 1.40kg/hh/wk.
- In total over 35% of residual waste collected could have been recycled alternatively at the kerbside – 2.23kg/hh/wk.
- Around 59% of potentially recyclable materials consisted of food waste with 15% being paper and 8% being card and cardboard.
- Residual waste collected from Cambridge households was deemed to be around 51% biodegradable.
- Collected waste had a packaging content of 17%.

Mixed recycling – Blue bins

- Over the survey, 78% of households presented blue bins for collection
- In terms of waste generation, kerbside households were setting out an average of 3.16kg/hh/wk in their blue bins.
- Overall 6.4% of blue bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.20kg/hh/wk.
- Around 77% of paper, 87% of recyclable glass, 73% of card and cardboard, 78% of plastic bottles and 59% of the recyclable metals available for mixed recycling were correctly captured.
- Kerbside properties diverted around 23.7% of their waste through their blue bins.

Organic waste recycling – Green bins

- Over the survey, 58% of households opted to present their green organic recycling bins at the kerbside for collection.
- In terms of waste generation, households were setting out an average of 2.96kg/hh/wk at the kerbside.
- Overall 2.6% of green bin recycling waste collected from all properties was classified as contamination – the equivalent of 0.08kg/hh/wk.
- Green bins collected from households on a communal service had very high contamination levels of 31.3%. Bins had significant levels of residual waste and also large amounts of paper and cardboard.
- The majority of contamination of green bin waste was due to general residual materials; forming 69% of the contamination. Up to 23% of contamination was due to textiles.
- 21% of food waste and 97% of garden waste was correctly captured by households using the scheme.
- Properties on the green bin collection scheme diverted an average of around 23.1% of their waste through these collections.
- When combined with the diversion through mixed recycling collections, Cambridge households are diverting around 46.8% (5.84kg/hh/wk) of their total waste (12.48kg/hh/wk) through recycling collections.

4) Compositional Analysis of Residual Waste

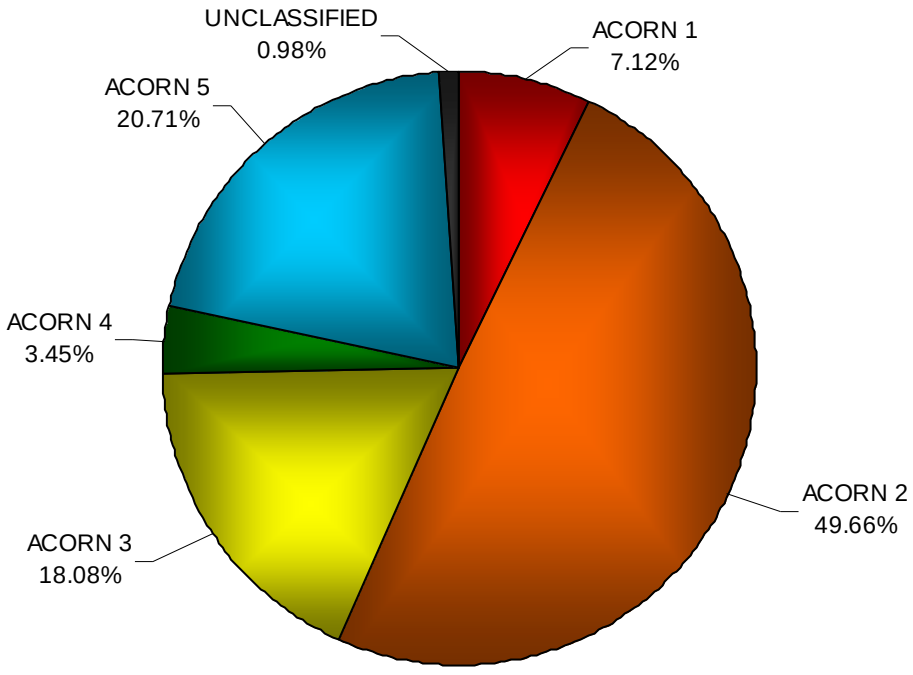
4.1 Set out rates and waste generation levels

Table 4.1.2 and Figure 4.1.2 highlight the average set out rates for residual waste observed at the time waste was collected for compositional analysis. Table 4.1.3 and Figure 4.1.3 show the average amount of residual waste generated in kg/hh/wk. Around 60 households were selected for each sample from each Acorn category with the set out relating to the proportion of these households actively placing out their waste. The amount of waste in kilograms per household per week is collected from each sample of 60 households, not just those that are participating. Results are shown by Acorn; as all five Acorn categories were sampled it was possible to weight the results according to the socio-demographic profile for Cambridge as per Table 4.1.1. A table giving a brief description of the types of households typical for each Acorn category is shown in the appendix section.

Table 4.1.1: Acorn profile for Cambridge

ACORN	% SET OUT
1	7.12%
2	49.66%
3	18.08%
4	3.45%
5	20.71%
UNCLASSIFIED	0.98%
TOTAL	100%

Figure 4.1.1: Acorn profile for Cambridge



Observed set out rates for residual waste ranged between 71% in the low performing Acorn 5 area (LPA) to 95% in Acorn 3. On average 84% of households in Cambridge are projected to be setting out their residual waste for collection.

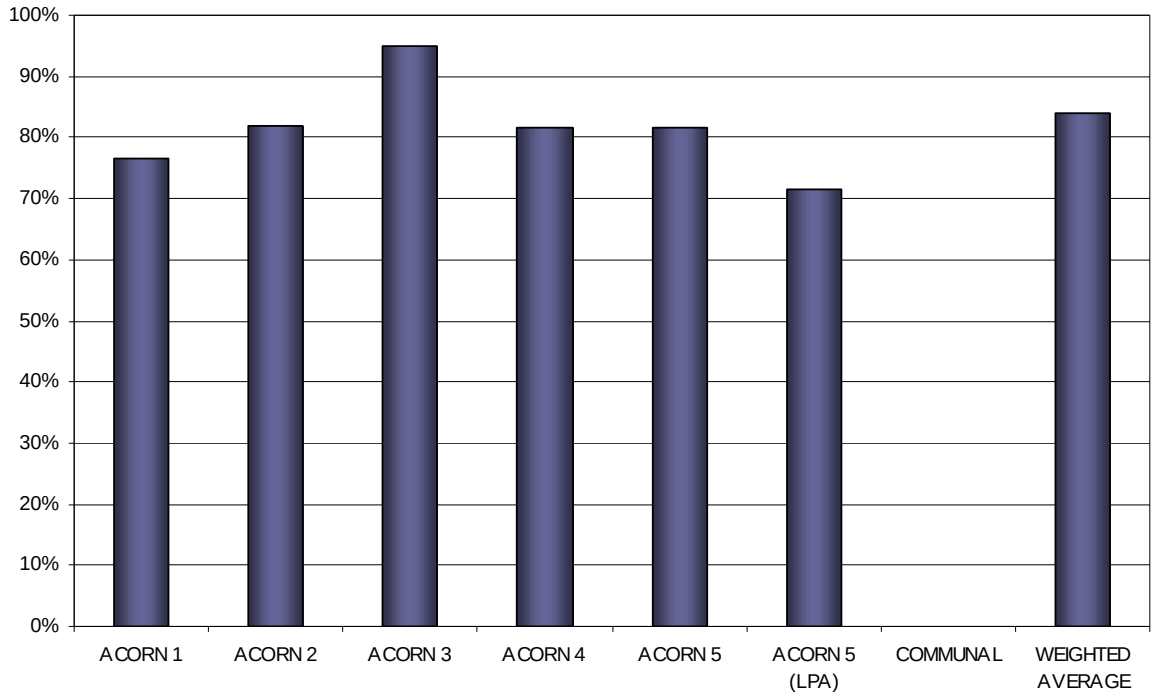
Table 4.1.2: Kerbside residual waste set out rates for each Acorn sample

ACORN	% SET OUT
1	77%
2	82%
3	95%
4	82%
5	82%
5 (LPA)*	71%
COMMUNAL	N/A**
WEIGHTED AVERAGE	84%

***Acorn 5 Low Performing Area**

**** Do not have their own bin so set out is not applicable**

Figure 4.1.2: Kerbside residual waste set out rates by Acorn (%)

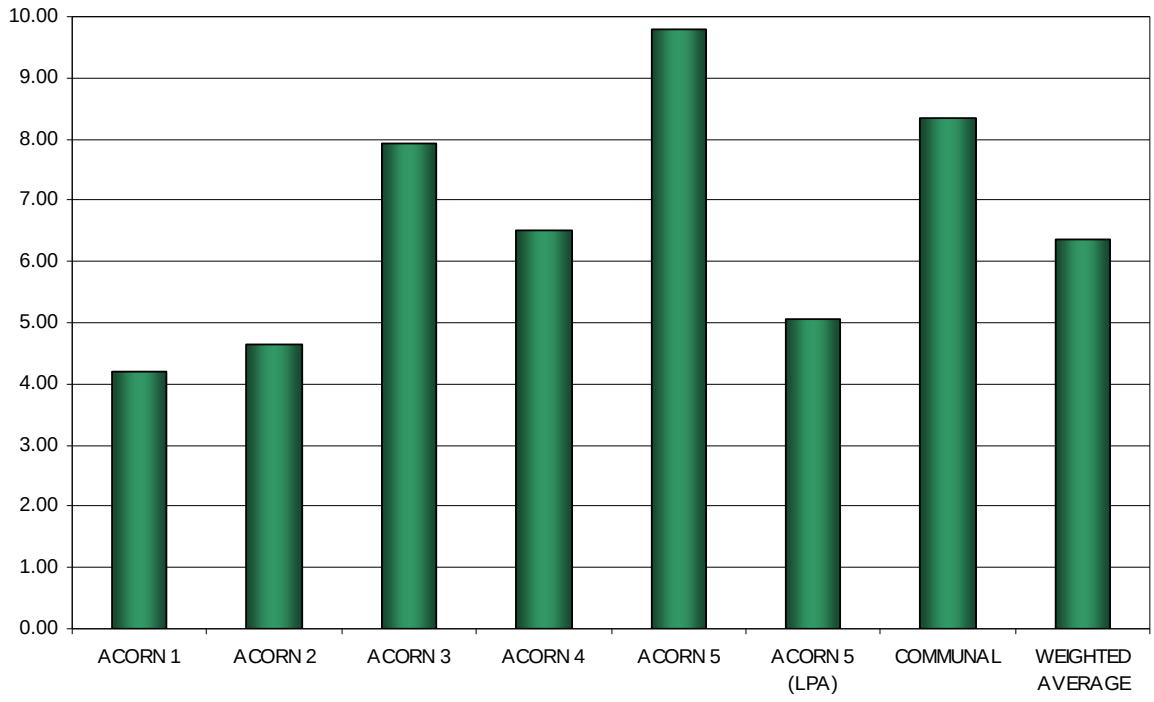


From observed results, the level of residual waste being disposed of at the kerbside ranged between 4.20kg/hh/wk in Acorn 1 to 9.80kg/hh/wk in Acorn 5. On average 6.36kg/hh/wk of residual waste is being disposed of by households throughout Cambridge.

Table 4.1.3: Kerbside residual waste generation rates for each Acorn sample (kg/hh/wk)

ACORN	KG/HH/WK
1	4.20
2	4.66
3	7.93
4	6.50
5	9.80
5 (LPA)	5.06
COMMUNAL	8.33
WEIGHTED AVERAGE	6.36

Figure 4.1.3: Average residual waste generation rates by Acorn (kg/hh/wk)



4.2 Compositional analysis of household residual waste

This section looks at the average amount and composition of the residual waste presented by various socio-demographic households sampled throughout the City. Hand sorting of the residual waste gave concentration by weight figures for the fifteen 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).

By knowing the composition of waste from the various Acorn samples it is possible to gain an insight into the make-up and volumes of the residual waste that can be expected from the City as a whole. Additional information on the selected lower performing and communal bins areas can also be gained. Detailed residual composition tables can be found in a separate data appendix.

Table 4.2.1 and Figure 4.2.1 show residual waste data in terms of percentage composition with Table 4.2.2 and Figure 4.2.2 showing generation rates for major materials in terms of kg/hh/wk. All residual waste will contain a proportion that is classified as potentially recyclable. That is to say that is should have been placed into one of the recycling receptacles supplied by the Council.

Table 4.2.1: Average residual waste composition weighted by Acorn (%)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	13.84%	11.35%	8.51%	7.78%	9.78%	5.93%	6.74%	10.19%
CARD & CARDBOARD	5.01%	3.32%	3.11%	2.57%	3.71%	1.92%	2.77%	3.45%
PLASTIC FILM	5.36%	7.98%	6.54%	4.06%	6.07%	8.81%	5.45%	6.77%
DENSE PLASTIC	10.76%	8.28%	12.09%	6.64%	4.78%	9.45%	5.83%	8.08%
TEXTILES	1.00%	6.24%	5.48%	7.74%	7.24%	3.66%	5.71%	6.19%
MISC COMBUSTIBLES	22.52%	16.70%	28.71%	17.69%	33.61%	30.14%	35.67%	25.19%
MISC NON-COMBUSTIBLES	12.58%	7.20%	11.17%	5.22%	11.50%	0.71%	0.34%	9.67%
GLASS	1.01%	4.13%	2.48%	2.21%	1.70%	4.42%	4.59%	2.75%
FERROUS METAL	5.19%	1.92%	2.02%	2.96%	2.06%	1.03%	2.48%	2.18%
NON-FERROUS METAL	0.57%	0.78%	0.53%	0.43%	0.55%	0.83%	0.74%	0.63%
GARDEN WASTE	2.49%	2.34%	0.52%	4.26%	0.31%	4.02%	1.57%	1.35%
PUTRESCIBLES	16.52%	28.37%	16.20%	32.97%	17.10%	28.45%	24.13%	21.57%
FINES	0.52%	0.00%	0.00%	1.22%	0.93%	0.20%	0.97%	0.37%
HHW	1.47%	0.30%	1.33%	0.00%	0.00%	0.03%	0.10%	0.48%
WEEE	1.17%	1.10%	1.32%	4.27%	0.67%	0.41%	2.91%	1.13%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
BLUE BIN RECYCLABLE	**17.47%**	**15.67%**	**11.43%**	**10.41%**	**11.16%**	**11.48%**	**14.01%**	**13.15%**
GREEN BIN RECYCLABLE	**18.94%**	**29.72%**	**15.72%**	**32.64%**	**16.78%**	**31.01%**	**23.21%**	**21.95%**
TOTAL RECYCLABLE	**36.41%**	**45.39%**	**27.15%**	**43.05%**	**27.94%**	**42.50%**	**37.21%**	**35.11%**

Table 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)

RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
DENSE PLASTIC	0.45	0.39	0.96	0.43	0.47	0.48	0.49	0.51
TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
MISC COMBUSTIBLES	0.95	0.78	2.28	1.15	3.29	1.52	2.97	1.60
MISC NON-COMBUSTIBLES	0.53	0.34	0.89	0.34	1.13	0.04	0.03	0.62
GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
FERROUS METAL	0.22	0.09	0.16	0.19	0.20	0.05	0.21	0.14
NON-FERROUS METAL	0.02	0.04	0.04	0.03	0.05	0.04	0.06	0.04
GARDEN WASTE	0.10	0.11	0.04	0.28	0.03	0.20	0.13	0.09
PUTRESCIBLES	0.69	1.32	1.28	2.14	1.68	1.44	2.01	1.37
FINES	0.02	0.00	0.00	0.08	0.09	0.01	0.08	0.02
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	**4.20**	**4.66**	**7.93**	**6.50**	**9.80**	**5.06**	**8.33**	**6.36**
BLUE BIN RECYCLABLE	**0.73**	**0.73**	**0.91**	**0.68**	**1.09**	**0.58**	**1.17**	**0.84**
GREEN BIN RECYCLABLE	**0.80**	**1.38**	**1.25**	**2.12**	**1.64**	**1.57**	**1.93**	**1.40**
TOTAL RECYCLABLE	**1.53**	**2.11**	**2.15**	**2.80**	**2.74**	**2.15**	**3.10**	**2.23**

Figure 4.2.1: Average residual waste composition weighted by Acorn (%)

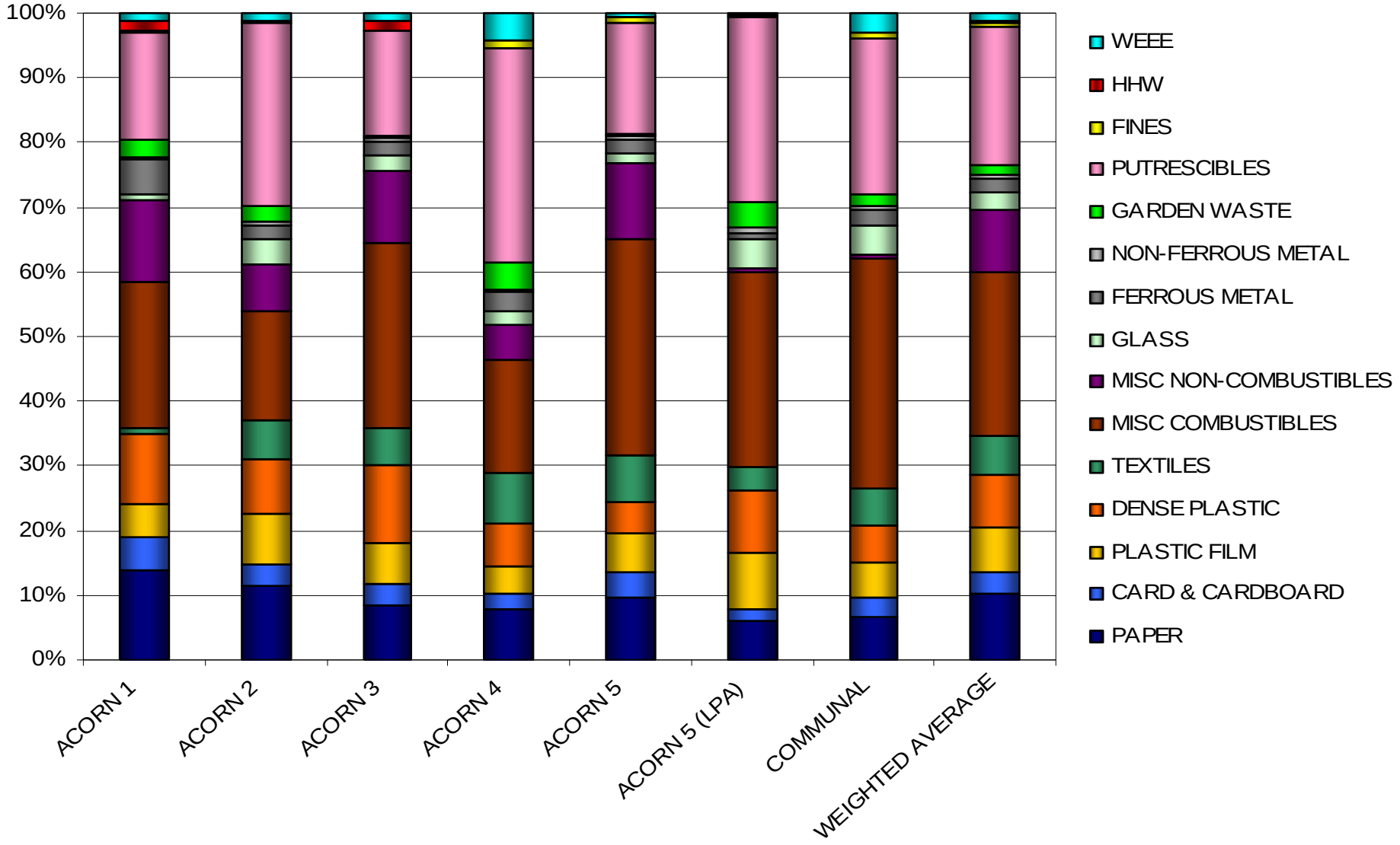
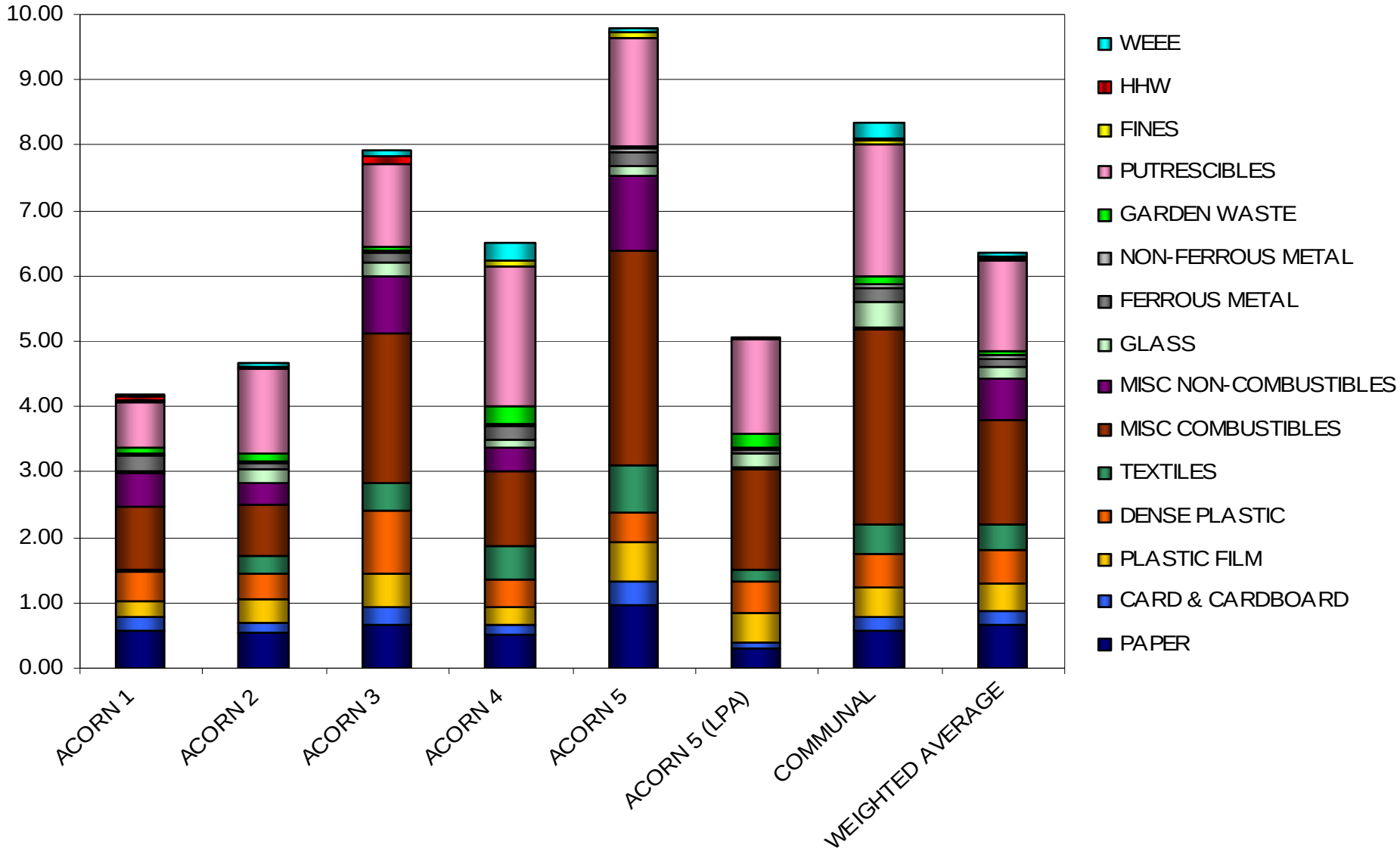


Figure 4.2.2: Average residual waste generation weighted by Acorn (kg/hh/wk)



4.2.1 Organic Waste

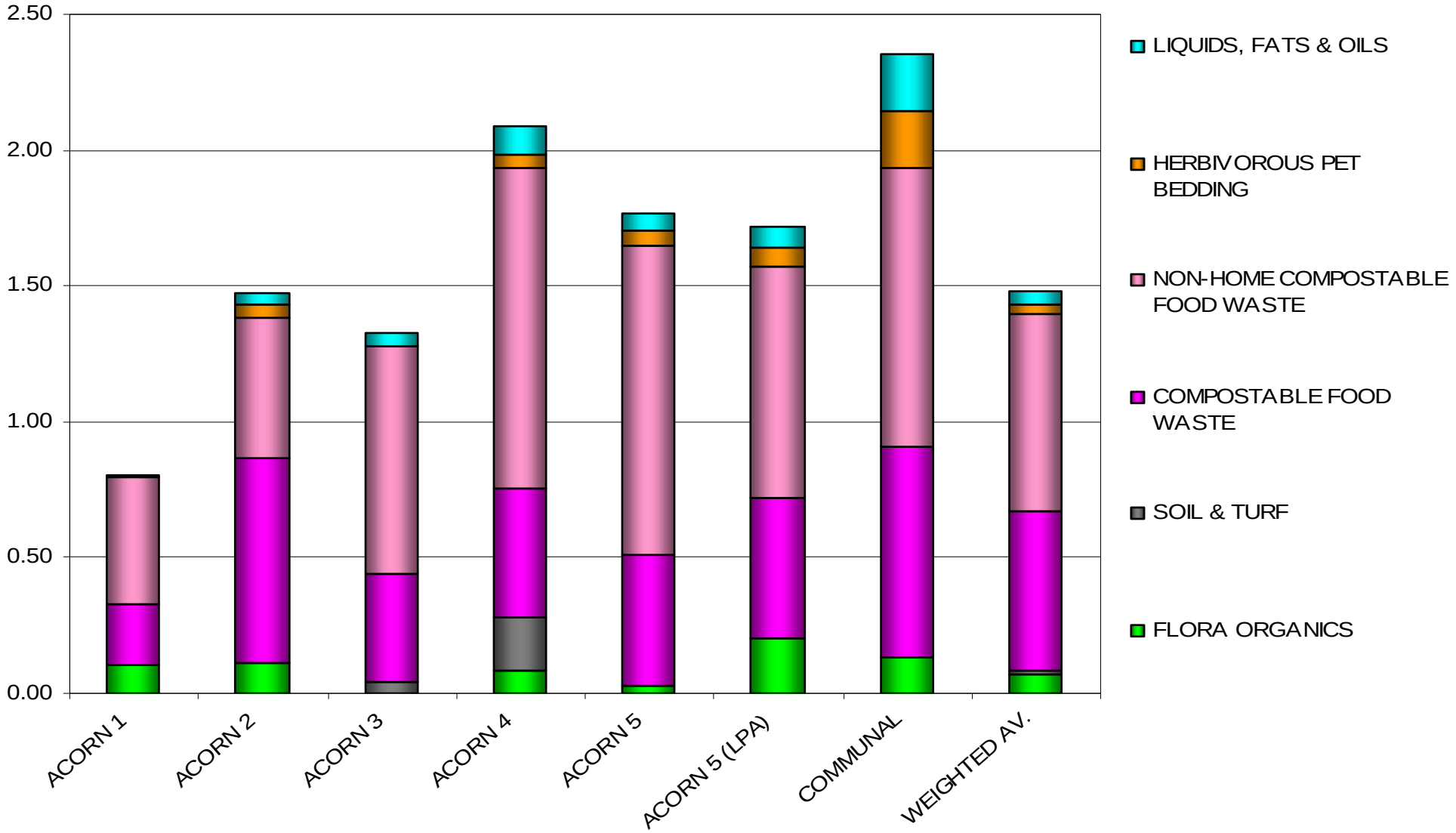
Organic waste, which includes garden and food waste (putrescibles), formed the greatest weight concentration of the primary waste categories for all Acorns. Ranges seen were from 16.7% from Acorn 3 households to 33.9% in Acorn 5 (LPA) households. Across the City as a whole around 23.3% of all residual waste (1.48kg/hh/wk) is classified as organic waste. Food waste accounted for between 15.6% (Acorn 3) and 27.4% (Acorn 2) of residual waste. Across the City as a whole around 20.6% of all residual waste (1.31kg/hh/wk) is classified as food waste. Currently Cambridge residents are able to recycle food waste at the kerbside using their green bin collection. Residents from Acorn 3 placed the most recyclable food into their residual bins at 2.81kg/hh/wk. Overall approximately 45% of this food waste (0.58kg/hh/wk) is potentially compostable in a general garden compost bin.

Residents throughout Cambridge can also utilise their green bins for the collection of general garden waste. In Acorns 3 and 5 levels of garden waste in residual bins were very low at 0.5% and 0.3% respectively. This equated to less than 0.05kg/hh/wk in total. In contrast the residual waste from Acorn 4 and Acorn 5(LPA) was over 4% garden waste; the equivalent of 0.28kg/hh/wk and 0.20kg/hh/wk respectively. Averaged for Cambridge it is seen that 17% of this garden waste consisted of soil and turf which is discouraged from the recycling collection. Across the City, recyclable forms of garden waste (i.e. garden clippings but not soil and turf) are responsible for an average of just 1.1%, or 0.07kg/hh/wk of residual waste. Table 4.2.1.1 and Figure 4.2.1.1 show the amounts of the different forms of organic waste found within the samples from each sample.

Table 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL ORGANICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AVERAGE
FLORA ORGANICS	0.10	0.11	0.00	0.08	0.03	0.20	0.13	0.07
SOIL & TURF	0.00	0.00	0.04	0.19	0.00	0.00	0.00	0.01
COMPOSTABLE FOOD WASTE	0.22	0.75	0.40	0.47	0.48	0.52	0.78	0.58
NON-HOME COMPOSTABLE FOOD WASTE	0.47	0.52	0.84	1.19	1.14	0.85	1.02	0.73
HERBIVOROUS PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	0.21	0.04
LIQUIDS, FATS & OILS	0.00	0.05	0.05	0.10	0.06	0.07	0.21	0.05
KG/HH/WK ORGANICS	0.80	1.48	1.33	2.09	1.77	1.72	2.35	1.48
% ORGANICS	19.08%	31.71%	16.71%	32.09%	18.06%	33.92%	28.22%	23.31%
KG/HH/WK FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	1.80	1.31
% FOOD WASTE	16.45%	27.37%	15.57%	25.53%	16.47%	27.00%	21.61%	20.59%

Figure 4.2.1.1: Levels of organic wastes within residual waste of each Acorn (kg/hh/wk)



4.2.2 Paper

On average, Acorn 1 residents had the highest concentrations of this type of waste (13.8%), with Acorn 5 disposing of the most at 0.96kg/hh/wk. In comparison just 5.9% (0.30kg/hh/wk) of residual waste from Acorn 5(LPA) was due to paper based materials. Across the City it was seen that around 10.2% or 0.65kg/hh/wk of residual waste consisted of discarded paper.

A proportion of this paper is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling higher grade white paper such as newspapers, junk mail, envelopes and directories. In addition to this higher grade paper, Cambridge residents are able to place shredded paper into their green organics bin. It was found that between 50.5% (Acorn 3 and Acorn 5(LPA) and 74.8% (Acorn 1) of paper could have been placed in either the blue or green bins as opposed to the residual bin.

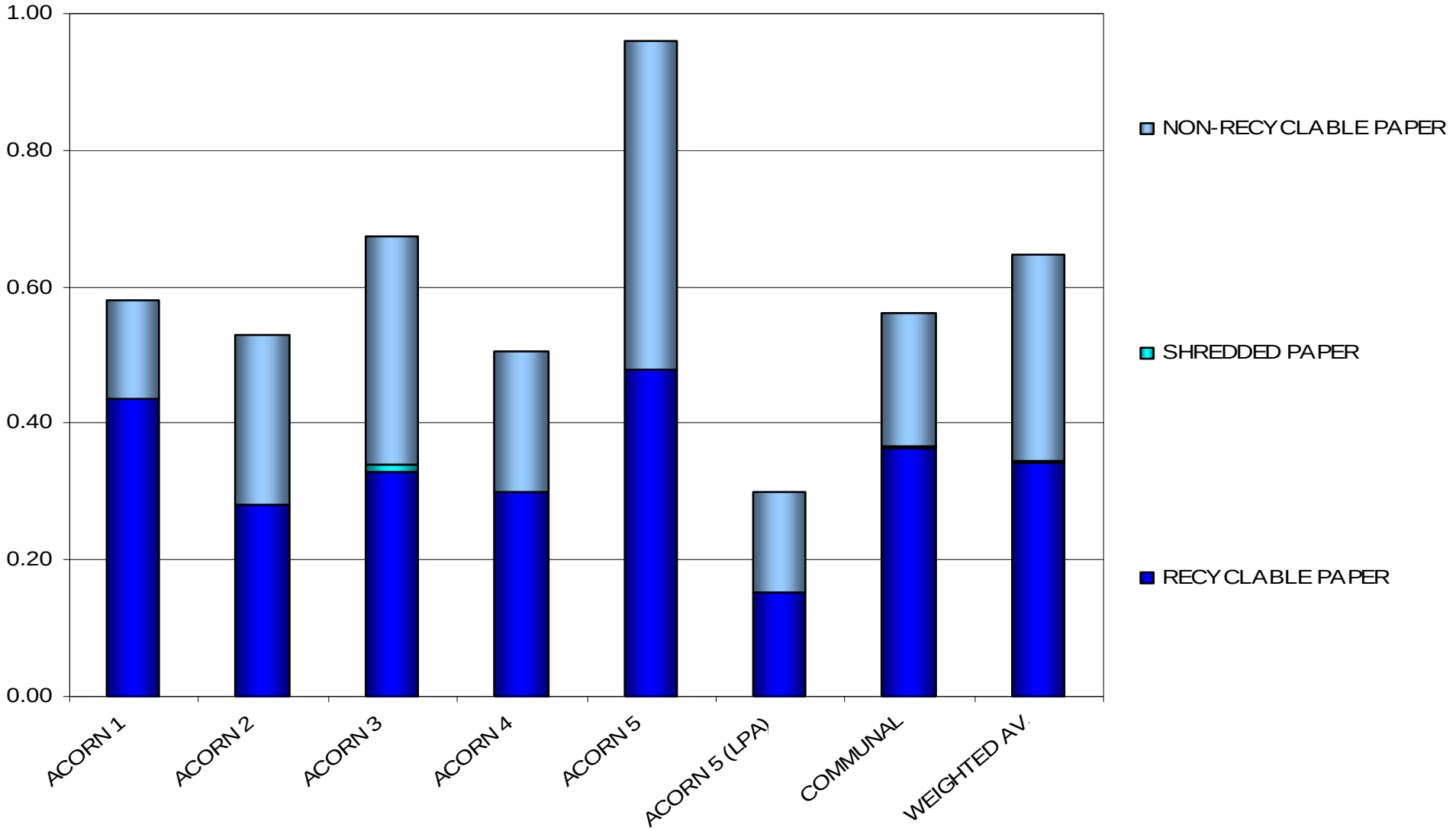
When accounting for all of the various types of paper within the residual waste, it is seen that 53.3% of residual paper was recyclable which accounted for 5.4% of all the residual waste or 0.35kg/hh/wk.

Table 4.2.2.1 and Figure 4.2.2.1 show the amounts of the different forms of paper waste for each Acorn.

Table 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PAPER	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.33	0.30	0.48	0.15	0.36	0.34
SHREDDED PAPER	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER	0.15	0.25	0.33	0.21	0.48	0.15	0.20	0.30
KG/HH/WK TOTAL PAPER	0.58	0.53	0.67	0.51	0.96	0.30	0.56	0.65
KG/HH/WK RECYCLABLE PAPER	0.43	0.28	0.34	0.30	0.48	0.15	0.37	0.35
% PAPER RECYCLABLE	74.77%	53.37%	50.52%	59.17%	49.83%	50.52%	65.29%	53.27%

Figure 4.2.2.1: Levels of paper wastes within residual waste of each Acorn (kg/hh/wk)



4.2.3 Card & Cardboard

On average, Acorn 1 residents had the highest concentrations of this type of waste (5%), with Acorn 5 disposing of the most at 0.36kg/hh/wk. In comparison just 1.9% (0.10kg/hh/wk) of residual waste from Acorn 5(LPA) was due to card and cardboard based materials. Across the City it was seen that around 3.5% or 0.22kg/hh/wk of residual waste consisted of discarded card and cardboard.

A proportion of this card & cardboard is available for recycling at the kerbside. Cambridge residents have a blue bin for recycling thin card, corrugated cardboard and drinks cartons. It was found that between 65% (Acorn 1) and 94% (Acorn 5-LPA) of card and cardboard could have been placed in the blue bin as opposed to the residual bin. Across Cambridge, 84% of residual card and cardboard was compatible with recycling collections which accounted for 2.9% of all the residual waste or 0.18kg/hh/wk.

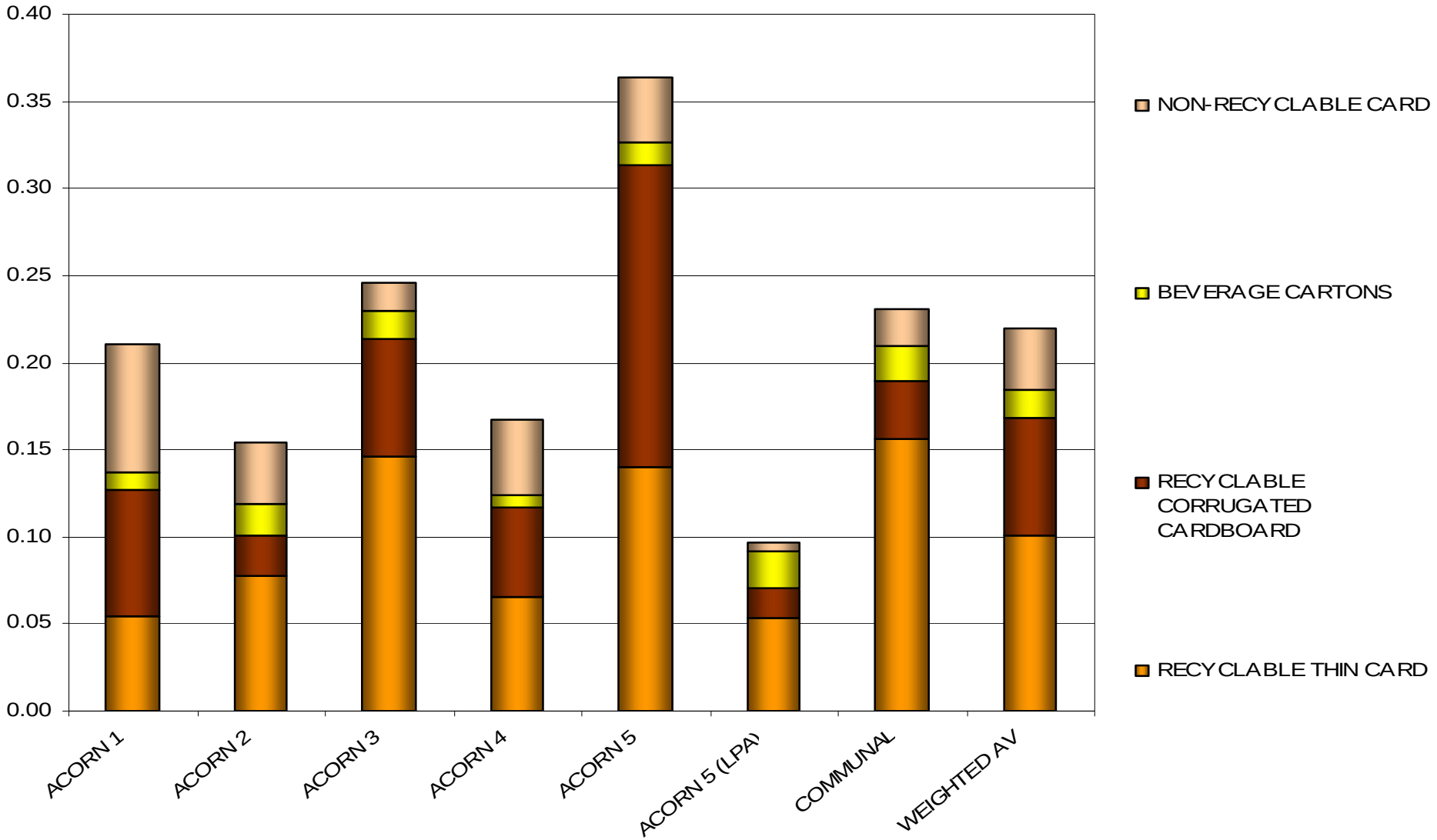
Table 4.2.3.1 and Figure 4.2.3.1 show the amounts of the different forms of card and cardboard waste for each Acorn.

When combining paper and card together it is estimated that 61% of that present in residual bins could have been recycled via kerbside recycling collections. This amounts to 8.3% of all the residual waste being collected – a total of 0.53kg/hh/wk.

Table 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)

RESIDUAL CARD	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE THIN CARD	0.05	0.08	0.15	0.07	0.14	0.05	0.16	0.10
RECYCLABLE CORRUGATED CARDBOARD	0.07	0.02	0.07	0.05	0.17	0.02	0.03	0.07
BEVERAGE CARTONS	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE CARD	0.07	0.04	0.02	0.04	0.04	0.01	0.02	0.04
KG/HH/WK TOTAL CARD & CARDBOARD	0.21	0.15	0.25	0.17	0.36	0.10	0.23	0.22
KG/HH/WK RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	0.33	0.09	0.21	0.18
% CARD KERBSIDE RECYCLABLE	65.22%	77.15%	93.19%	74.50%	89.79%	94.04%	90.71%	83.93%

Figure 4.2.3.1: Levels of card wastes within residual waste of each Acorn (kg/hh/wk)



4.2.4 Plastics

As a UK average approximately 12% of the waste disposed of by households is plastic. In this sampling campaign average ranges seen were 10.7% total plastic by weight from Acorn 4 households to 18.6% in the waste from Acorn 3 households. Cambridge residents currently recycle plastic bottles as part of their blue bin collections. Across the City as a whole, 14.9% of residual waste was classified as plastic which equates to 0.94kg/hh/wk. On the whole plastic waste, although not heavy in itself, can produce large volumes of waste.

Figure 4.2.4.1 clearly shows the levels of recyclable plastic bottles within the plastic portion of the residual waste. On average, around 46% of this plastic waste present in the residual was due to plastic film with the remainder being dense plastic. Up to 9.9% of residual dense plastic consisted of plastic bottles meaning that just 0.8% of residual waste (0.05kg/hh/wk) collected throughout Cambridge was made up of plastic bottles that could have been recycled. Up to 0.13kg/hh/wk of plastic bottles were seen in communal bins representing over a quarter of all the dense plastic present.

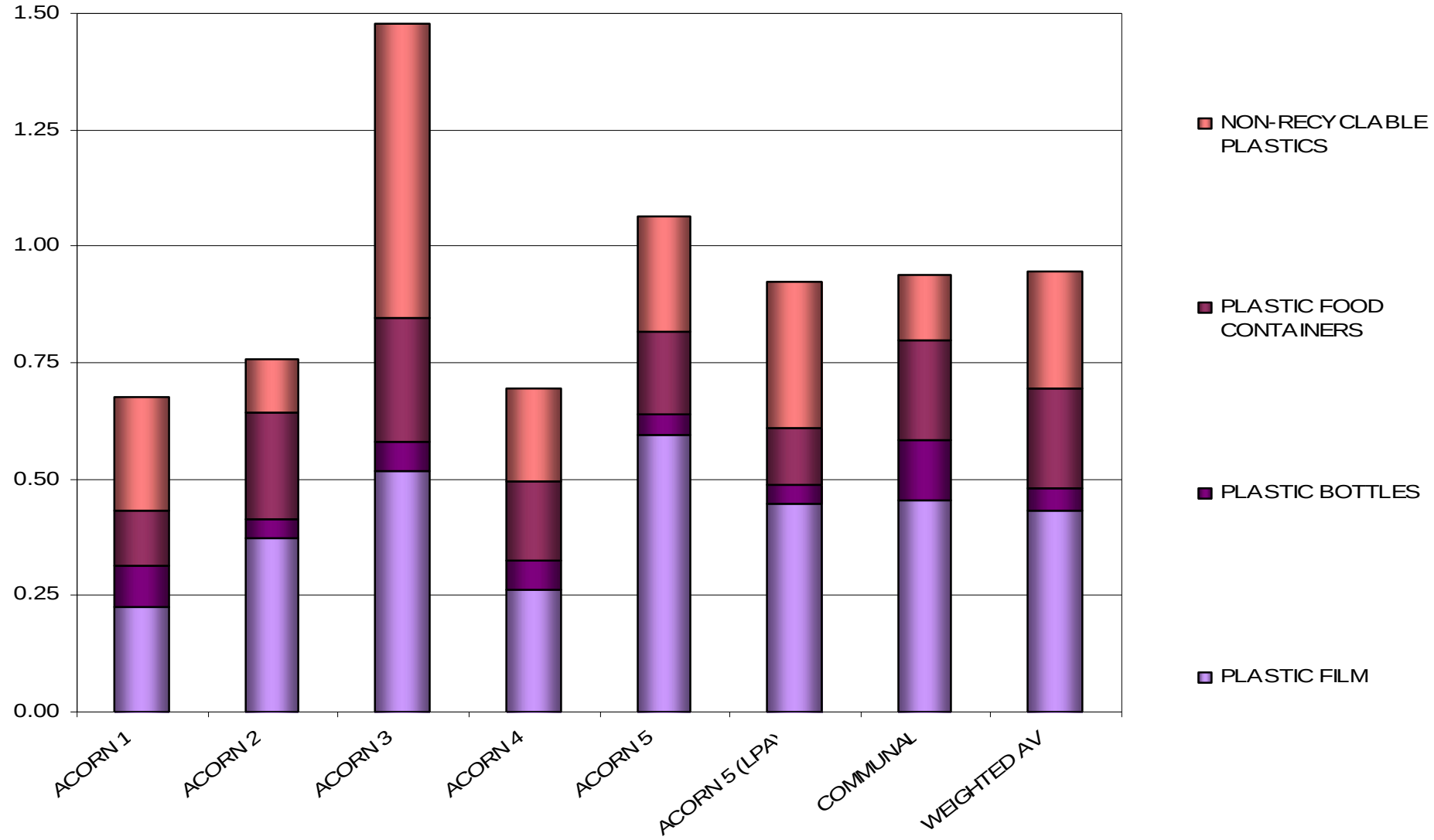
From July 2012 Cambridge households will be able to recycle plastic food containers in addition to plastic bottles. On average these formed 3.4% of the total residual waste equating to 0.21kg/hh/wk. This means that 0.27kg/hh/wk or 4.2% of the residual waste is due to recyclable plastic bottles and containers.

Table 4.2.4.1 and Figure 4.2.4.1 show the amounts of the different forms of plastic waste found within the residual samples from each Acorn.

Table 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)

RESIDUAL PLASTICS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PLASTIC FILM	0.23	0.37	0.52	0.26	0.59	0.45	0.45	0.43
PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	0.13	0.05
PLASTIC FOOD CONTAINERS	0.12	0.23	0.27	0.17	0.18	0.12	0.22	0.21
NON-RECYCLABLE PLASTICS	0.25	0.11	0.63	0.20	0.24	0.31	0.14	0.25
KG/HH/WK TOTAL PLASTIC	0.68	0.76	1.48	0.70	1.06	0.92	0.94	0.94
% DENSE PLASTIC RECYCLABLE	19.39%	11.04%	6.41%	14.22%	9.84%	9.18%	26.63%	9.85%

Figure 4.2.4.1: Levels of plastics within residual waste of each Acorn (kg/hh/wk)



4.2.5 Metals

In this sampling campaign average concentrations of residual metals were seen to be 1.9% total metal by weight from Acorn 5(LPA) households to 5.8% in the waste from Acorn 1 households, averaging 2.8% overall. Cambridge residents have access to a recycling collection of food and drink cans as well as empty aerosols and clean foil via their blue bin service. The average weight of metals in the residual waste from Acorn 5(LPA) was 0.09kg/hh/wk rising to 0.27kg/hh/wk in communal bins.

A proportion of this metal waste is available for recycling at the kerbside relative to the blue bin collection. It was found that just 13% of Acorn 1 metals were recyclable rising to 77% for the metals in Acorn 5(LPA) residual waste. Across the City an average of 52.5% or 0.09kg/hh/wk of residual metal is classified as recyclable, this equates to 1.5% of all collected residual waste.

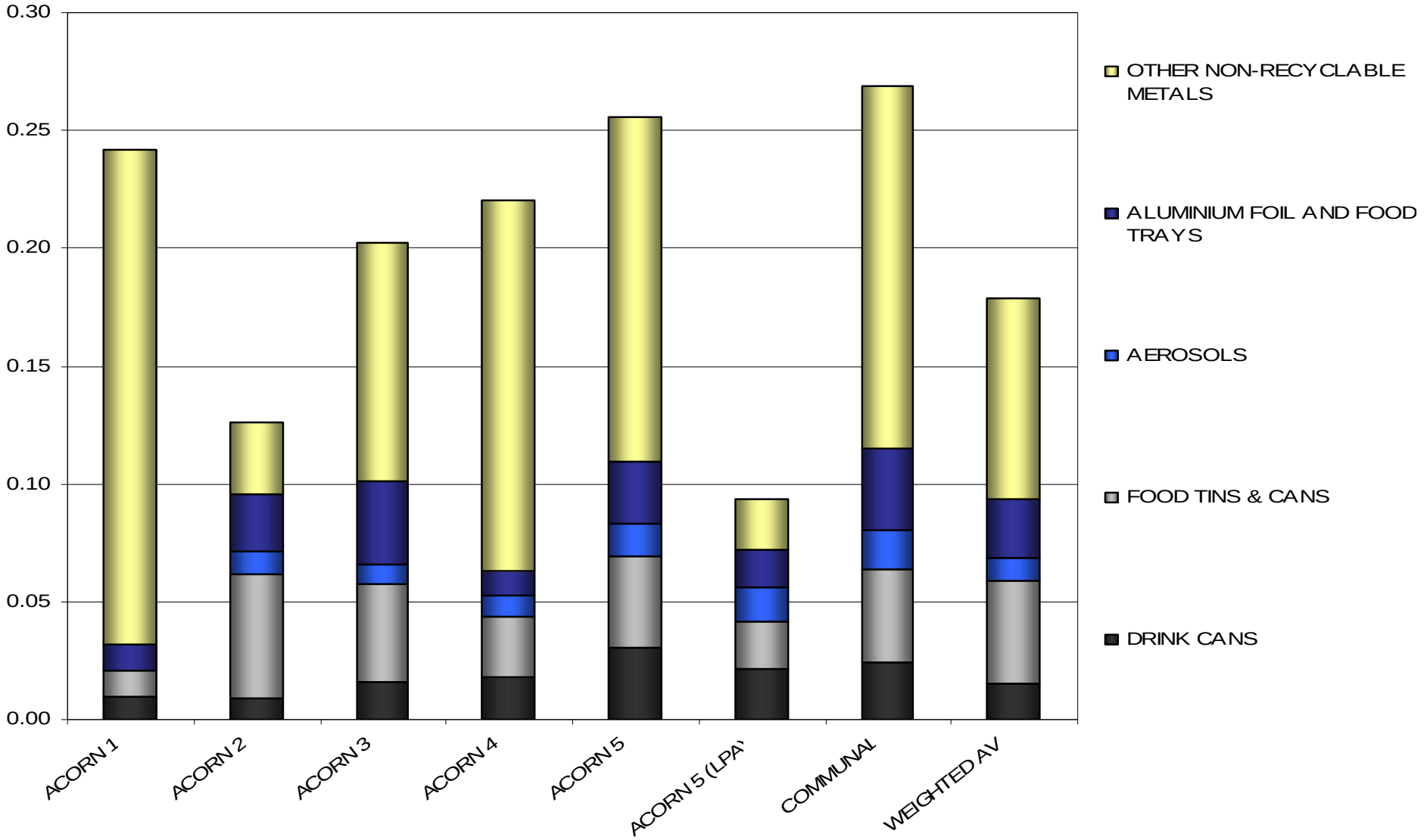
On the whole 78% of metals were ferrous accounting for 0.14kg/hh/wk with non-ferrous metals contributing 0.04kg/hh/wk. The majority of metallic waste present in all samples was seen to be ferrous.

Table 4.2.5.1 and Figure 4.2.5.1 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 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)

RESIDUAL METALS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
DRINK CANS	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.01
FOOD TINS & CANS	0.01	0.05	0.04	0.03	0.04	0.02	0.04	0.04
AEROSOLS	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01
ALUMINIUM FOIL AND FOOD TRAYS	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.03
OTHER NON-RECYCLABLE METALS	0.21	0.03	0.10	0.16	0.15	0.02	0.15	0.08
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	0.12	0.09
TOTAL METALS	0.24	0.13	0.20	0.22	0.26	0.09	0.27	0.18
% FERROUS	90.16%	71.00%	79.19%	87.30%	78.93%	55.42%	77.02%	77.64%
% RECYCLABLE	13.31%	76.02%	49.78%	28.45%	42.69%	77.11%	42.82%	52.46%

Figure 4.2.5.1: Levels of metals within residual waste of each Acorn (kg/hh/wk)



4.2.6 Glass

In this sampling campaign the average concentration of residual glass was seen to be 1% total glass by weight from Acorn 1 households rising to 4.6% in the waste from communal bins. Cambridge residents are able to recycle glass bottles and jars at the kerbside using their blue bin service. The weight of glass in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.38kg/hh/wk in communal bins. This represented a City wide average of 2.8% or 0.18kg/hh/wk.

A proportion of this glass consists of bottles and jars which could have been recycled at the kerbside. It was found that across Cambridge an average of 94% or 0.16kg/hh/wk of residual glass is classified as recyclable, this equates to 2.6% of all collected residual waste.

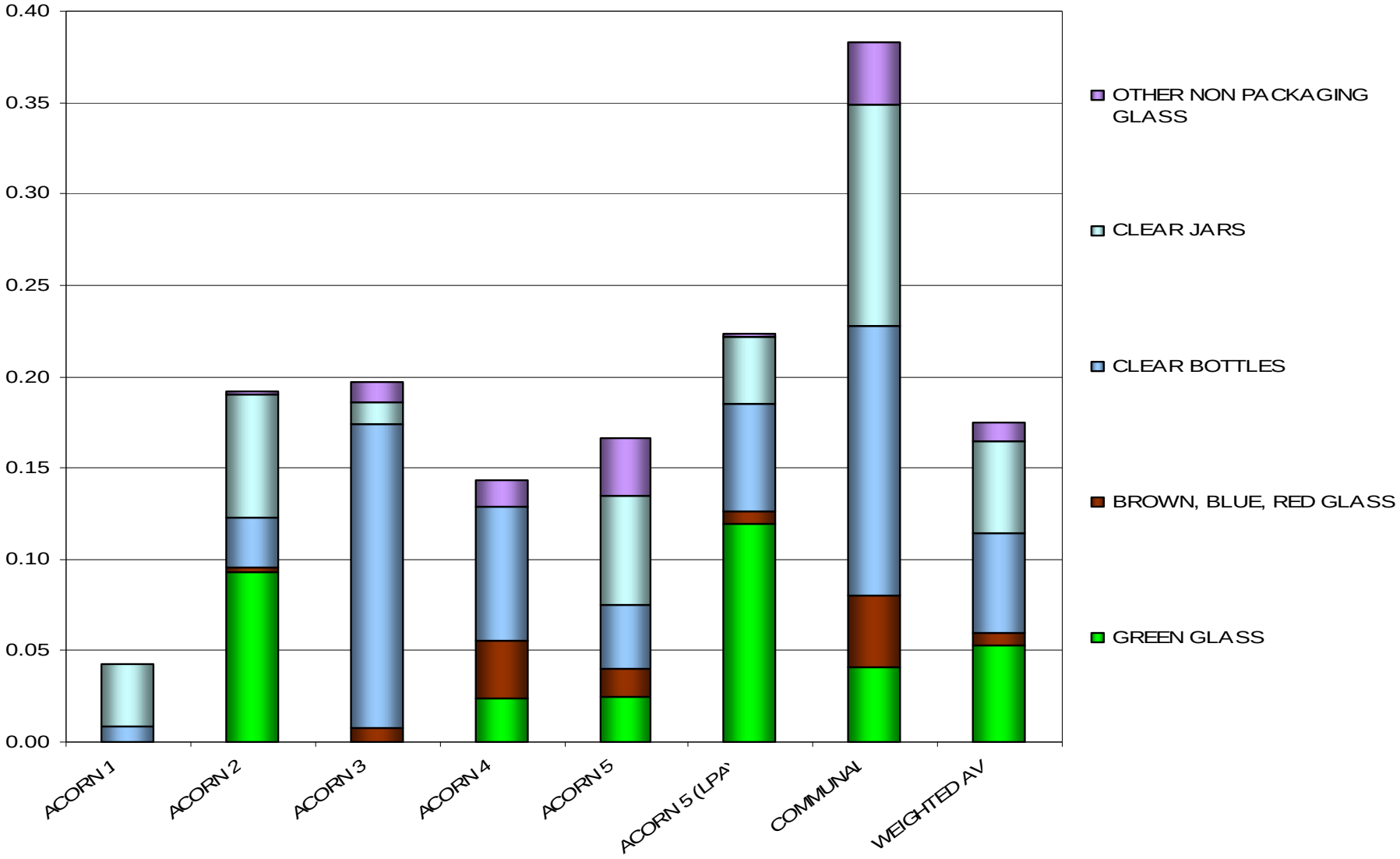
In most samples the majority of recyclable glass was seen to be higher grade clear glass, across Cambridge 64% of recyclable glass was clear, accounting for 0.11kg/hh/wk of residual waste. Around 52% of the clear glass was due to jars as opposed to bottles.

Table 4.2.6.1 and Figure 4.2.6.1 show the amounts of the different forms of glass waste found within the samples from each Acorn.

Table 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)

RESIDUAL GLASS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
GREEN GLASS	0.00	0.09	0.00	0.02	0.02	0.12	0.04	0.05
BROWN, BLUE, RED GLASS	0.00	0.00	0.01	0.03	0.02	0.01	0.04	0.01
CLEAR BOTTLES	0.01	0.03	0.17	0.07	0.03	0.06	0.15	0.05
CLEAR JARS	0.03	0.07	0.01	0.00	0.06	0.04	0.12	0.05
OTHER NON PACKAGING GLASS	0.00	0.00	0.01	0.01	0.03	0.00	0.03	0.01
KG/HH/WK TOTAL GLASS	0.04	0.19	0.20	0.14	0.17	0.22	0.38	0.18
KG/HH/WK RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	0.35	0.16
% RECYCLABLE	100%	98.99%	94.36%	89.99%	80.74%	99.24%	91.15%	94.17%
% OF RECYCLABLE GLASS - CLEAR	100%	49.56%	95.85%	57.08%	70.33%	42.98%	76.93%	63.76%

Figure 4.2.6.1: Levels of glass within residual waste of each Acorn (kg/hh/wk)



4.2.7 Textiles

The concentration of residual textile waste was seen to be 1% textiles from Acorn 1 households to 7.7% in the waste from Acorn 4 households. Cambridge residents are currently not able to recycle textiles at the kerbside. The average weight of textile waste in the residual waste from Acorn 1 was 0.04kg/hh/wk rising to 0.71kg/hh/wk in Acorn 5. On average 6.2% or 0.39kg/hh/wk of residual waste is classified as textile waste.

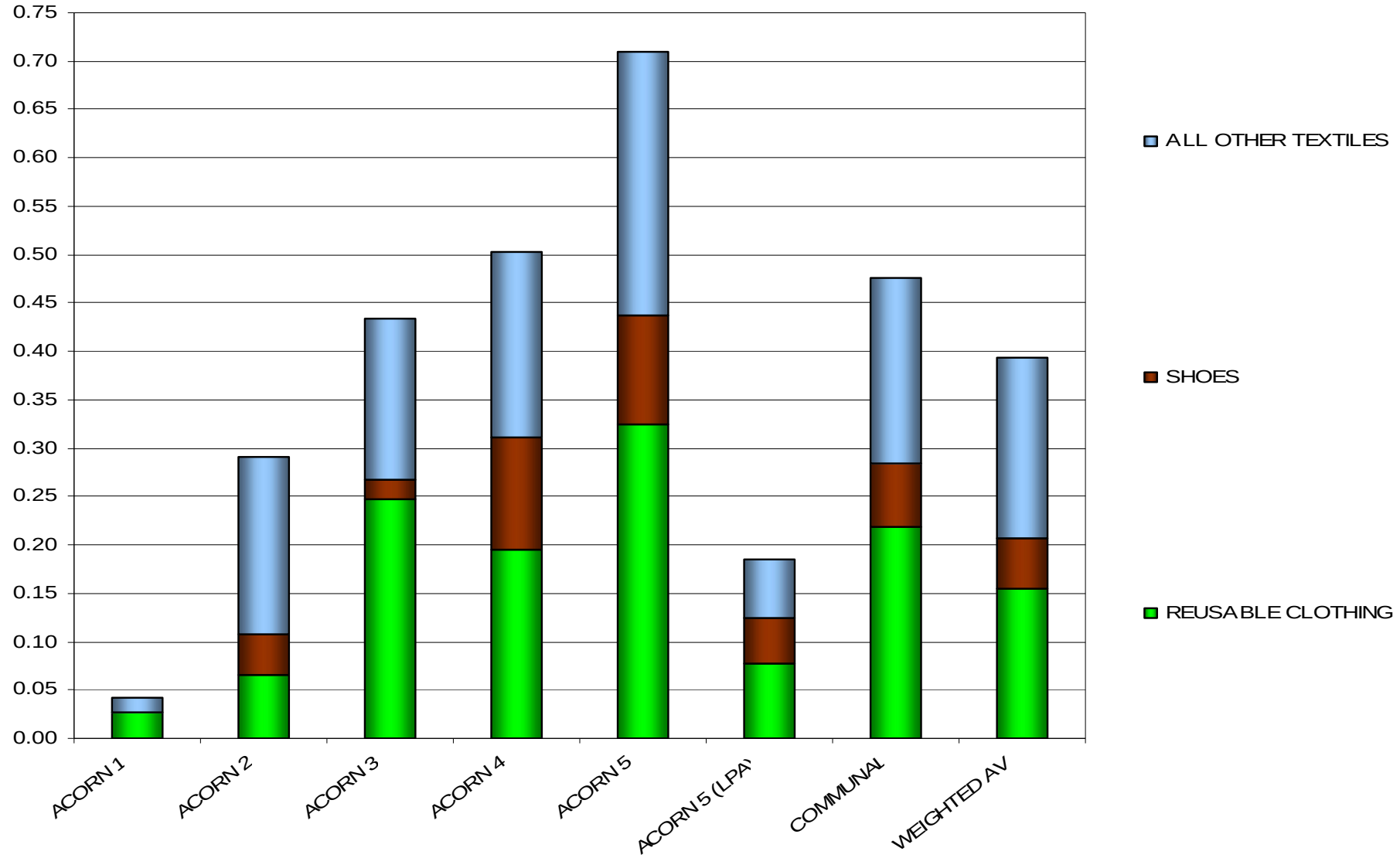
A proportion of this textile waste is available for recycling either at bring banks or charity outlets in the form of reusable clothes and shoes. It was found that between 37% (Acorn 2) and 67% of Acorn 5(LPA) of textile waste was of this potentially recyclable type. Up to 0.44kg/hh/wk (Acorn 5) of recyclable textiles are being placed into the residual waste by Cambridge householders. Across Cambridge an average of 52.5% or 0.21kg/hh/wk of residual textiles is classified as reusable, this equates to 3.3% of all collected residual waste.

Table 4.2.7.1 and Figure 4.2.7.1 show the amounts of the different forms of textile waste found within the samples from each Acorn.

Table 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)

RESIDUAL TEXTILES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
REUSABLE CLOTHING	0.03	0.07	0.25	0.20	0.33	0.08	0.22	0.15
SHOES	0.00	0.04	0.02	0.12	0.11	0.05	0.07	0.05
ALL OTHER TEXTILES	0.01	0.18	0.17	0.19	0.27	0.06	0.19	0.19
KG/HH/WK TOTAL TEXTILES	0.04	0.29	0.43	0.50	0.71	0.18	0.48	0.39
KG/HH/WK REUSABLE TEXTILES	0.03	0.11	0.27	0.31	0.44	0.12	0.28	0.21
% REUSABLE TEXTILES	66.10%	36.88%	61.45%	61.89%	61.69%	67.35%	59.77%	52.51%

Figure 4.2.7.1: Levels of textiles within residual waste of each Acorn (kg/hh/wk)



4.2.8 Hazardous Items (HHW) & WEEE

In this sampling campaign the average overall concentration of hazardous and WEEE waste was seen to be 1.6% which equates to around 0.10kg/hh/wk. Acorn 4 households disposed of the most HHW and WEEE waste, where it was responsible for 4.3% of collected waste or 0.28kg/hh/wk. Table 4.2.8.1 shows the amounts of HHW and WEEE within the samples from each Acorn.

Table 4.2.8.1: Levels of HHW and WEEE within each Acorn (kg/hh/wk)

RESIDUAL HHW & WEEE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HHW	0.06	0.01	0.11	0.00	0.00	0.00	0.01	0.03
WEEE	0.05	0.05	0.10	0.28	0.07	0.02	0.24	0.07
TOTAL	0.11	0.06	0.21	0.28	0.07	0.02	0.25	0.10
% HHW & WEEE	2.64%	1.40%	2.65%	4.27%	0.67%	0.44%	3.00%	1.61%

HHW	WEEE
PAINT	CHARGERS
HALOGEN BULB	GAME REMOTE
BATTERIES	XMAS LIGHTS
MEDICINES	THERMOSTAT
WEED KILLER	MOBILE PHONE
	TORCHES
	SMOKE ALARM
	SWITCH
	MODEM
	LAMPS
	KETTLES
	STEREO & SPEAKERS
	MOTOR
	TELEPHONE
	HAIR STRAIGHTENERS
	CABLES & LEADS
	SOCKERS
	DEEP FAT FRYER
	FAN
	BLENDER
	CALCULATOR

4.2.9 Disposable Nappies

The profile of this type of waste has increased in recent years. Levels of this waste within the residual bins of households with babies can be extremely high. In this survey the concentrations of disposable nappies ranged between 1.3% in Acorn 3 up to 33.5% in communal bins. Communal bins were seen to contain around 2.79kg/hh/wk of disposable nappies. Throughout Cambridge as a whole around 17% of collected residual waste consists of disposable nappies, which equates to 1.08kg/hh/wk.

4.3 Potential recyclability of the residual waste

The overall recyclability of the residual waste relates to all the items present that could have been accepted into the kerbside recycling schemes currently running in Cambridge. Results from the survey showed that the overall recyclability of the residual waste was highest in Acorn 2 households at 45.4%, and lowest in Acorn 3 at 27.2%. Across Cambridge it is expected that 35.1% of all residual waste being disposed of is recyclable at the kerbside.

The majority of the recyclable materials present within the residual waste were compatible with the green organics bin. On average 22% of residual waste could have been recycled in the green bin ranging from 15.7% of Acorn 3 waste up to 32.6% of Acorn 4 waste.

On average just over 13% of the residual waste throughout Cambridge was recyclable via the blue bin collection. Around 10 4% of the residual waste from Acorn 4 was compatible with blue bins compared with 17.5% of that from Acorn 1.

Table 4.3.1.1: Proportion of residual waste currently recyclable relative to current schemes (%)

% RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	17.47%	15.67%	11.43%	10.41%	11.16%	11.48%	14.01%	13.15%
GREEN BIN RECYCLABLE	18.94%	29.72%	15.72%	32.64%	16.78%	31.01%	23.21%	21.95%
TOTAL RECYCLABLE	36.41%	45.39%	27.15%	43.05%	27.94%	42.50%	37.21%	35.11%

In terms of the amount of recyclables disposed of it is seen that Acorn 1 householders place around 1.53kg/hh/wk of materials in residual bins that could either be placed into their blue or green recycling bins. For communal bins this amount was 3.1kg/hh/wk. Across Cambridge around 2.23kg/hh/wk of recyclable material is being disposed of in the residual waste.

Table 4.3.1.2: Kg/hh/wk of residual waste currently and potentially recyclable relative to current schemes

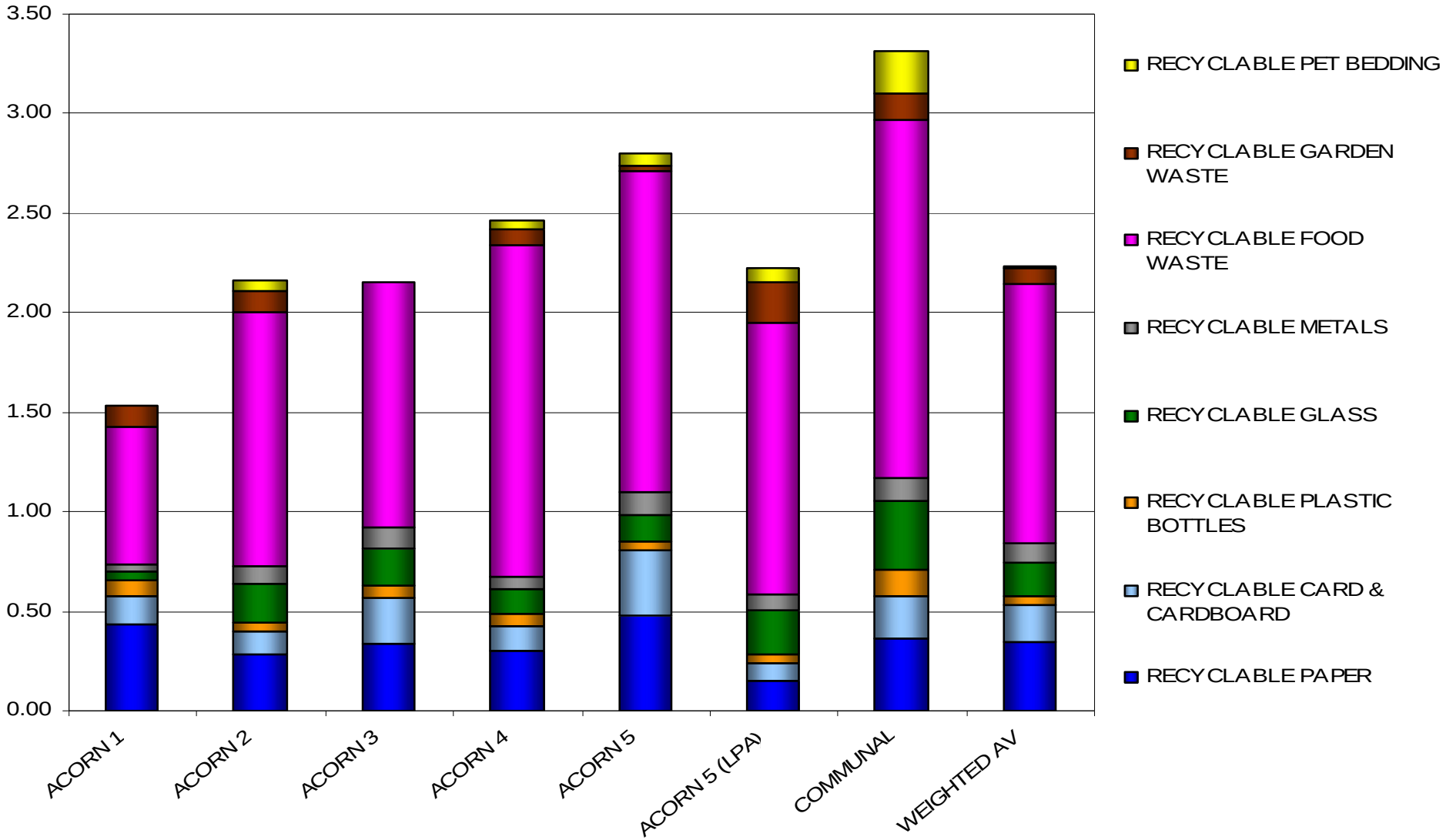
KG/HH/WK RECYCLABLE MATERIALS WITHIN RESIDUAL WASTE	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE BIN RECYCLABLE	0.73	0.73	0.91	0.68	1.09	0.58	1.17	0.84
GREEN BIN RECYCLABLE	0.80	1.38	1.25	2.12	1.64	1.57	1.93	1.40
TOTAL RECYCLABLE	1.53	2.11	2.15	2.80	2.74	2.15	3.10	2.23

Figure 4.3.1.1 clearly shows the levels of residual materials currently collectable in the recycling collections available in Cambridge. Different households were seen to dispose of differing levels of recyclable materials, both in terms of volume and composition (Table 4.3.1.3). Without exception it is seen that the two Acorn 5 samples and the waste from the communal bins contained the highest levels of each material compatible with kerbside recycling.

Table 4.3.1.3: Kg/hh/wk of residual waste potentially 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	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	0.43	0.28	0.34	0.30	**0.48**	0.15	0.37	0.35
RECYCLABLE CARD & CARDBOARD	0.14	0.12	0.23	0.12	**0.33**	0.09	0.21	0.18
RECYCLABLE PLASTIC BOTTLES	0.09	0.04	0.06	0.06	0.05	0.04	**0.13**	0.05
RECYCLABLE GLASS	0.04	0.19	0.19	0.13	0.13	0.22	**0.35**	0.16
RECYCLABLE METALS	0.03	0.10	0.10	0.06	0.11	0.07	**0.12**	0.09
RECYCLABLE FOOD WASTE	0.69	1.27	1.23	1.66	1.61	1.37	**1.80**	1.31
RECYCLABLE GARDEN WASTE	0.10	0.11	0.00	0.08	0.03	**0.20**	0.13	0.07
RECYCLABLE PET BEDDING	0.00	0.05	0.00	0.05	0.06	0.07	**0.21**	0.01
TOTAL RECYCLABLE	1.53	2.16	2.15	2.47	2.80	2.22	3.31	2.23

Figure 4.3.1.1: Kg/hh/wk of residual waste potentially recyclable relative to Acorn (Kg/hh/wk)



4.4 Biodegradable waste

These figures are useful when considering the proportion of biodegradable waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using the compositional data in accordance with the percentages outlined in previous reports. For example, only 50% of miscellaneous combustible materials are considered to be biodegradable whereas 100% of paper and card is considered to be biodegradable.

National average figures are around 68%; in this survey the biodegradability of residual waste weighted across Cambridge was well below this level at 50.7%. Acorn 4 residual waste displayed the highest concentration of biodegradable items at 59.4%, with Acorn 3 residual waste being just 44.4% biodegradable. On average, around 3.22kg/hh/wk of biodegradable material was being placed into residual containers by Cambridge residents.

Table 4.4.1: Percentage composition of residual waste per Acorn – biodegradable materials

BIODEGRADABLE CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	17.19%	12.94%	10.94%	9.61%	11.96%	7.39%	8.80%	12.25%
TEXTILES	0.50%	3.12%	2.74%	3.87%	3.62%	1.83%	2.85%	3.10%
MISC. COMBUSTIBLE*	11.26%	8.35%	14.36%	8.84%	16.80%	15.07%	17.84%	12.60%
	7.94%	5.73%	8.53%	4.78%	12.16%	12.51%	16.76%	8.51%
PUTRESCIBLES	18.98%	30.22%	16.40%	36.43%	17.10%	31.74%	24.44%	22.53%
FINES	0.26%	0.00%	0.00%	0.61%	0.46%	0.10%	0.49%	0.18%
TOTAL BIODEGRADABLE	48.18%	54.63%	44.44%	59.36%	49.94%	56.13%	54.42%	50.66%

* Disposable nappies are part of the miscellaneous combustible section. Their contribution to this section of biodegradable waste is highlighted in red.

4.5 Packaging Waste

These figures are useful when considering the proportion of packaging waste, which may be subject to the national provision of the Landfill Directive. The data has been calculated using a similar method to that used to calculate biodegradability.

Levels of packaging in the residual waste ranged from 12.3% in Acorn 5 residual waste to 22.1% in Acorn 2 residual waste. On average, around 1.08kg/hh/wk of packaging materials were being placed into residual containers by Cambridge residents, 17% of the total waste being disposed of.

Table 4.5.1: Percentage composition of residual waste per Acorn – packaging materials

PACKAGING CONTRIBUTION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
PAPER AND CARD	4.62%	4.43%	3.32%	2.98%	4.28%	2.41%	3.88%	4.09%
PLASTIC FILM	3.69%	5.06%	4.61%	2.62%	2.89%	5.53%	3.40%	4.11%
DENSE PLASTIC	7.36%	6.70%	4.88%	3.90%	2.81%	4.28%	4.41%	4.96%
GLASS	1.01%	4.08%	2.34%	1.99%	1.37%	4.39%	4.18%	2.59%
METALS	0.63%	1.79%	1.05%	0.89%	0.98%	1.27%	1.17%	1.27%
TOTAL PACKAGING	17.31%	22.06%	16.20%	12.37%	12.34%	17.87%	17.05%	17.02%

5) Mixed dry recycling waste

5.1 Set out rates and waste generation

Table 5.1.1 and Figure 5.1.1 highlight the set out rates for blue recycling bins observed at the time waste was collected for compositional analysis. Table 5.1.2 and Figure 5.1.2 show the amount of mixed recycling waste generated in kg/hh/wk. The same houses were visited that had their residual waste surveyed. It was possible to calculate the set out relating to the proportion of these households actively placing out their waste. The 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. Set out rates for mixed recycling waste ranged between 66% for Acorn 4 and 84% for Acorn 3. Across Cambridge it is estimated that around 78% of residents are placing out their blue bins for collection.

Table 5.1.1: Average Set Out for mixed recycling waste (%)

ACORN	% SET OUT
1	74%
2	75%
3	84%
4	66%
5	82%
5 (LPA)	78%
COMMUNAL	N/A
WEIGHTED AVERAGE	78%

In this survey the average amount of mixed recycling generated in blue bins ranged between 2.36kg/hh/wk from Acorn 1 to 3.83kg/hh/wk from Acorn 3. Across Cambridge around 3.16kg/hh/wk of blue bin recycling waste is being placed out for collection at the kerbside.

Table 5.1.2: Average Mixed Recycling waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	2.36
2	3.07
3	3.83
4	2.95
5	3.09
5 (LPA)	2.52
COMMUNAL	3.80
WEIGHTED AVERAGE	3.16

Figure 5.1.1: Average Set Out for mixed recycling waste (%)

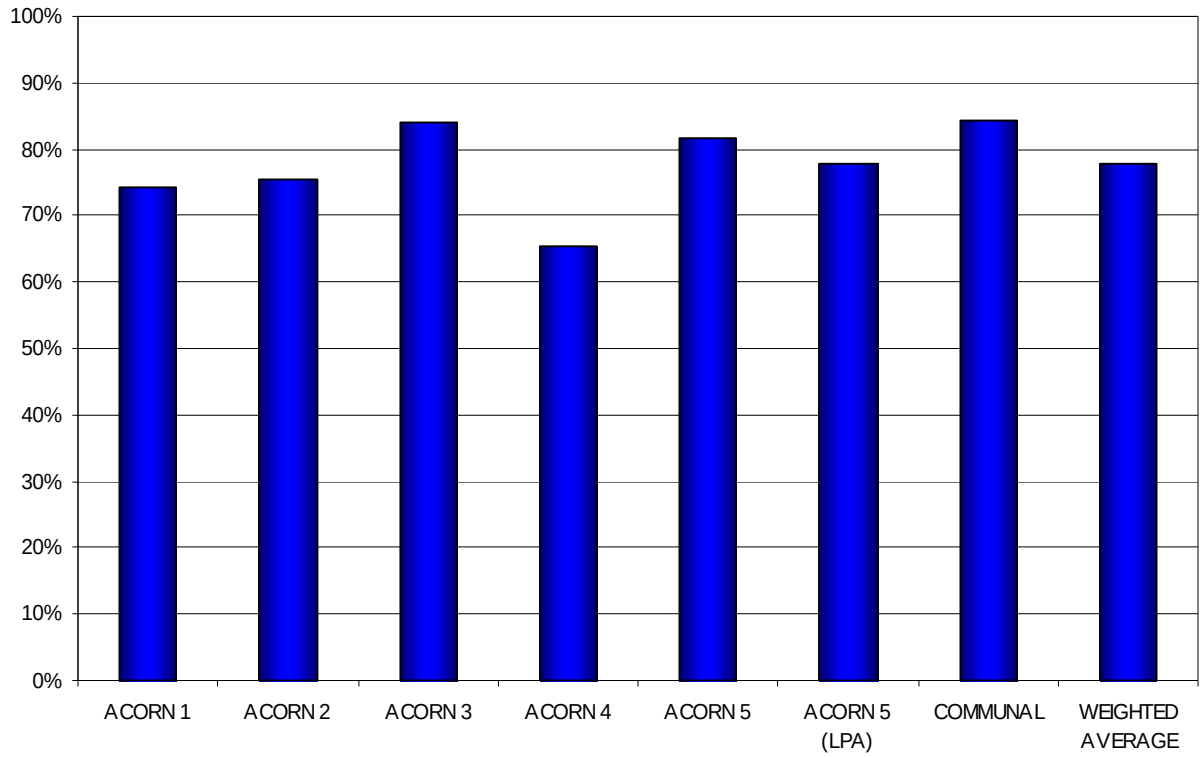
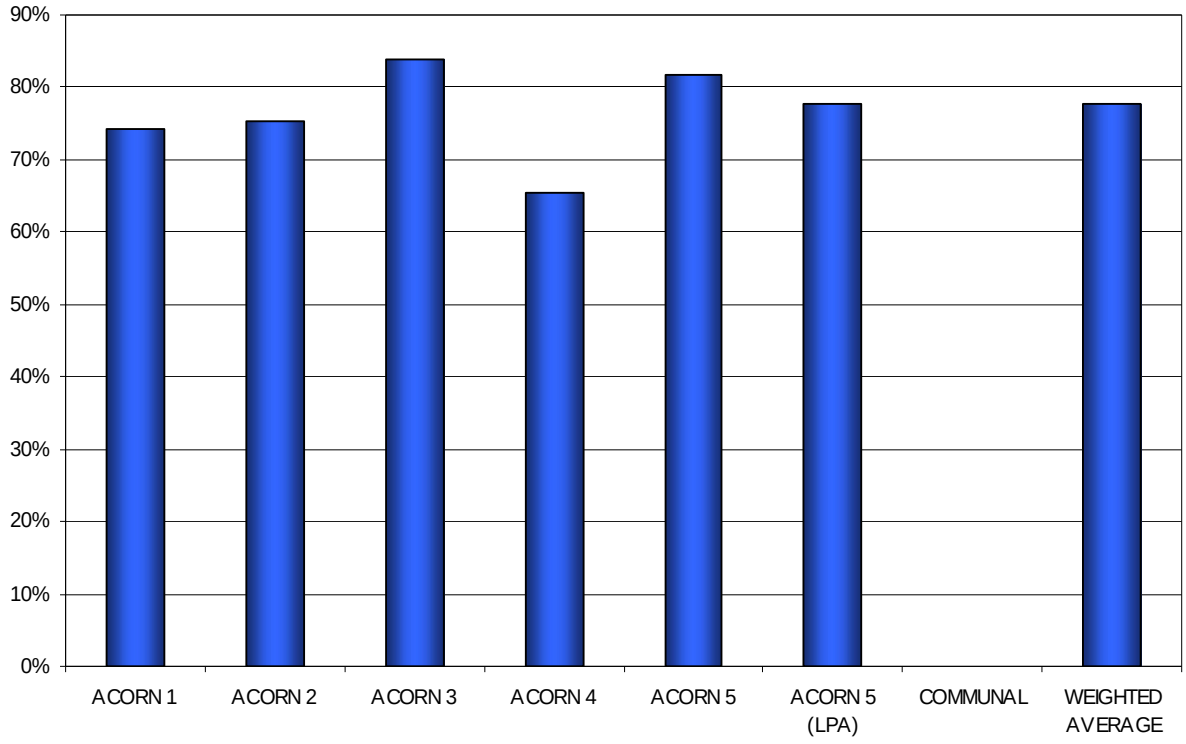


Figure 5.1.2: Average Mixed recycling waste generation rates (kg/hh/wk)



5.2 Compositional analysis of mixed recycling waste

This section looks at the average amount and composition of the mixed recycling waste presented by households sampled throughout Cambridge. 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 5.2.1 and Figure 5.2.1 show mixed recycling data in terms of percentage composition with Table 5.2.2 and Figure 5.2.2 showing generation rates for major materials in terms of kg/hh/wk for each sample taken from the blue recycling bins.

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

Table 5.2.1: Composition of mixed recycling (% concentration) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	50.89%	46.17%	23.96%	25.91%	23.28%	31.61%	32.48%	36.16%
RECYCLABLE CARD & CARDBOARD	12.80%	12.42%	14.12%	13.13%	17.38%	13.94%	14.95%	13.85%
RECYCLABLE PLASTIC BOTTLES	4.33%	4.28%	7.60%	5.74%	7.68%	8.58%	7.17%	5.76%
RECYCLABLE GLASS	18.59%	30.83%	41.13%	36.02%	35.39%	32.94%	25.61%	33.55%
RECYCLABLE METALS	5.08%	2.87%	6.02%	5.95%	5.12%	4.86%	5.56%	4.25%
CONTAMINATION MATERIALS	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%
TOTAL RECYCLING	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn

BLUE BIN RECYCLING	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	1.20	1.42	0.92	0.76	0.72	0.80	1.24	1.14
RECYCLABLE CARD & CARDBOARD	0.30	0.38	0.54	0.39	0.54	0.35	0.57	0.44
RECYCLABLE PLASTIC BOTTLES	0.10	0.13	0.29	0.17	0.24	0.22	0.27	0.18
RECYCLABLE GLASS	0.44	0.95	1.58	1.06	1.09	0.83	0.97	1.06
RECYCLABLE METALS	0.12	0.09	0.23	0.18	0.16	0.12	0.21	0.13
CONTAMINATION MATERIALS	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20
TOTAL RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16

Figure 5.2.1: Composition of mixed recycling (%) by Acorn

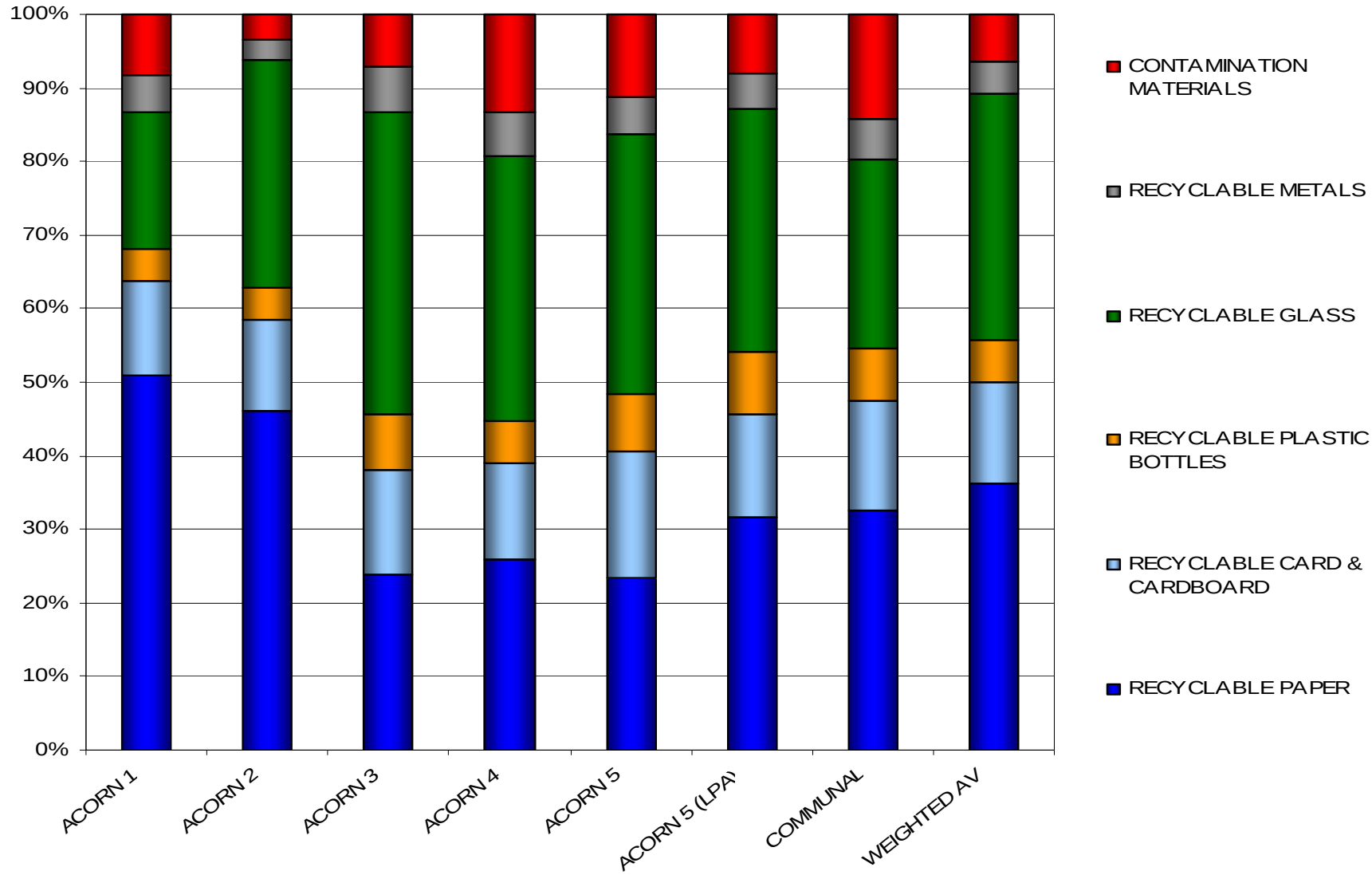
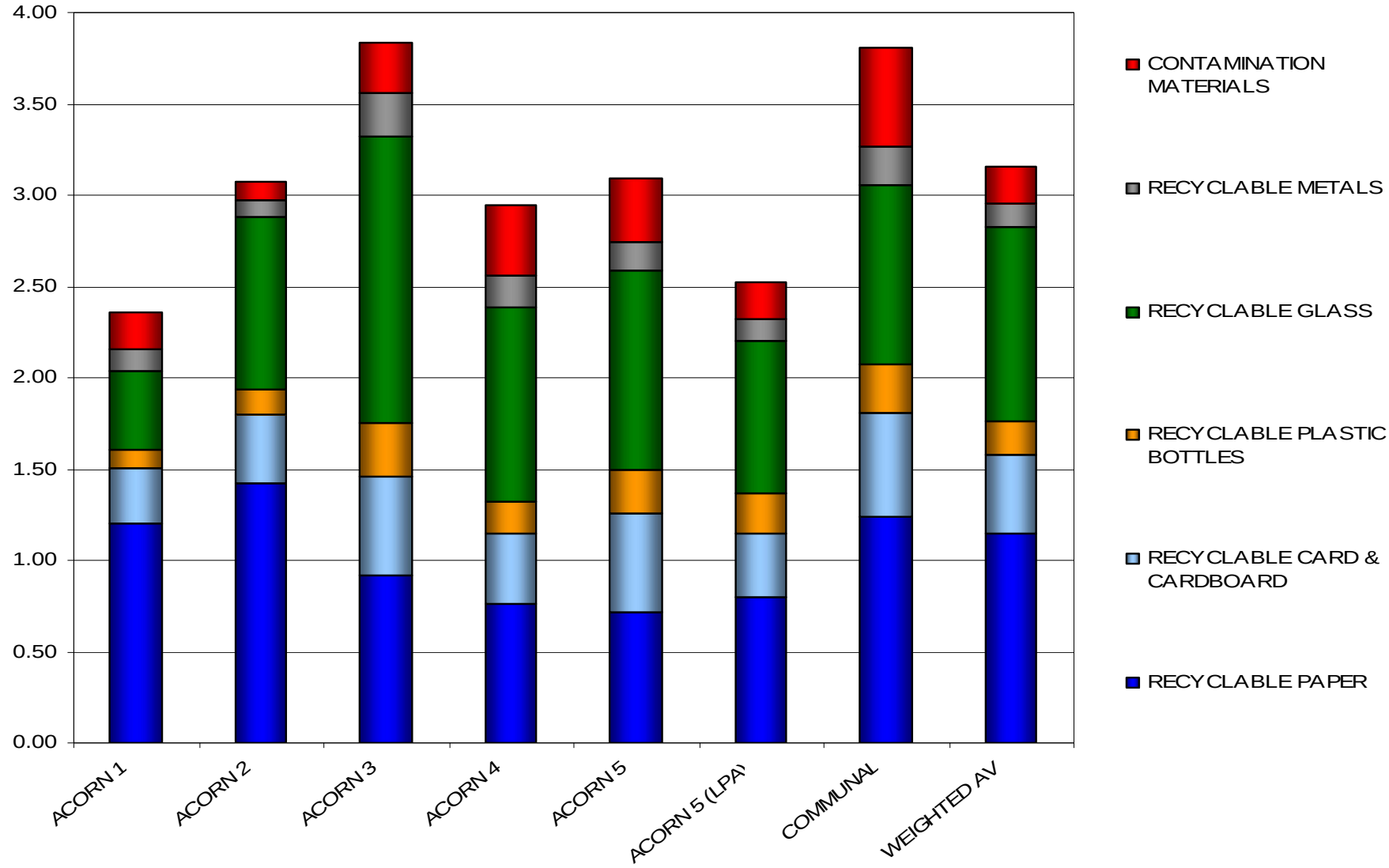


Figure 5.2.2: Composition of mixed recycling (kg/hh/wk) by Acorn



5.3 Materials placed out for mixed recycling collections

This chapter looks in more detail at the individual materials placed out for blue bin recycling collections and highlights the effectiveness with which the mixed recycling scheme is capturing these items. Looking at the relationship between the residual and recycling waste streams presented will additionally give indications as to the overall diversion being achieved in the Cambridge samples.

Table 5.3.1 summarises the capture and diversion rates seen for the range of materials collected in the dry recycling collections. Recyclable paper, card & cardboard, plastics, glass and metals are collected in the blue bin.

Across Cambridge around 75.6% of all the materials currently collected in blue bins are being correctly recycled at the kerbside. Acorns 1 – 4 all recycled between 73% and 79% of their blue bin materials. In comparison Acorn 5 households recycled 69% whilst those using communal bins recycled just 58%. Overall it is estimated that 23.7% of kerbside waste throughout Cambridge is diverted through blue bin collections.

Table 5.3.1: Summary table for material capture and diversion rates (%) for mixed recycling

% CAPTURE RATES	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RECYCLABLE PAPER	73.72%	83.14%	72.96%	72.49%	59.96%	84.58%	83.29%	76.73%
RECYCLABLE CARD & CARDBOARD	72.89%	77.28%	72.19%	77.83%	66.54%	82.21%	81.76%	72.67%
PLASTIC BOTTLES	53.80%	75.57%	82.58%	73.38%	83.76%	83.16%	62.63%	78.24%
COLOURED GLASS BOTTLES & JARS	100.00%	87.60%	99.09%	88.53%	93.66%	72.18%	80.07%	91.55%
CLEAR GLASS BOTTLES	91.08%	86.29%	70.26%	89.58%	90.54%	81.91%	74.03%	82.40%
CLEAR GLASS JARS	79.37%	60.32%	96.72%	N/A	74.00%	86.58%	65.68%	75.68%
ALL RECYCLABLE GLASS	91.20%	83.29%	89.45%	89.15%	89.05%	78.94%	73.64%	86.53%
DRINK CANS	67.43%	75.29%	75.31%	82.71%	63.14%	64.51%	68.55%	71.54%
FOOD TINS	88.57%	51.11%	78.10%	73.66%	70.06%	75.17%	65.10%	65.51%
AEROSOLS	100.00%	35.30%	71.44%	61.23%	46.61%	52.05%	43.96%	51.30%
OTHER RECYCLABLE METALS	19.96%	7.86%	25.61%	26.29%	12.14%	29.91%	63.26%	14.45%
ALL RECYCLABLE METALS	78.80%	47.98%	69.56%	73.66%	59.18%	62.96%	63.49%	58.87%
ALL BLUE BIN MATERIALS	72.69%	79.14%	78.60%	77.33%	69.48%	77.35%	58.45%	76.55%
% DIVERSION	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%

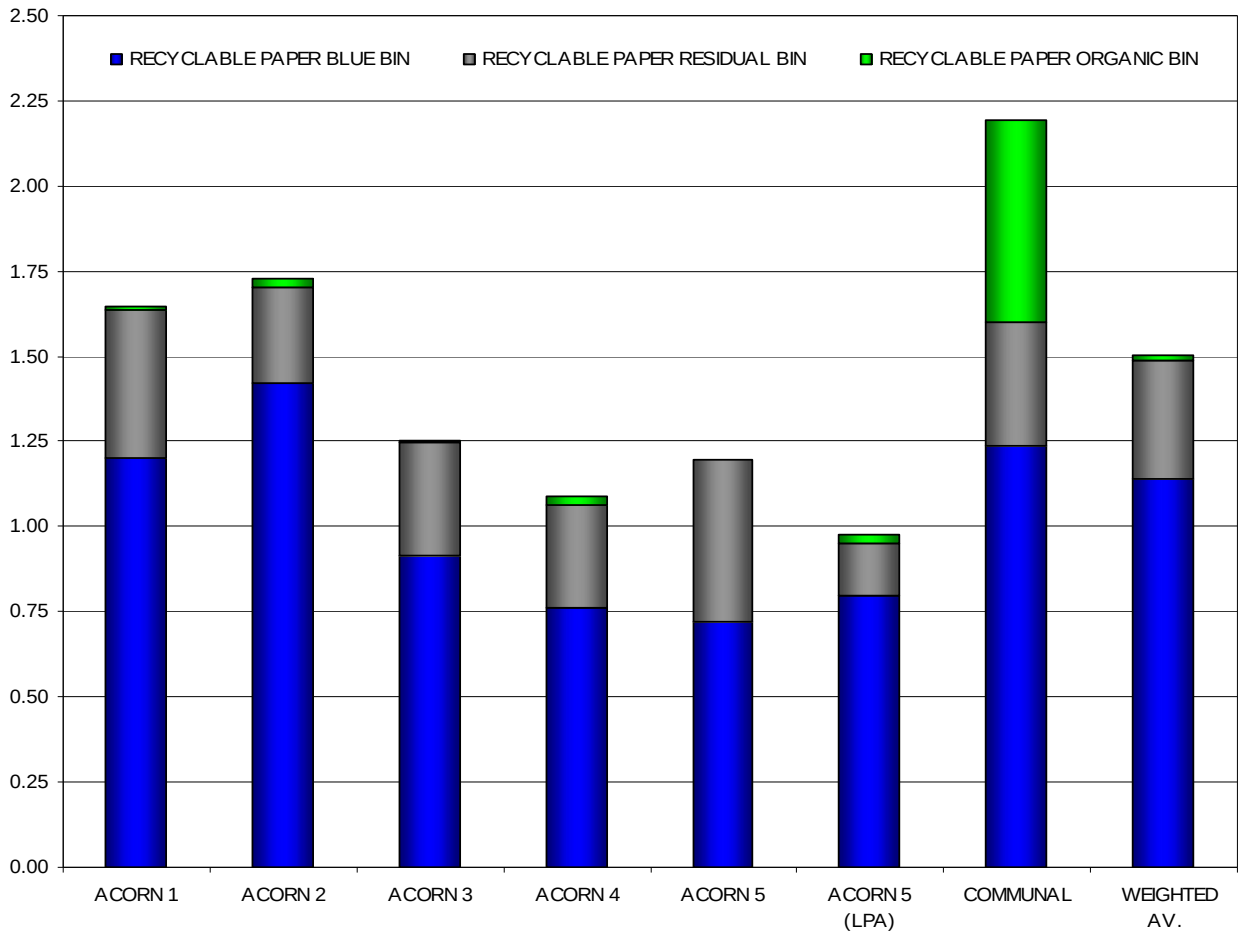
5.3.1 Paper Capture

Acorn 2 residents captured the highest proportion of their recyclable paper with 82% correctly being recycled; they generated 1.73kg/hh/wk of this material. Residents in communal bin areas captured the least recyclable paper at 56% additionally they also generated the most of this recyclable paper at 2.19kg/hh/wk.

Across Cambridge it is estimated that 1.50kg/hh/wk of recyclable paper is generated with around 76% being correctly placed into the blue bin*.

There are many different forms of paper and decisions have to be made by residents as to whether a particular piece of paper is to go into the recycling or residual waste. On average, the majority of all recyclable forms of paper are being correctly diverted by all the residents sampled although there is around 0.36kg/hh/wk of potentially recyclable paper not being placed into blue bins. On average 23% of recyclable paper is in the residual bin with 1% in the organic bin. Figure 5.3.2.1 shows the distribution of recyclable paper throughout the residual and recycling waste by Acorn category.

Figure 5.3.1.1: Distribution of recyclable paper within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes the paper disposed of in the organics bin. Although it is preferential that recyclable paper is put into the blue bin it is acceptable for the green bin. Shredded paper is only acceptable in green bins.

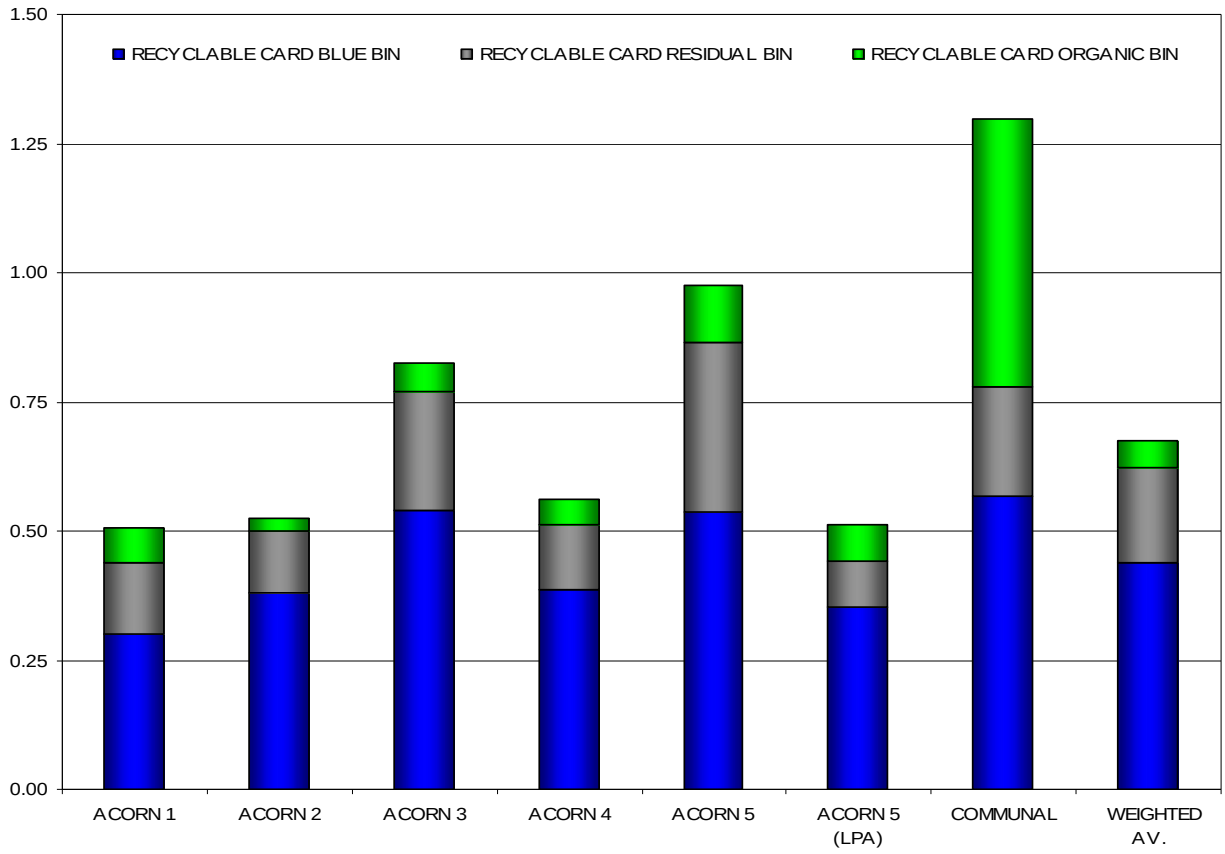
5.3.2 Card & Cardboard Capture

Acorn 2 residents captured the highest proportion of their recyclable card & cardboard with 73% correctly being recycled; they generated 0.52kg/hh/wk of this material. Residents in communal bin areas captured the least at less than 44% additionally they also generated the most of this recyclable card & cardboard at 1.30kg/hh/wk.

Across Cambridge it is estimated that 0.67kg/hh/wk of recyclable paper is generated with around 65% being correctly placed into the blue bin*.

As for paper, are many different forms of card & cardboard and decisions have to be made by residents as to whether a particular piece is to go into the recycling or residual waste. With the exception of residents in the communal bin sample, the majority of all recyclable forms of card & cardboard are being correctly diverted by all the residents surveyed although there is around 0.24kg/hh/wk of potentially recyclable card & cardboard not being placed into blue bins. On average 27% of recyclable card & cardboard is in the residual bin with 8% in the organic bin. Figure 5.3.3.1 shows the distribution of recyclable card & cardboard throughout the residual and recycling waste by Acorn category.

Figure 5.3.2.1: Distribution of recyclable card within residual and mixed recycling samples (kg/hh/wk)



* This capture rate includes certain card disposed of in the organics bin. Although it is preferential that recyclable card & cardboard is put into the blue bin it is acceptable for the green bin. Tetrapaks are only acceptable in blue bins.

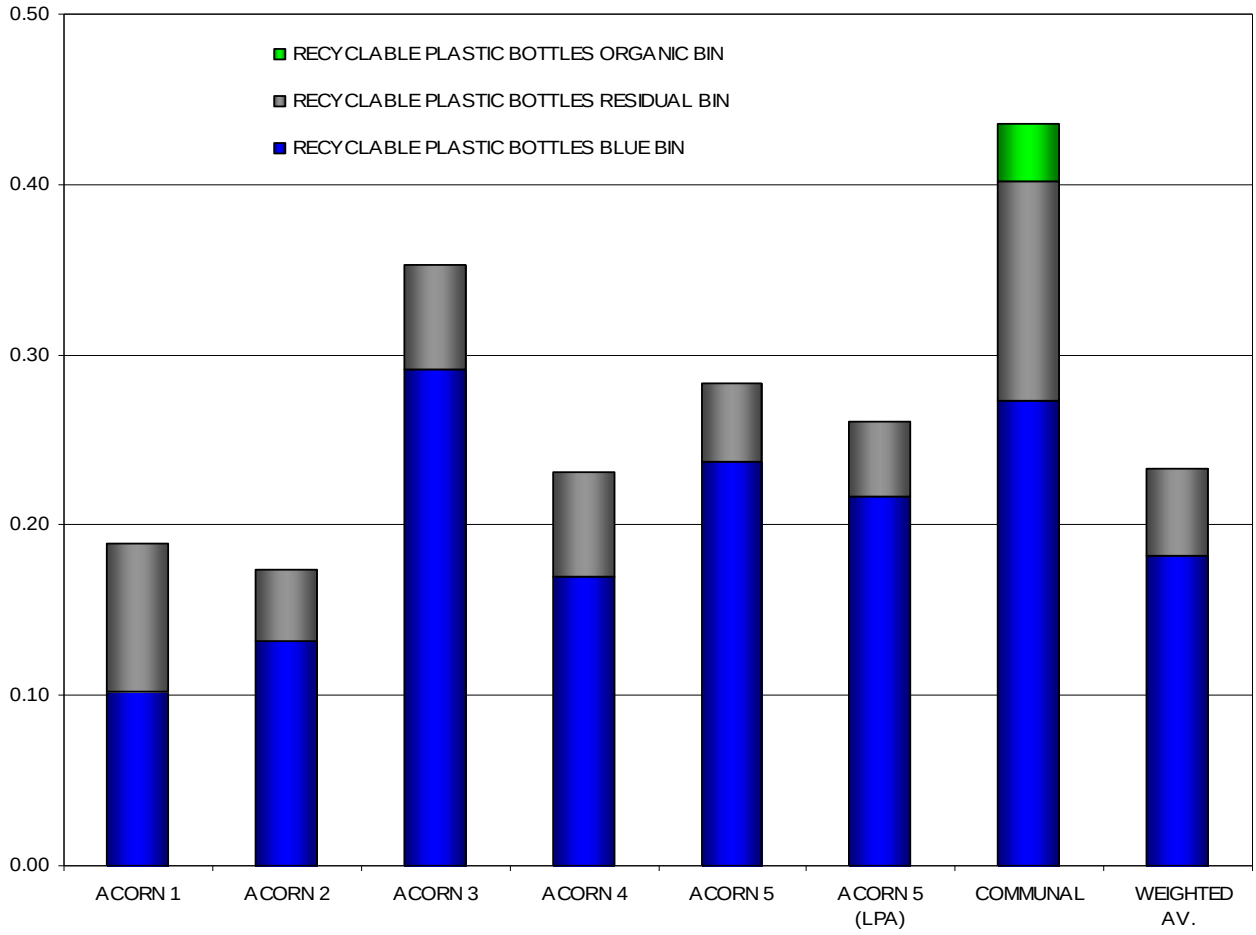
5.3.3 Plastic Bottles Capture

Acorn 5 residents captured the highest proportion of their recyclable plastic bottles with 84% correctly being recycled; they generated 0.26kg/hh/wk of this material. Residents in Acorn 1 areas captured the least recyclable paper at 54% additionally they generated 0.19kg/hh/wk.

Across Cambridge it is estimated that 0.23kg/hh/wk of recyclable plastic bottles are generated with around 78% being correctly placed into the blue bin.

Plastic bottles are easily identifiable when compared with other non-recyclable plastics. The majority of all recyclable plastic bottles are being correctly diverted by all the residents surveyed and there is just 0.05kg/hh/wk of these bottles not being placed into blue bins. On average 22% of recyclable plastic bottles are in the residual bin. Figure 5.3.3.1 shows the distribution of recyclable plastic bottles throughout the residual and recycling waste by Acorn category.

Figure 5.3.3.1: Distribution of recyclable plastic bottles within residual and mixed recycling samples (kg/hh/wk)

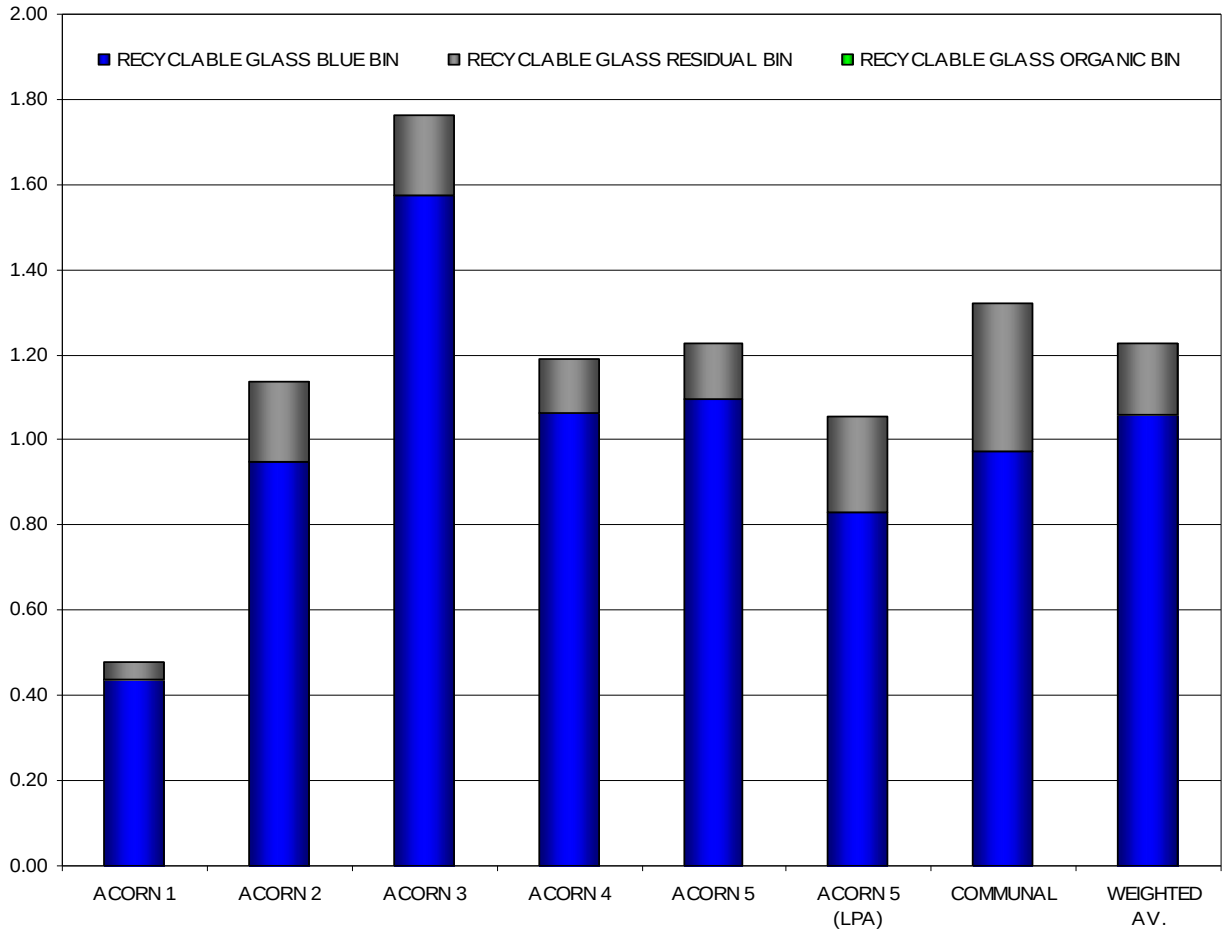


5.3.4 Glass Capture

Acorn 1 residents captured the highest proportion of their recyclable glass with 91% correctly being recycled, while residents from communal bin areas captured 74%. Acorn 3 residents produced the most recyclable glass in their combined kerbside waste at 1.76kg/hh/wk compared with 0.48kg/hh/wk from Acorn 1. On average, 87% of all recyclable glass is being correctly diverted by the Cambridge residents sampled with around 1.23kg/hh/wk being sampled.

Overall capture rates for coloured glass bottles were 92% with 82% of clear glass bottles similarly captured. Clear glass is generally considered to be more highly valued as a recyclate and it was seen that just 76% of glass jars were captured. It is often seen to be the case that empty jars are more messy than empty bottles and residents may not clean them for recycling, thus choosing to place them in the residual bins. On average, the vast majority of all recyclable forms of glass are being correctly diverted by the residents sampled although there is around 13% or 0.16kg/hh/wk of potentially recyclable glass not being placed into blue bins. Figure 5.3.4.1 shows the distribution of recyclable glass throughout the residual and mixed recycling waste.

Figure 5.3.4.1: Distribution of recyclable glass within residual and mixed recycling samples (kg/hh/wk)



5.3.5 Metals Capture

Acorn 1 residents captured the highest proportion of their recyclable metals with 79% correctly being recycled, while residents from Acorn 2 captured just 48%. Acorn 3 and communal bin users produced the most recyclable metals in their combined kerbside waste at 0.33kg/hh/wk compared with 0.15kg/hh/wk from Acorn 1. On average, 59% of all recyclable metals are being correctly diverted by Cambridge residents sampled with around 0.23kg/hh/wk being generated.

Overall capture rates for drinks cans were 72%, with 66% of food tins recycled. It is often seen to be the case that residents are unwilling to clean out food tins before recycling and this can lead to low capture rates when compared with cleaner drinks cans. Capture rates for empty aerosols were seen to be lower with just 51% of those available being placed into recycling containers. With the exception of Acorn 2 residents, the majority of all recyclable forms of metals are being correctly diverted, although there is around 0.09kg/hh/wk of potentially recyclable metal not being placed into blue bins. On average 41% of recyclable metal are in the residual bin. Figure 5.3.5.1 shows the distribution of recyclable metals throughout the residual and mixed recycling waste.

Figure 5.3.5.1: Distribution of recyclable metals within residual and mixed recycling samples (kg/hh/wk)

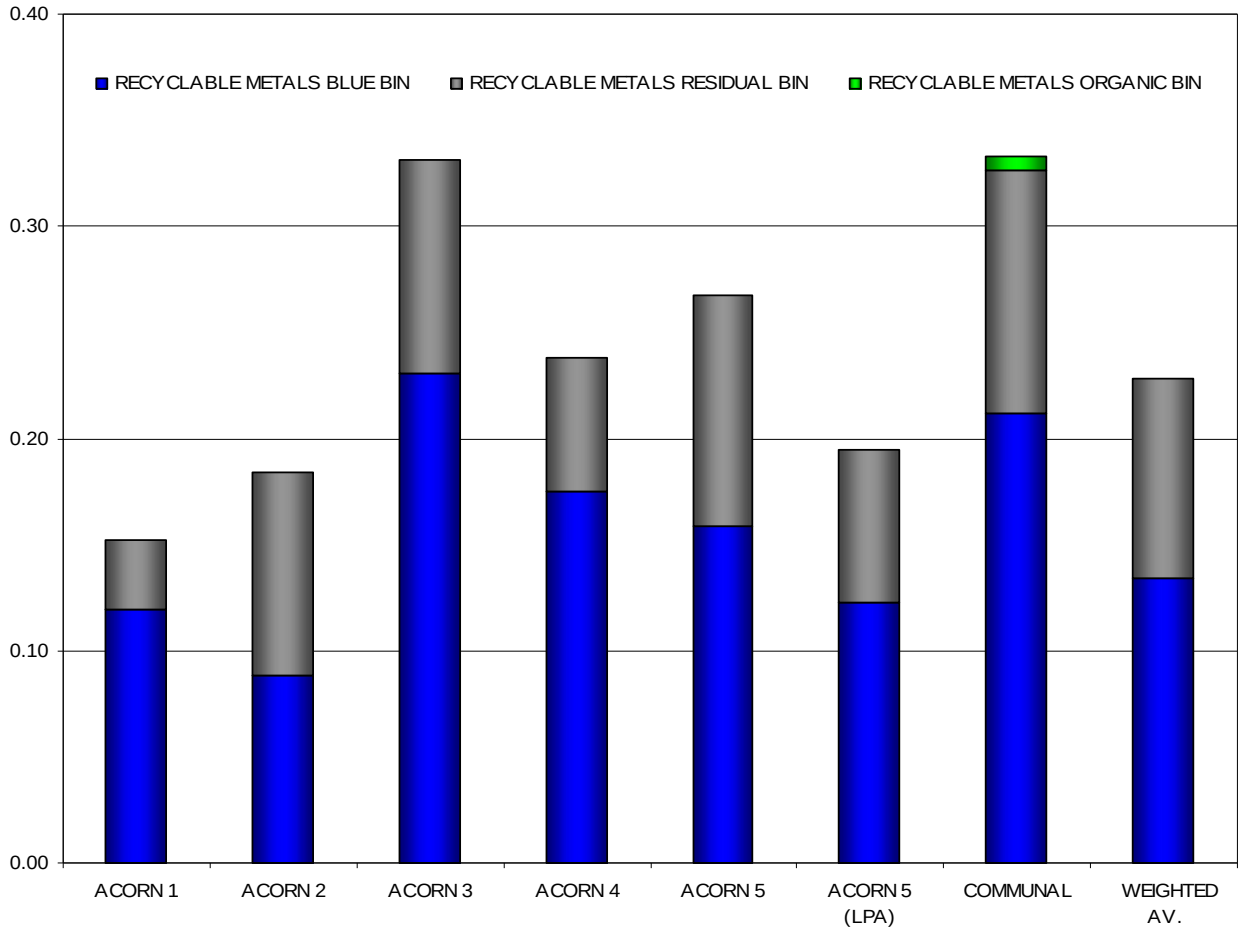
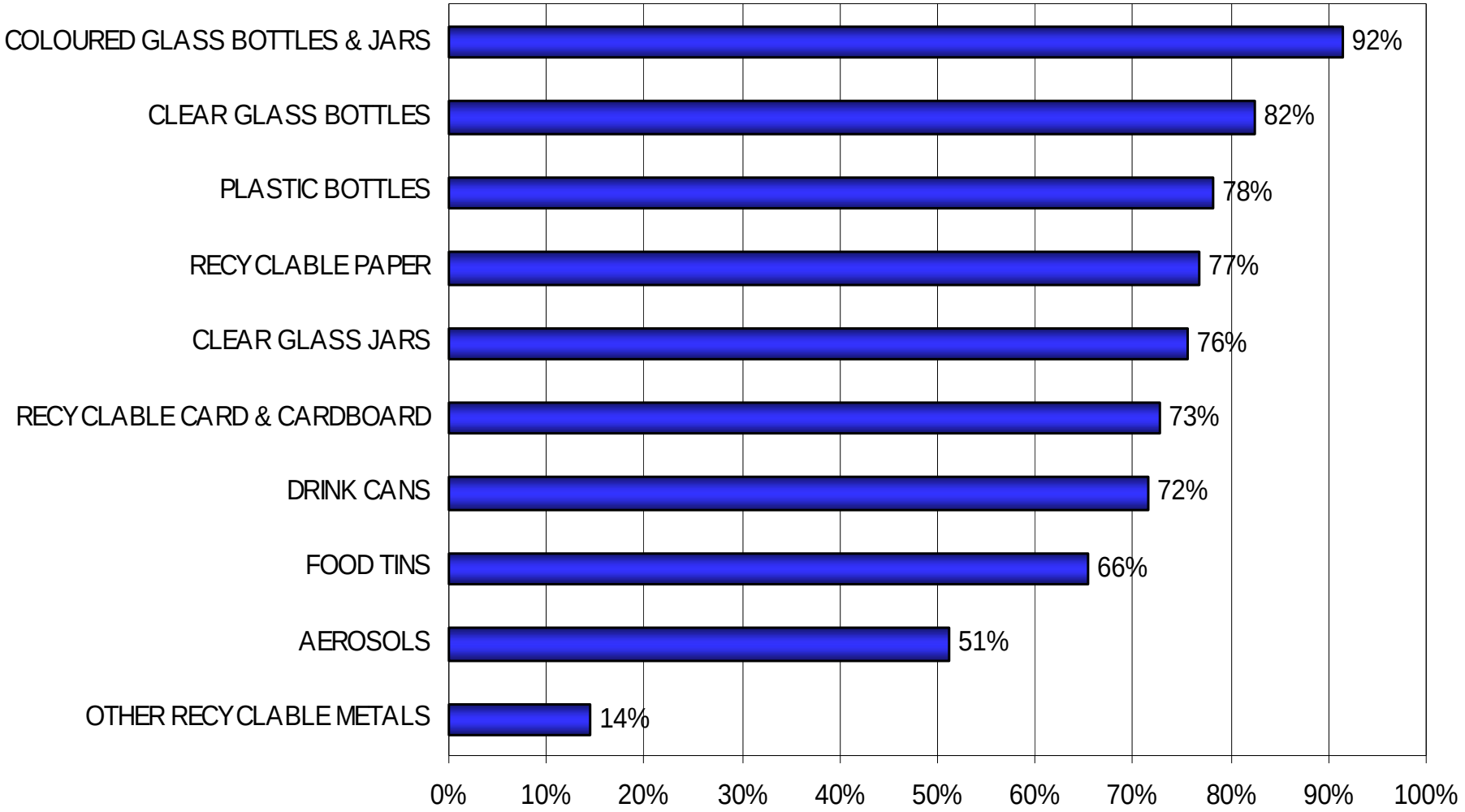


Figure 5.3.5.2: Summary chart of capture rates for blue bin recyclables.



5.4 Blue Bin Recycling Contamination

From Table 5.2.1 it has been shown that on average 6.4% of blue bin recycling is made up of contamination. This equates to around 0.20kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the recycling waste in Cambridge.

Some forms of contamination may be due to residents' lack of knowledge in relation to the recycling scheme. For example a householder may believe all plastic containers are accepted alongside recyclable plastic bottles. Other contamination will be formed from waste that is totally unrelated to the materials collected (i.e. disposable nappies, wood or bagged kitchen waste). Table 5.4.1 and Figure 5.4.1 show the amounts of contamination materials recovered from the blue bin.

The blue bin contained between 0.11kg/hh/wk (Acorn 2) and 0.54kg/hh/wk (communal bin households) of contamination.

Table 5.4.1: Breakdown of contamination materials in the blue bin recycling waste (kg/hh/wk)

BLUE BIN CONTAMINATION KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	0.04	0.03	0.06	0.04	0.13	0.04	0.06	0.06
PLASTIC FILM	0.01	0.01	0.04	0.01	0.01	0.02	0.02	0.02
NON-RECYCLABLE PLASTICS	0.09	0.04	0.07	0.14	0.08	0.11	0.19	0.06
TEXTILES	0.00	0.01	0.03	0.06	0.00	0.00	0.00	0.01
NON-RECYCLABLE GLASS	0.00	0.01	0.00	0.00	0.00	0.01	0.00	<0.01
NON-RECYCLABLE METALS	0.04	0.00	0.00	0.00	0.00	0.01	0.01	<0.01
FOOD WASTE	0.00	0.01	0.02	0.10	0.08	0.01	0.07	0.03
LIQUIDS	0.01	0.00	0.01	0.04	0.00	0.00	0.02	<0.01
ALL OTHER CONTAMINATION	0.01	0.00	0.04	0.00	0.04	0.01	0.17	0.02
TOTAL CONTAMINATION	0.20	0.11	0.27	0.39	0.34	0.20	0.54	0.20

Figure 5.4.1: Breakdown of contamination materials present within blue bin recycling containers (kg/hh/wk).

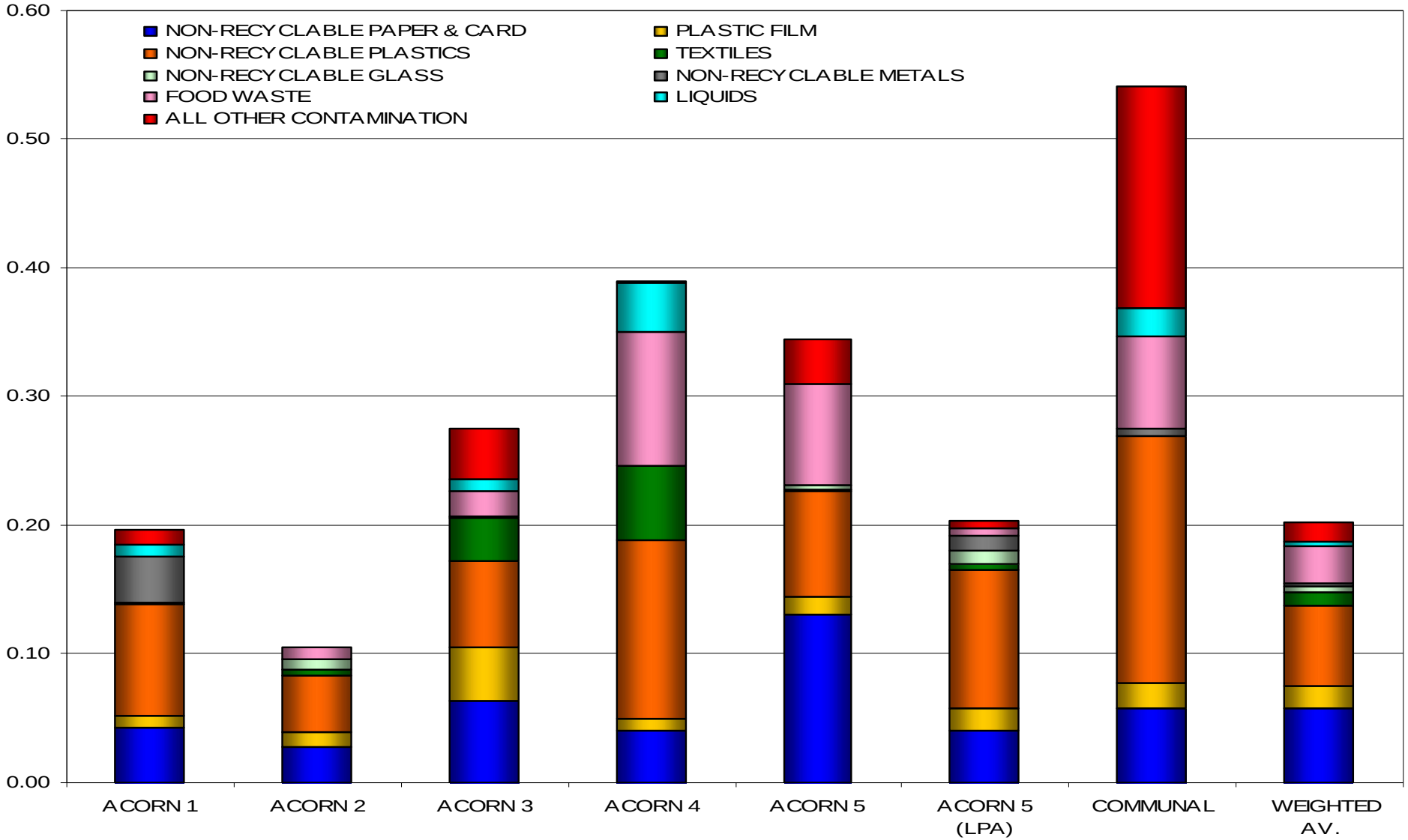


Table 5.4.2 shows the levels of contamination materials recovered from the blue bin as a percentage of the total. On average 6.4% of blue bin recycling is deemed to be contamination. Almost 4% of contamination is due to non-recyclable plastic containers, paper and card. Just over 3% of Acorn 2 recycling was classed as contamination compared with over 14% of that from households on communal bins.

Table 5.4.2: Levels of contamination within the blue bin recycling waste (% of total)

BLUE BIN CONTAMINATION %	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	1.84%	0.90%	1.67%	1.35%	4.23%	1.61%	1.52%	1.82%
PLASTIC FILM	0.39%	0.39%	1.07%	0.33%	0.43%	0.70%	0.53%	0.54%
NON-RECYCLABLE PLASTICS	3.65%	1.42%	1.75%	4.71%	2.68%	4.25%	5.04%	1.98%
TEXTILES	0.00%	0.17%	0.88%	1.96%	0.02%	0.17%	0.00%	0.35%
NON-RECYCLABLE GLASS	0.05%	0.25%	0.04%	0.00%	0.10%	0.40%	0.00%	0.16%
NON-RECYCLABLE METALS	1.52%	0.00%	0.00%	0.00%	0.00%	0.50%	0.13%	0.08%
FOOD WASTE	0.00%	0.31%	0.49%	3.54%	2.54%	0.23%	1.90%	0.89%
LIQUIDS	0.42%	0.00%	0.26%	1.27%	0.00%	0.00%	0.57%	0.12%
ALL OTHER CONTAMINATION	0.44%	0.00%	1.01%	0.07%	1.14%	0.21%	4.53%	0.48%
TOTAL CONTAMINATION	8.32%	3.43%	7.18%	13.23%	11.15%	8.06%	14.22%	6.42%

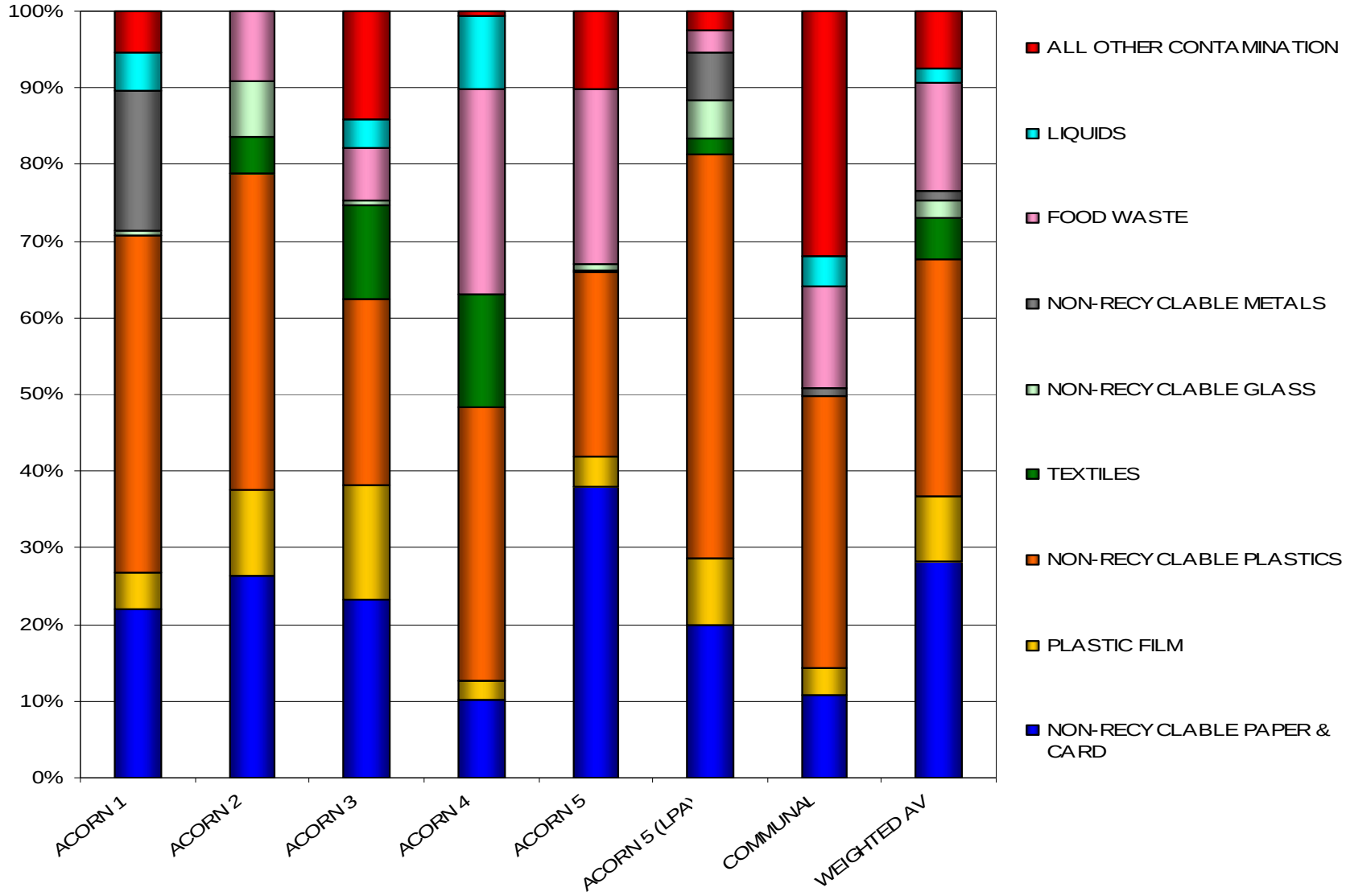
Table 5.4.3 and Figure 5.4.2 show a breakdown of the contaminants to highlight materials causing the greatest contribution to the overall contamination levels within blue bins. Around 31% of the contamination was due to non-recyclable dense plastics, these formed over half of the contamination from Acorn 5(LPA) households. Over 28% of contamination was due to non-recyclable paper and card; this formed almost 40% of Acorn 5 contamination. Up to 14% of contamination was formed from food waste and this material represented a quarter of the overall contamination from Acorn 4 and 5 households.

Blue bins from communal households had very high levels of miscellaneous contamination at 32% of the total. These items are typical of general residual waste being placed into recycling bins.

Table 5.4.3: Proportional breakdown of blue bin contaminants (% of contamination).

% OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
NON-RECYCLABLE PAPER & CARD	22.09%	26.25%	23.24%	10.23%	37.98%	19.92%	10.70%	28.31%
PLASTIC FILM	4.74%	11.25%	14.85%	2.49%	3.87%	8.66%	3.70%	8.48%
NON-RECYCLABLE PLASTICS	43.90%	41.25%	24.42%	35.58%	24.04%	52.71%	35.46%	30.78%
TEXTILES	0.00%	4.86%	12.28%	14.84%	0.21%	2.16%	0.00%	5.38%
NON-RECYCLABLE GLASS	0.64%	7.36%	0.62%	0.00%	0.88%	4.96%	0.00%	2.43%
NON-RECYCLABLE METALS	18.22%	0.00%	0.00%	0.00%	0.00%	6.17%	0.92%	1.27%
FOOD WASTE	0.00%	9.03%	6.80%	26.73%	22.82%	2.86%	13.33%	13.94%
LIQUIDS	5.09%	0.00%	3.68%	9.59%	0.00%	0.00%	4.04%	1.91%
ALL OTHER CONTAMINATION	5.32%	0.00%	14.12%	0.55%	10.19%	2.55%	31.86%	7.52%
TOTAL CONTAMINATION	100%	100%	100%	100%	100%	100%	100%	100%

Figure 5.4.2: Proportional breakdown of blue bin contaminants (% of contamination).



6) Green Bin Organic Recycling Waste

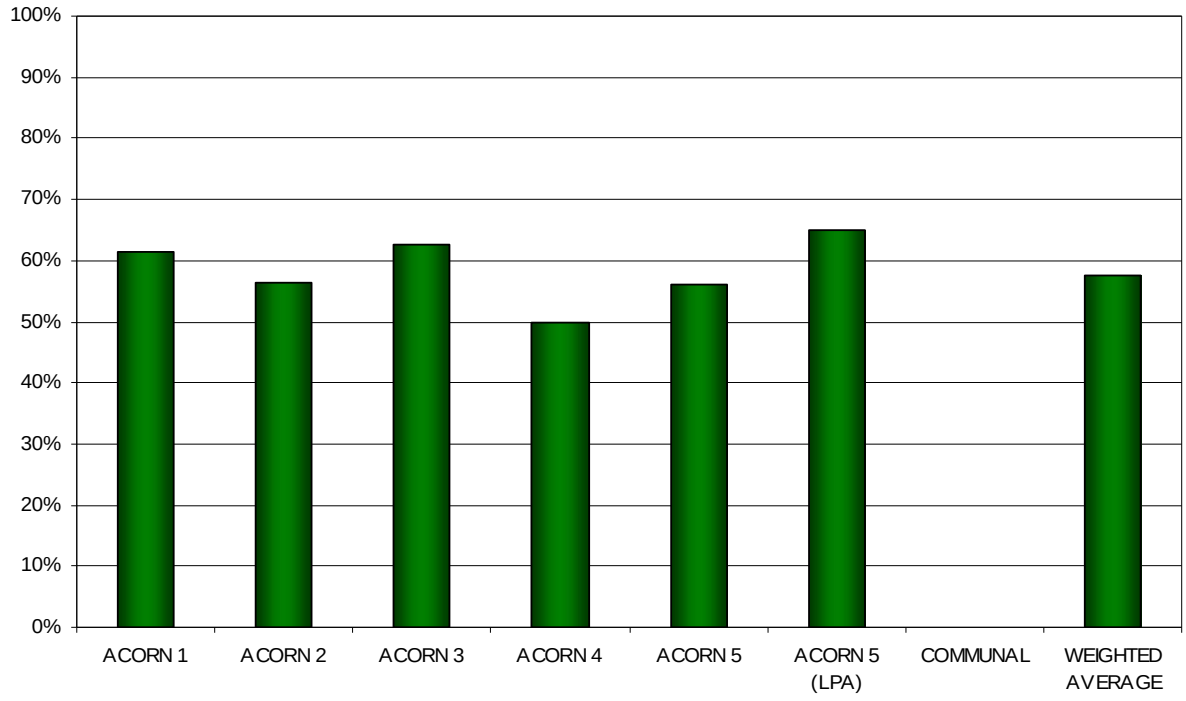
6.1 Set out rates and waste generation

Table 6.1.1 and Figure 6.1.1 highlight the average set out rates for green bin organic recycling waste observed during the compositional analysis. Table 6.1.2 and Figure 6.1.2 show the average amounts of this recycling waste generated in kg/hh/wk. Set out rates ranged between 50% for Acorn 4 and 65% for Acorn 5(LPA) were observed. Across Cambridge around 58% of residents are opting to place out organic waste containers for collection.

Table 6.1.1: Average Set Out For Green Bin Waste (%)

ACORN	% SET OUT
1	61%
2	57%
3	63%
4	50%
5	56%
5 (LPA)	65%
COMMUNAL	N/A
WEIGHTED AVERAGE	58%

Figure 6.1.1: Average Set Out For Green Bin Waste (%)

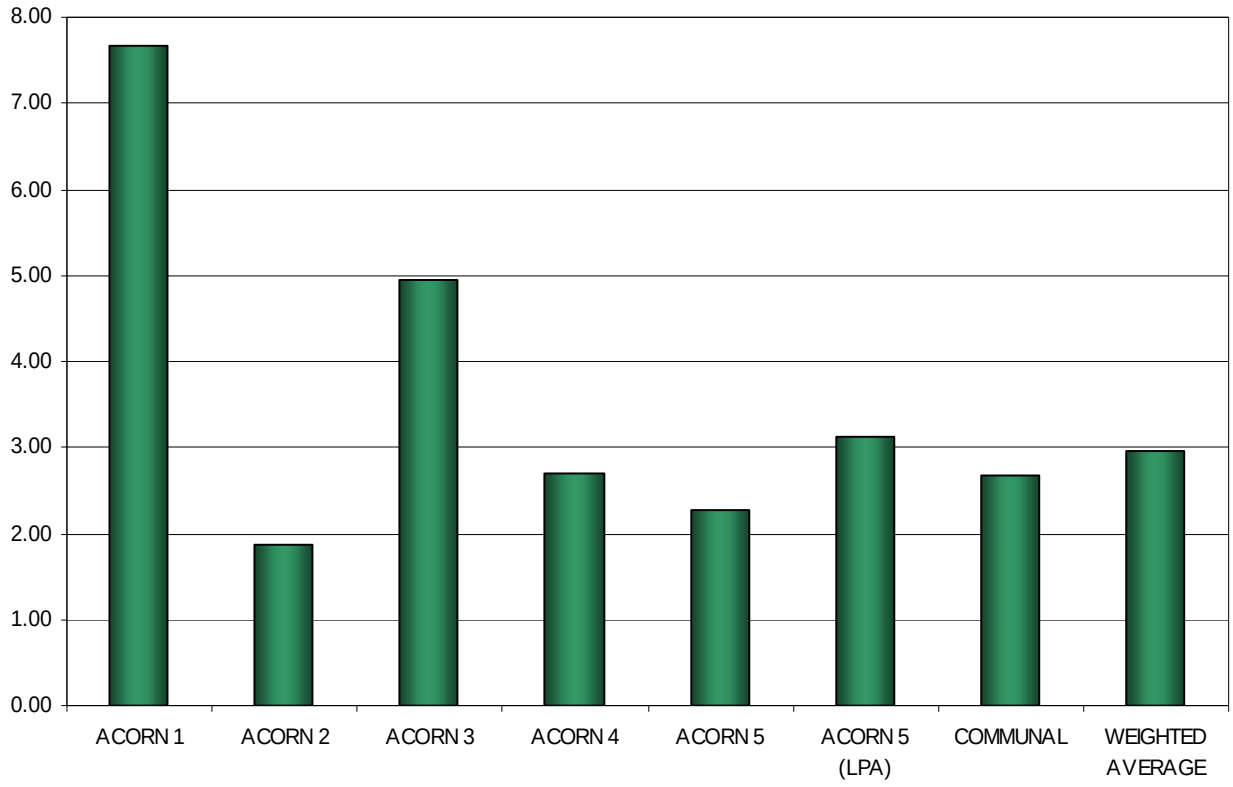


In this survey the amount of green bin recycling generated ranged between 1.86kg/hh/wk from Acorn 2 to 7.66kg/hh/wk from Acorn 1. Across Cambridge around 2.96kg/hh/wk organically recycled waste is being collected from the kerbside.

Table 6.1.2: Average green bin waste generation rates (kg/hh/wk)

ACORN	KG/HH/WK
1	7.66
2	1.86
3	4.95
4	2.71
5	2.27
5 (LPA)	3.13
COMMUNAL	2.69
WEIGHTED AVERAGE	2.96

Figure 6.1.2: Average green bin waste generation rates (kg/hh/wk)



6.2 Compositional analysis of green recycling bins

This section looks at the average amount and composition of the green bin organic recycling waste presented by participating households sampled throughout Cambridge. Results can again be expressed in terms of percentage concentration and kg/hh/wk for individual samples and in relation to the household Acorn surveyed.

Table 6.2.1 and Figure 6.2.1 show green bin recycling data in terms of percentage composition with Table 6.2.2 and Figure 6.2.2 showing average generation rates for major materials in terms of kg/hh/wk. As residual waste will contain a proportion that is classified as potentially recyclable; then recycling waste will contain a faction that is deemed to be contamination. That is to say that it is not compatible with the materials currently acceptable to the green bin recycling scheme.

Table 6.2.1: Average Composition of organic recycling (% concentration) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	2.50%	1.99%	11.17%	10.82%	6.71%	2.90%	25.30%	5.93%
NON-HOME COMPOSTABLE FOODS	0.66%	15.64%	3.09%	7.53%	0.88%	9.13%	1.41%	6.38%
FLORA ORGANICS	92.93%	79.43%	81.99%	74.25%	77.77%	72.68%	0.39%	82.30%
OTHER ACCEPTABLE ORGANICS	3.67%	2.83%	1.24%	2.73%	4.95%	13.64%	41.62%	2.84%
SOIL & TURF	0.00%	0.00%	0.00%	4.22%	0.00%	0.00%	0.00%	0.13%
NON-RECYCLABLE PAPER & CARD	0.00%	0.11%	0.02%	0.08%	0.13%	1.01%	8.60%	0.06%
PLASTICS	0.00%	0.00%	0.02%	0.00%	0.07%	0.00%	6.17%	0.02%
TEXTILES	0.24%	0.00%	0.00%	0.00%	3.37%	0.00%	2.21%	0.59%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.00%
ALL OTHER WASTE	0.00%	0.00%	2.47%	0.36%	6.13%	0.64%	13.52%	1.75%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6.2.2: Average Composition of organic recycling (kg/hh/wk) by Acorn

ORGANIC RECYCLING KG/HH/WK	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	0.19	0.04	0.55	0.29	0.15	0.09	0.68	0.18
NON-HOME COMPOSTABLE FOODS	0.05	0.29	0.15	0.20	0.02	0.29	0.04	0.19
FLORA ORGANICS	7.12	1.48	4.06	2.01	1.77	2.28	0.01	2.43
OTHER ACCEPTABLE ORGANICS	0.28	0.05	0.06	0.07	0.11	0.43	1.12	0.08
SOIL & TURF	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
NON-RECYCLABLE PAPER & CARD	0.00	0.00	0.00	0.00	0.00	0.03	0.23	0.00
PLASTICS	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00
TEXTILES	0.02	0.00	0.00	0.00	0.08	0.00	0.06	0.02
GLASS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
METALS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
ALL OTHER WASTE	0.00	0.00	0.12	0.01	0.14	0.02	0.36	0.05
TOTAL	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96

Figure 6.2.1: Average Composition of organic recycling (% by weight) by Acorn

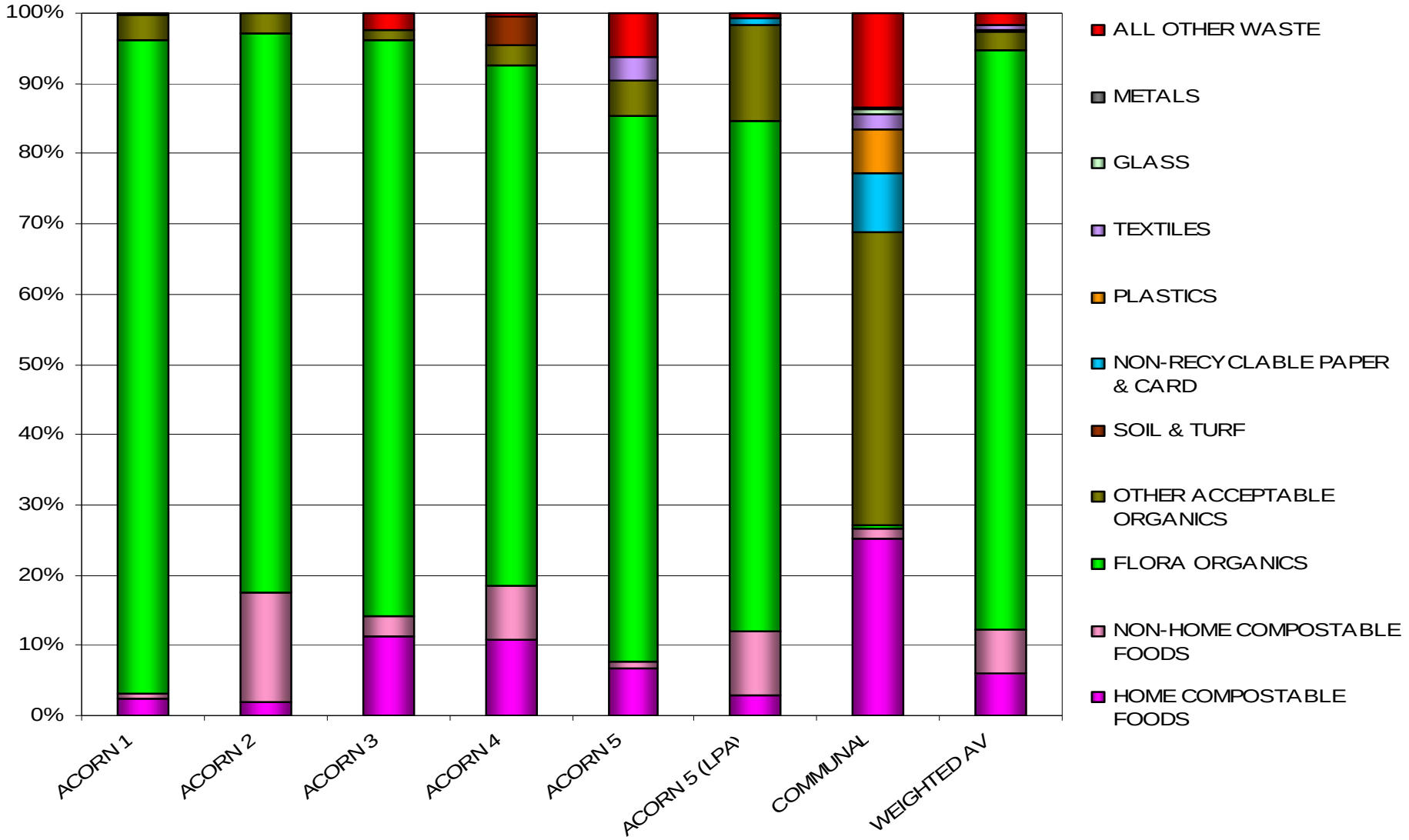
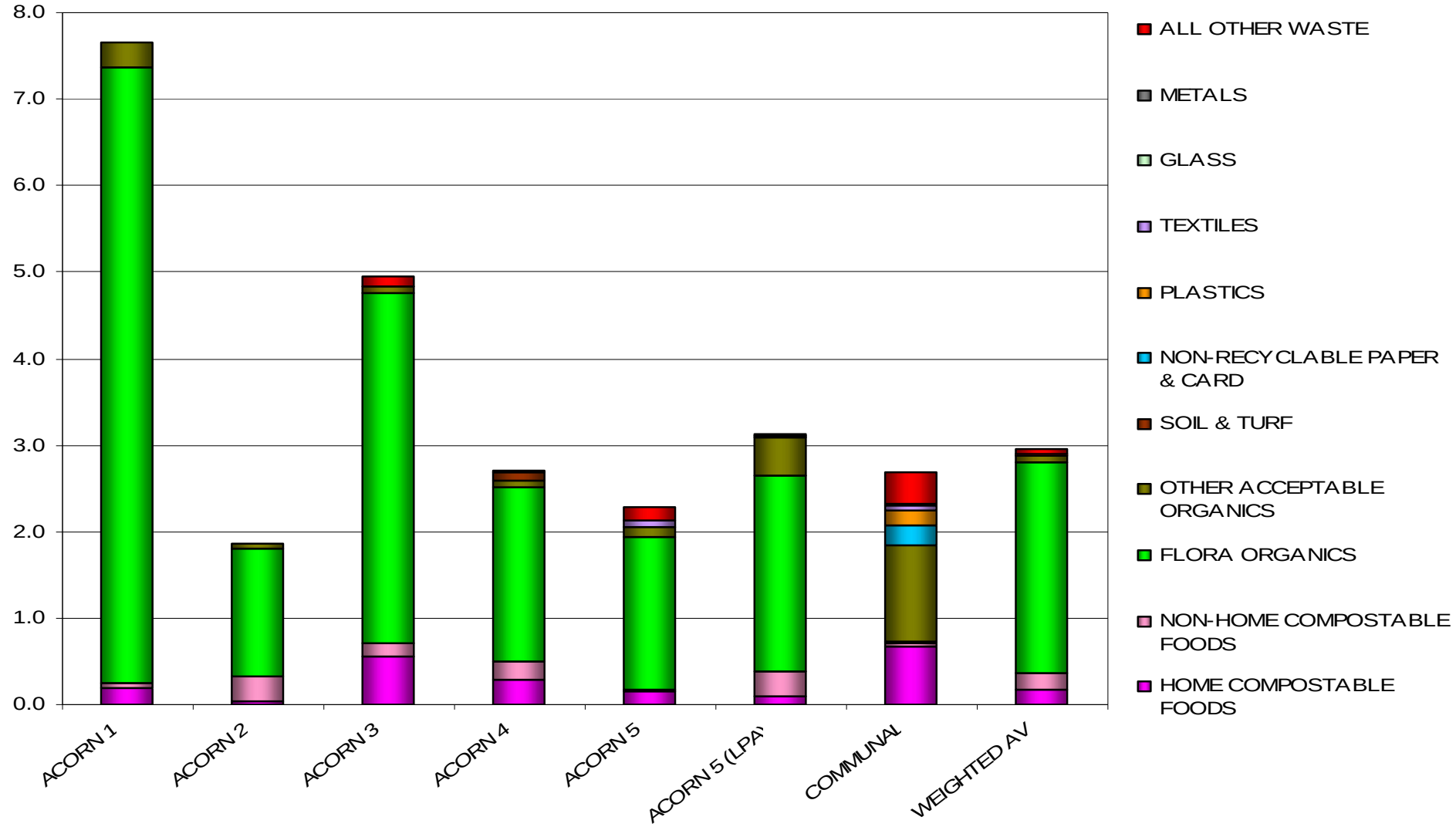


Figure 6.2.2: Composition of organic recycling (kg/hh/wk) by Acorn



6.3 Materials placed out for green bin recycling collections

This chapter looks in more detail at the individual materials placed out for green bin recycling collections and highlights the effectiveness with which this scheme is capturing these items. Looking at the relationship between the residual, dry recycling and green bin recycling waste presented will additionally give indications as to the overall diversion being achieved throughout Cambridge.

Table 6.3.1: Summary table for material capture and diversion rates (%) for green bin recycling

CAPTURE & DIVERSION RATES (%)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
HOME COMPOSTABLE FOODS	46.37%	4.67%	58.24%	38.15%	24.18%	14.92%	46.36%	23.12%
NON-HOME COMPOSTABLE FOODS*	9.71%	35.45%	15.16%	13.65%	1.61%	25.11%	3.37%	20.00%
ALL FOOD WASTE	25.96%	20.33%	36.04%	21.97%	9.25%	21.56%	27.69%	21.39%
FLORA ORGANICS	98.55%	93.12%	100.00%	96.06%	98.29%	91.73%	7.40%	97.15%
PET BEDDING & UNTREATED WOOD	100.00%	N/A	N/A	0.00%	N/A	100.00%	100.00%	75.69%
ACCEPTABLE PAPER & CARD	4.14%	2.37%	3.07%	4.56%	5.27%	7.22%	32.03%	3.28%
ALL ORGANICS	90.49%	56.22%	79.01%	52.97%	52.93%	65.41%	27.50%	66.27%
% DIVERSION	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%

* Contains all unidentifiable and unsortable composite food waste. Some of this will be home compostable fragments, however, due to a significant proportion being non fruit and vegetable waste; this faction is deemed non-home compostable.

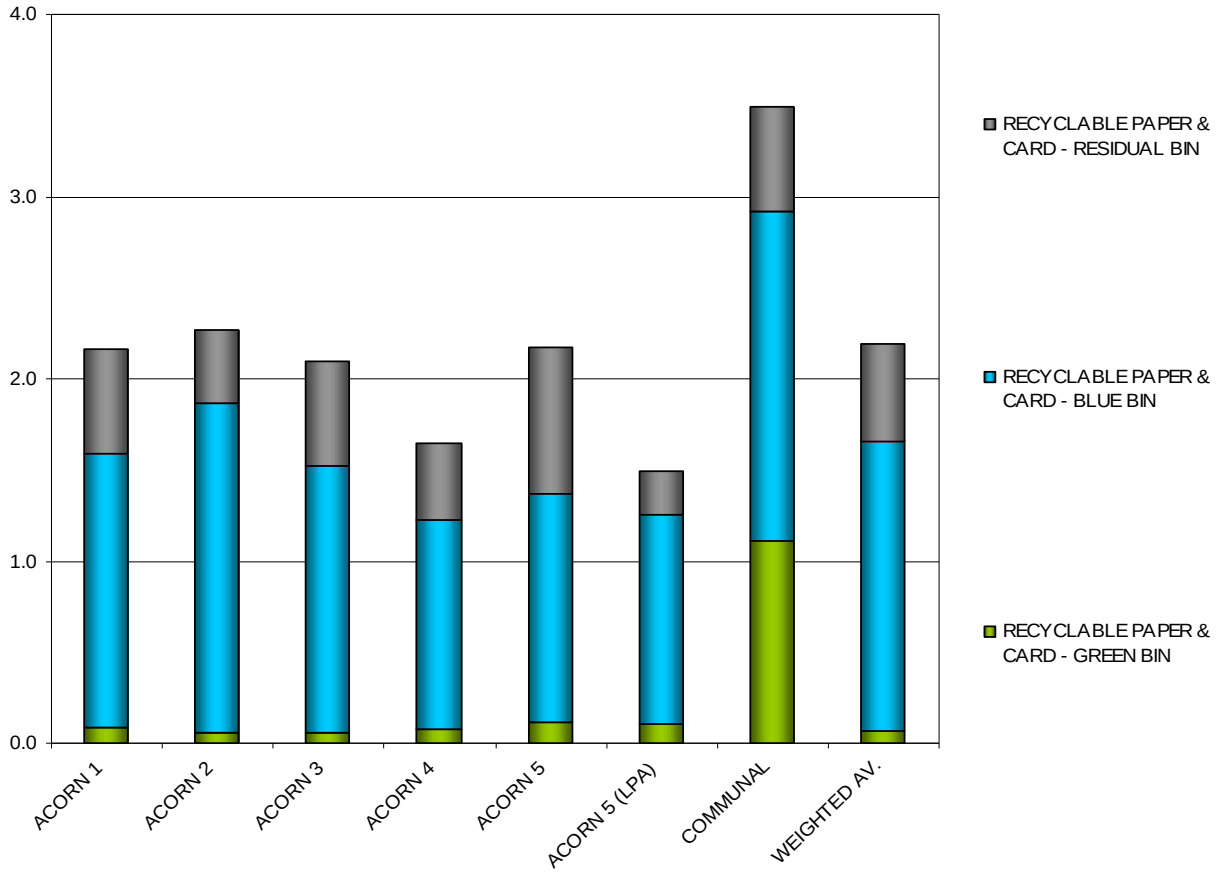
Table 6.3.1 summarises the average capture and diversion rates seen for materials achieved for the green bin organic recycling collections. By far the most efficient recyclers of organic waste were Acorn 1 households who recycled over 90% of that being generated. Acorn 3 households captured over 79% of their organics whilst the rate for Acorns 2, 4 and 5 was between 53% and 56%. IN contrast it was seen that residents in communal bin areas only managed to capture 27.5% of the organic waste that they were disposing of. Across Cambridge, 66.3% of the organics available for green bin recycling were correctly captured by participating households.

6.3.1 Paper & Card Capture

Residents are able to recycle paper, thin card and corrugated cardboard in their green bins. It is however the case that with the exception of shredded paper, it is preferable for these recyclables to be placed into blue recycling bins.

Figure 6.3.1.1. shows the distribution of recyclable paper, card and cardboard throughout the three kerbside schemes by Acorn category. It is clear that residents using communal bins not only generate the most recyclable paper and card; they also place by far the highest proportion in their green bins at 32%. Typically between 2% and 5% of all recyclable paper and card was present in green bins for Acorns 1 – 5 with just over 7% seen for the Acorn 5(LPA) sample.

Figure 6.3.1.1 Distribution of recyclable paper & card within residual and recycling samples (kg/hh/wk)



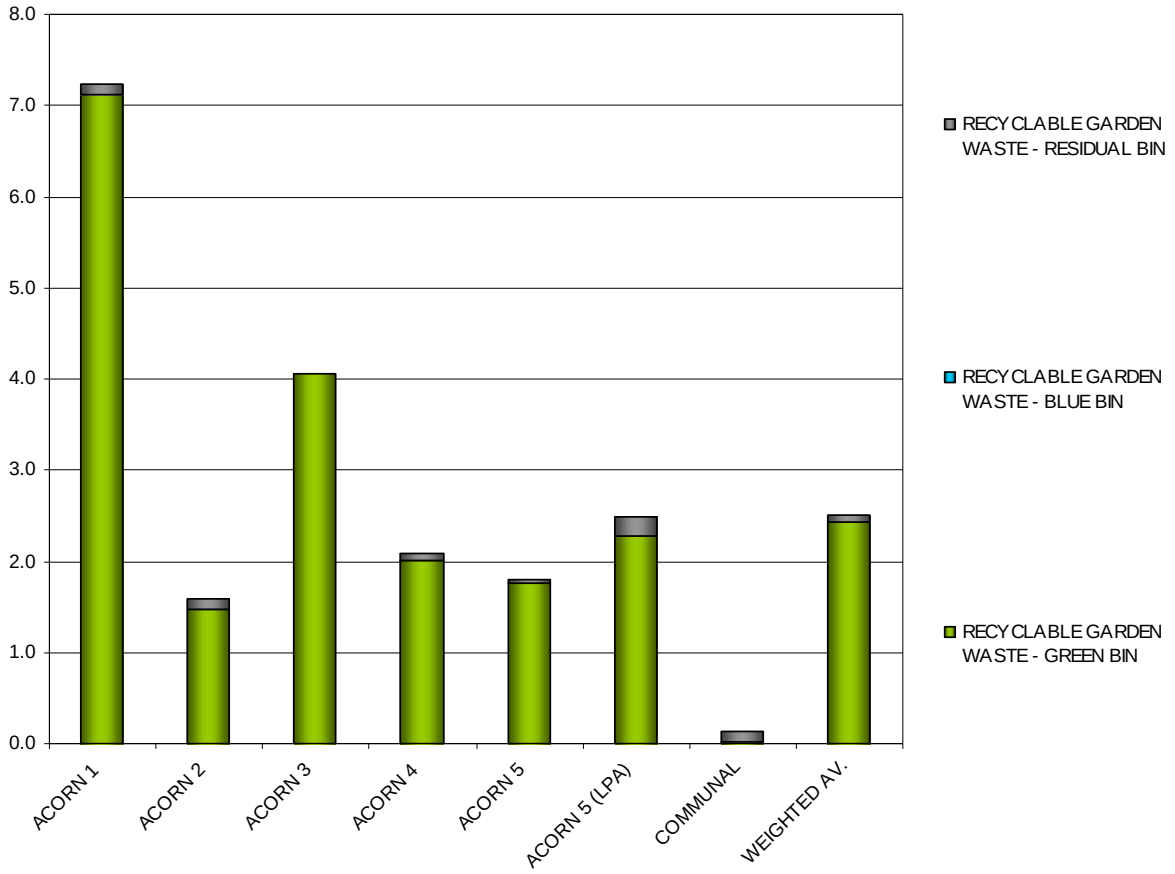
6.3.2 Garden Waste Capture

Residents are able to recycle garden clippings in their green bins. With the exception of the communal bin residents it was seen that garden waste was by far the greatest constituent of the presented organic recycling. Just 7% of garden waste was captured in communal bins areas although very little of this type of waste is actually generated. On average it is seen that over 97% of the available garden waste is recycled by Cambridge residents. All Acorns recorded capture rates of between 92% and 100%.

It is seen that communal bin households generated just 0.13kg/hh/wk of recyclable garden waste compared with 7.23kg/hh/wk from Acorn 1 households. On average residents throughout Cambridge create 2.51kg/hh/wk of recyclable garden waste.

Soil and turf are also classed as garden waste but are not allowable in green bins. This waste was only generated in low amounts across Cambridge (0.02kg/hh/wk) with around 22% ending up in green bins.

Figure 6.3.2.1. Distribution of garden waste within residual and recycling samples (kg/hh/wk)



6.3.3 Food Waste Capture

Residents are able to all forms of food waste in their green bins. Capture rates were seen to vary greatly across the samples taken. Food waste can broadly be divided into two types. Firstly 'home-compostable' which covers things like raw fruit and vegetable waste, egg shells, tea bags etc which could potentially be composted in standard compost bins. Non-home compostable food are generally cooked and prepared foods and plate scrapings which residents would not normally compost with their garden, fruit and vegetable wastes.

Overall capture rates for all food waste varied at between 9.3% in Acorn 5 up to 36% in Acorn 3. This represented an average figure of 21.4% for Cambridge. Acorn 1 households produced just 0.93kg/hh/wk of total food waste compared with 2.59kg/hh/wk from communal bin households. On average Cambridge residents are producing of 1.70kg/hh/wk of food waste.

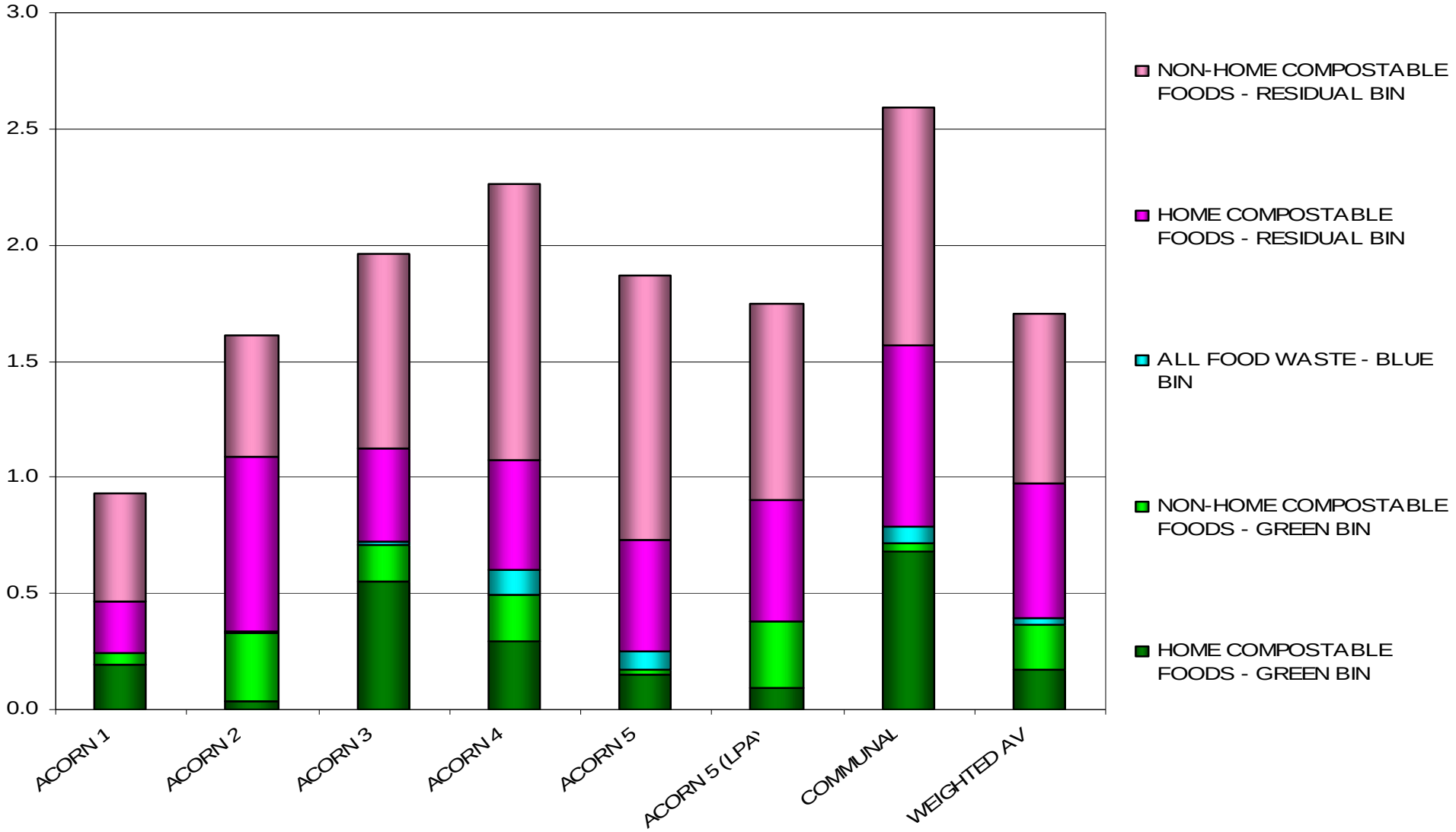
As well as differences in the levels and capture rates for food waste between the Acorn samples, there was a significant difference between the types of food being recycled. Home compostable food waste is generally less 'messy' than non-home compostable food waste and was seen to have capture rates of between 4.7% (Acorn 2) and 58.2% (Acorn 3) at an average of 23.1%. Conversely capture rates for non-home compostable food waste were lower at between 1.6% (Acorn 5) and 35.5% (Acorn 2); an average of 20%.

In terms of diversion solely through the green bin recycling it is seen that just 12.5% diversion is achieved by communal bin users compared with almost 54% for Acorn 1. Overall this is an average diversion of 23.1% which is very similar to that recorded for blue bins. Total diversion rates for the combined recycling collections are shown in section 7.

With the exception of communal bin users, all sample areas were seen to generate more non-home compostable food waste than home compostable food waste at average figures of 0.94kg/hh/wk and 0.76kg/hh/wk respectively. During the sorting of the waste it is the method to class some of the food waste as unidentifiable or unsortable. This is basically a degraded mixture of foods which are recyclable and are classified as non-compostable as will contain waste other than fruit and vegetable matter.

Figure 6.3.3.1 shows the distribution and levels of food waste throughout the residual and green bin containers. Overall, 0.58kg/hh/wk of home compostable and 0.75kg/hh/wk of non-home composable food waste is not being recycled in the green bins. This represents a total of 1.34kg/hh/wk of potentially recyclable material.

Figure 6.3.2.1. Distribution of food waste within residual and recycling samples (kg/hh/wk)



6.4 Green Bin Recycling Contamination

From Table 6.2.1 it has been shown that between 0.1% (Acorn 2) and 31.3% (communal bin users) of collected green bin recycling is due to contamination. Across Cambridge approximately 2.6% of green bin recycling waste was not compatible with the accepted materials, equating to 0.08kg/hh/wk. This section looks to breakdown the amounts and concentrations of various contaminants being placed into the green bin recycling waste in Cambridge.

Table 6.4.1 and Figures 6.4.1 and 6.4.2 show the proportions of contamination materials in each area.

Table 6.4.1: Percentage breakdown of contamination in green bin waste

% BREAKDOWN OF CONTAMINANTS	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
SOIL & TURF	0.00%	0.00%	0.00%	90.45%	0.00%	0.00%	0.00%	5.28%
NON-RECYCLABLE PAPER & CARD	0.00%	100.00%	0.65%	1.77%	1.31%	61.27%	27.50%	2.47%
PLASTICS	0.00%	0.00%	0.65%	0.00%	0.76%	0.00%	19.71%	0.66%
TEXTILES	100.00%	0.00%	0.00%	0.00%	34.71%	0.00%	7.07%	22.96%
GLASS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.70%	<0.01%
METALS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.79%	<0.01%
ALL OTHER WASTE	0.00%	0.00%	98.70%	7.78%	63.22%	38.73%	43.22%	68.63%
TOTAL CONTAMINATION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
CONTAMINATION KG/HH/WK	0.02	0.00	0.12	0.13	0.22	0.05	0.84	0.08
% CONTAMINATION	0.24%	0.11%	2.50%	4.67%	9.70%	1.64%	31.28%	2.55%

Figure 6.4.1: Contamination materials in green bin recycling

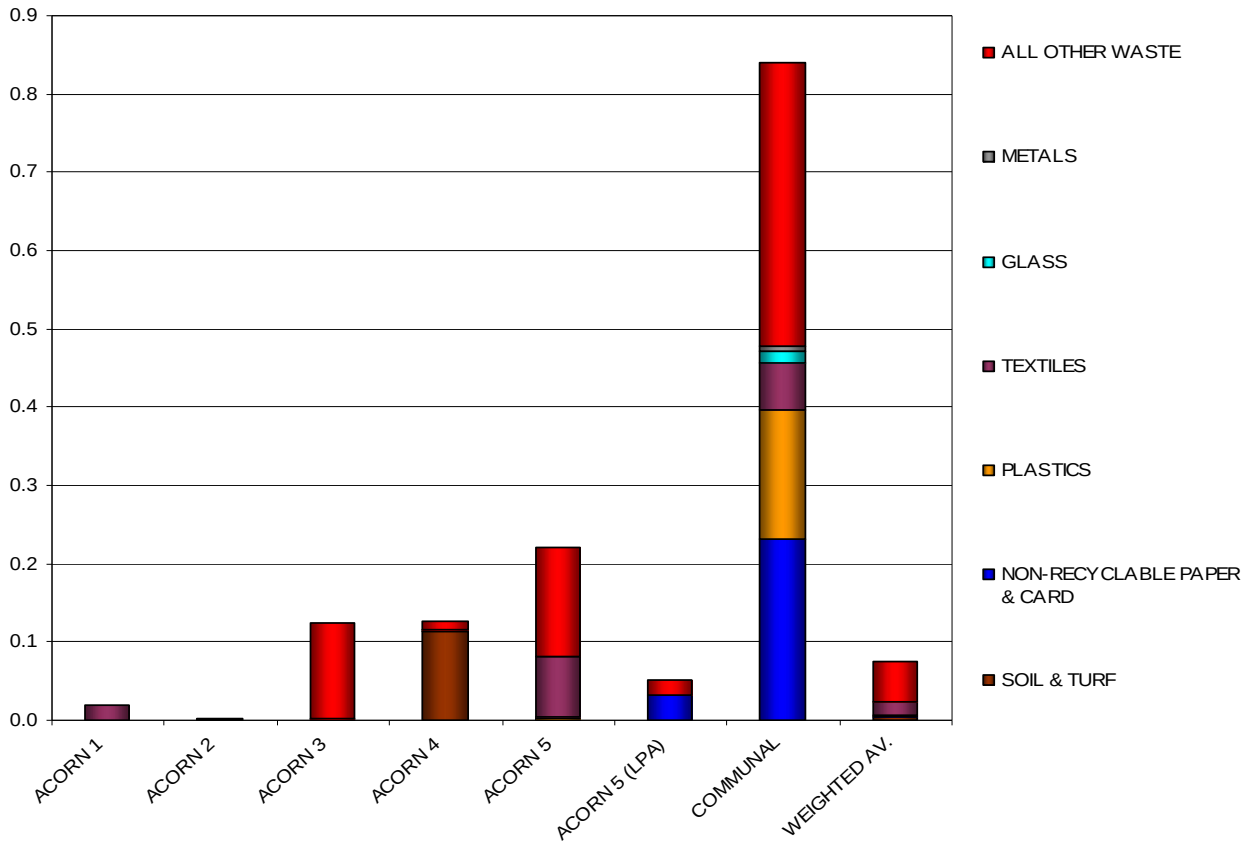
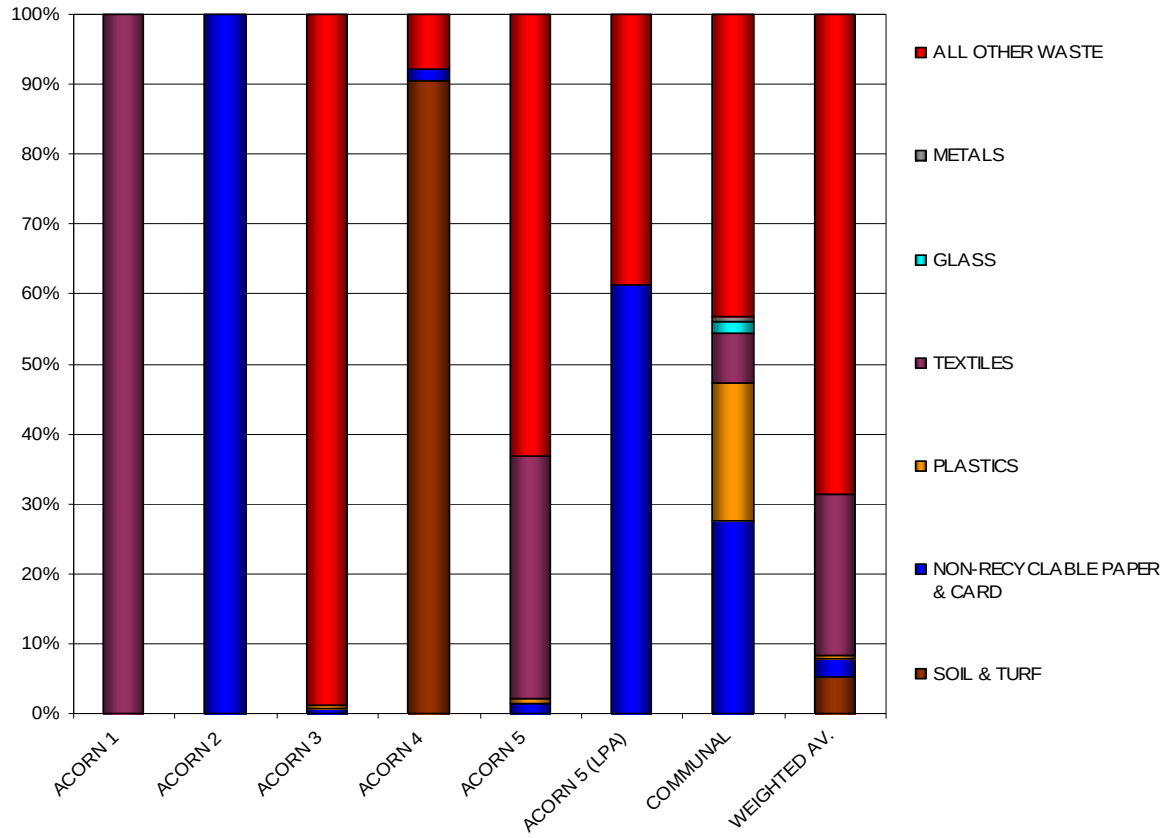


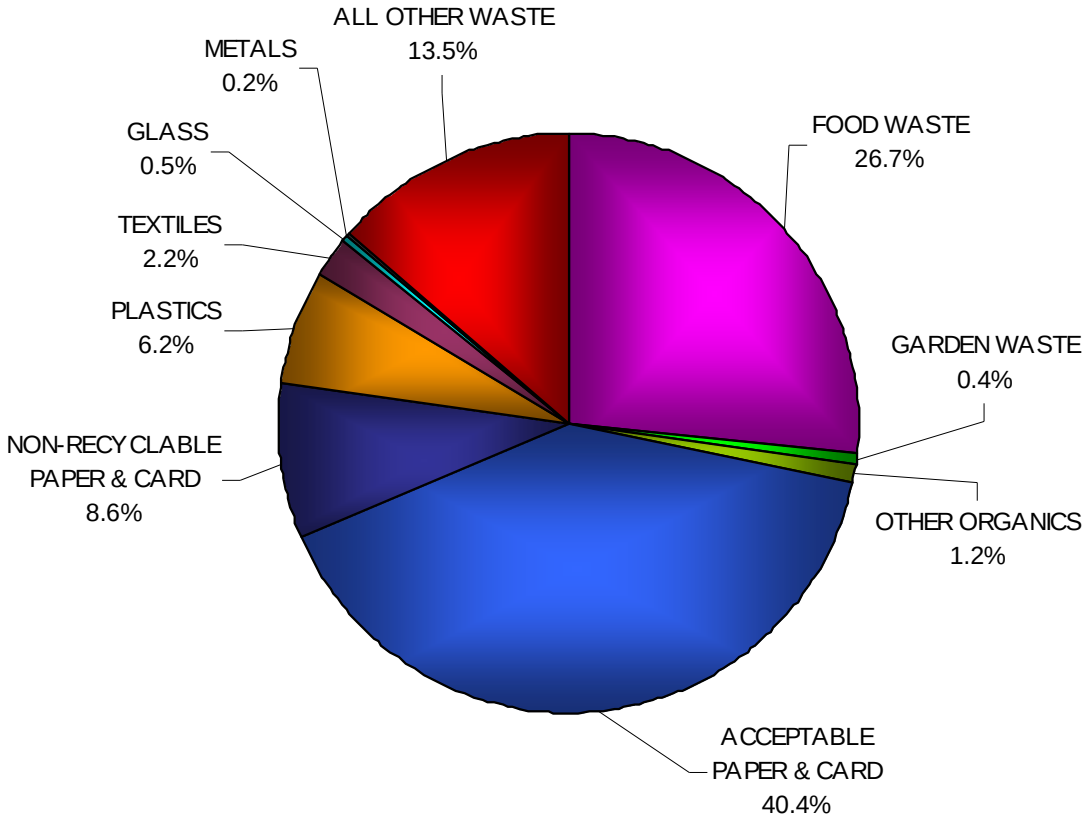
Figure 6.4.2: % breakdown of contaminants within green recycling bins



Overall it was seen that 68.8% of the contamination was due to miscellaneous other waste. This would be a mixture of general waste that can generally be considered to be residual waste. This material formed up to 99% of the contamination seen in Acorn 3 green bins. Up to 23% of contamination was due to textile waste. Around 35% of Acorn 5 green bin contamination was due to waste textiles. All of the contamination in Acorn 2 green bins was due to non-recyclable paper and card and over 90% of the contamination in Acorn 4 was due to soil and turf. Combined these wastes formed just under 8% of the contamination.

The composition of the organic recycling collected from households using communal bins was markedly different from all of the other samples. Of the 2.69kg/hh/wk presented up to 0.84kg/hh/wk or 31.3% was due to contaminants; this was far greater than any of the other samples. A wide range of contaminants including general residual waste, glass, metal and plastic were seen in these recycling bins and they appear to be used by residents as general waste disposal containers. These bins also contain significantly more paper and cardboard waste than other sample surveyed.

Figure 6.4.3 % breakdown of contaminants within green recycling bins from communal users



7) Overall Diversion through Recycling Collections

7.1 Total waste generation levels & diversion

Capture rates determine how much of a material that should be recycled actually is being recycled. Diversion rates show the percentage of total generated waste produced from an area that is being 'Diverted' via the available recycling stream(s).

Table 7.1.1 and Figure 7.1.1 show the total waste generation (residual, blue bin and green bin recycling) for each of areas sampled. Acorn 2 produced the lowest levels of total waste at 9.59kg/hh/wk with the households from Acorn 3 generating the most at 16.71kg/hh/wk. Across Cambridge it is estimated that the weekly output of kerbside waste is 12.48kg/hh/wk.

Table 7.1.2 and Figure 7.1.2 show the proportion of this total waste that is being diverted through the various kerbside recycling collections. Using the blue and green recycling bins, Cambridge residents are diverting an average of 46.8% of all waste generated at the kerbside. Residents from Acorn 1 were managing to divert almost 69% of their waste compared with 50% for Acorns 2 and 3, 42% for Acorn 4 and 32% for Acorn 5. The low performing Acorn 5 area residents also diverted around 50% of their waste with households using communal bins diverting around 34.5%.

Table 7.1.1: Average annual waste generation levels by Acorn (kg/hh/wk)

TOTAL KERBSIDE WASTE (KG/HH/WK)	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
RESIDUAL WASTE	4.20	4.66	7.93	6.50	9.80	5.06	8.33	6.36
BLUE BIN RECYCLING	2.36	3.07	3.83	2.95	3.09	2.52	3.80	3.16
GREEN BIN RECYCLING	7.66	1.86	4.95	2.71	2.27	3.13	2.69	2.96
TOTAL WASTE	14.22	9.59	16.71	12.16	15.17	10.71	14.82	12.48

Figure 7.1.1: Total waste generation levels by Acorn (kg/hh/wk)

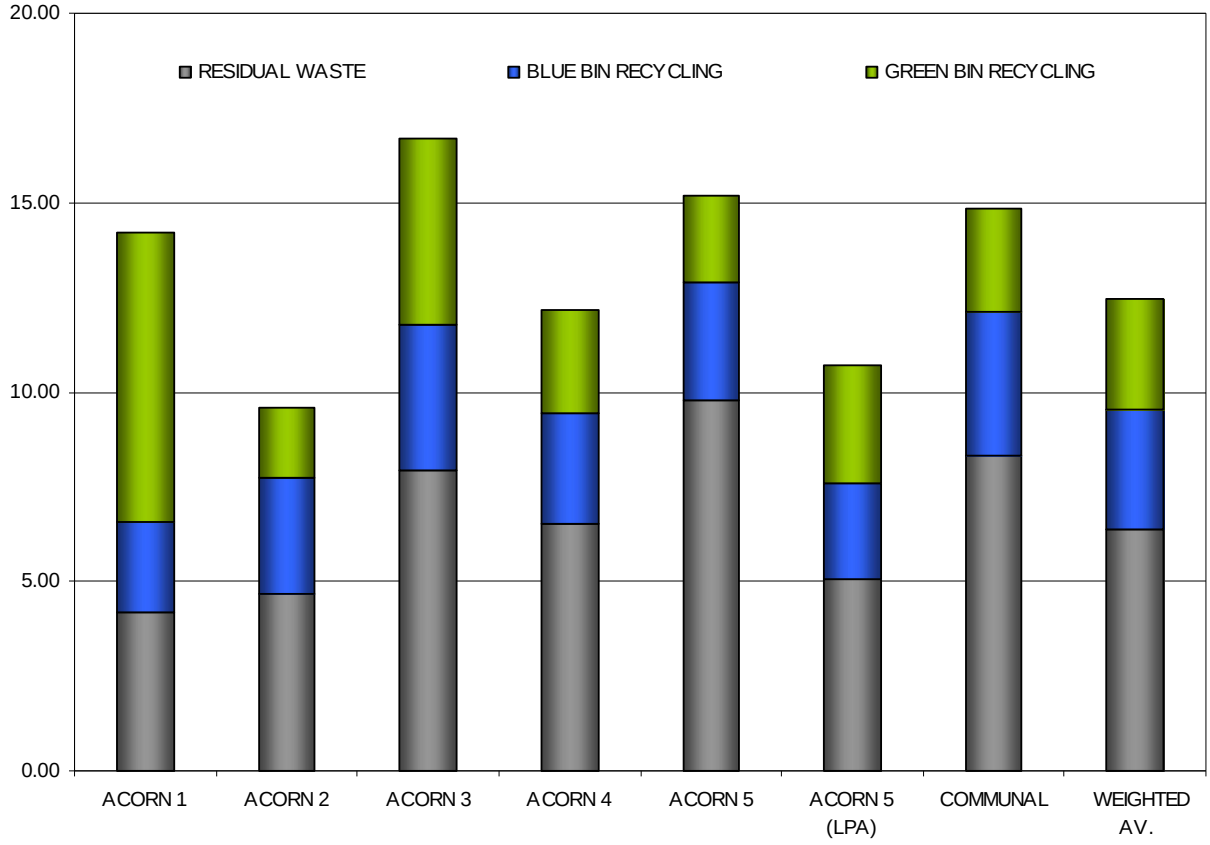
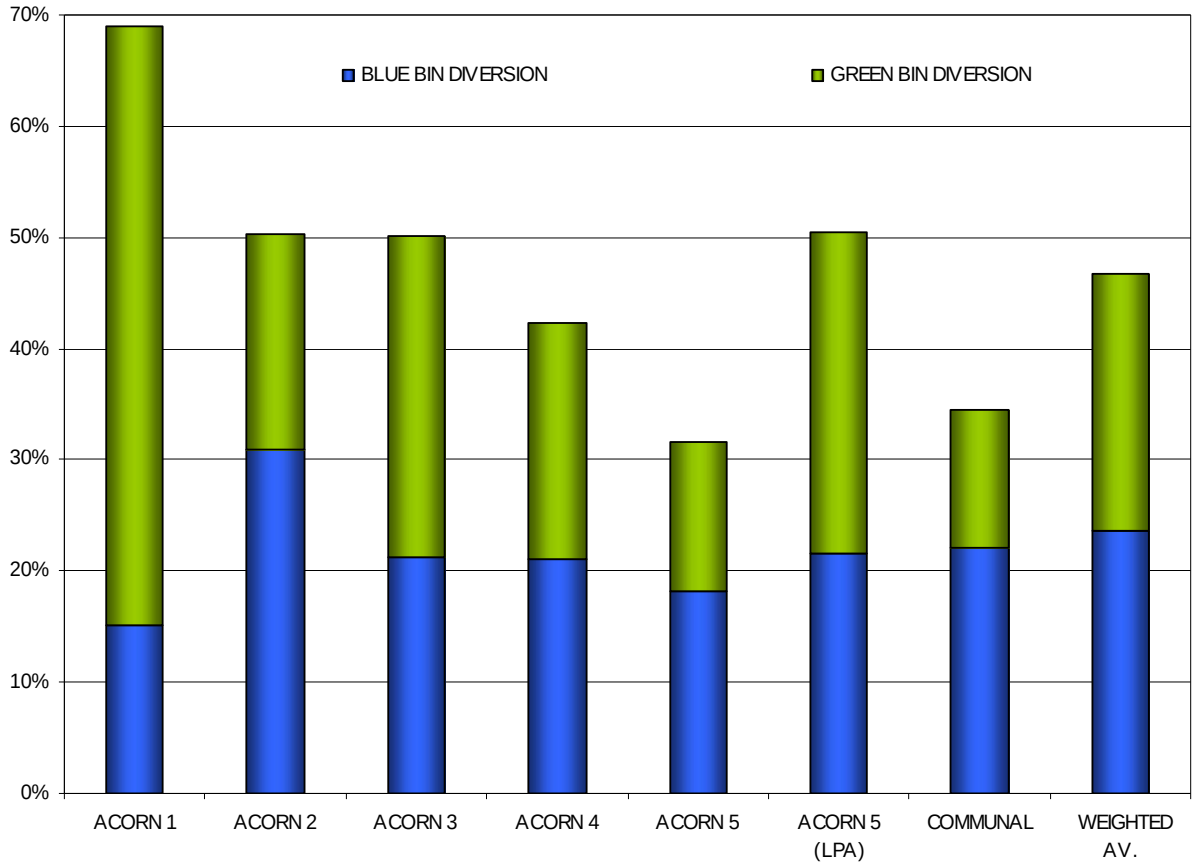


Table 7.1.2: Diversion rates (%) for individual recycling collections and overall

% DIVERSION	ACORN 1	ACORN 2	ACORN 3	ACORN 4	ACORN 5	ACORN 5 (LPA)	COMMUNAL	WEIGHTED AV.
BLUE RECYCLING BINS	15.19%	30.96%	21.27%	21.04%	18.11%	21.66%	22.01%	23.69%
GREEN RECYCLING BINS	53.76%	19.36%	28.89%	21.23%	13.54%	28.75%	12.45%	23.10%
TOTAL DIVERSION	68.96%	50.32%	50.16%	42.27%	31.65%	50.41%	34.46%	46.79%

Figure 7.1.2: Diversion rates (%) for individual recycling collections and overall



Current recycling figures for Cambridge suggest a waste diversion rate of 43.7%. Therefore weighted figures for the City during this survey show a level of around 3% above this rate and 1.8% above the aspirational target of 45% for 2012.

Data from this survey suggests a level of 331.9kg/hh/yr for residual waste and 651.1kg/hh/yr for total kerbside waste.

Were all of the currently recyclable materials being disposed of at the kerbside placed into the correct recycling bin then the maximum achievable diversion rate for Cambridge would be 65%.

Appendix 1: ACORN Category Classification[1].

ACORN 1 – WEALTHY ACHIEVERS – U.K. AVERAGE 23.3%
These are some of the most successful and affluent people in the UK. They live in wealthy, high status rural, semi-rural and suburban areas of the country. Middle-aged or older people predominate, with many empty nesters and wealthy retired. Some neighbourhoods contain large numbers of well-off families with school age children, particularly in the more suburban locations. These people live in large houses, which are usually detached with four or more bedrooms. Almost 90% are owner occupiers, with half of those owning their home outright. They are very well educated and most are employed in managerial and professional occupations. Many own their own business. Car ownership is high, with many households running two or more cars. Incomes are high, as are levels of savings and investments. These people are well established at the top of the social ladder. They enjoy all the advantages of being healthy, wealthy and confident consumers.
ACORN 2 – URBAN PROSPERITY – U.K. AVERAGE 13.3%
These are well educated and mostly prosperous people living in our major towns and cities. They include both older wealthy people living in the most exclusive parts of London and other cities, and highly educated younger professionals moving up the corporate ladder. This category also includes some well educated but less affluent individuals, such as students and graduates in their first jobs. The wealthier people tend to be in senior managerial or professional careers, and often live in large terraced or detached houses with four or more bedrooms. Some of the younger professionals may be buying or renting flats. The less affluent will be privately renting. These people have a cosmopolitan outlook and enjoy their urban lifestyle. They like to eat out in restaurants, go to the theatre and cinema and make the most of the culture and nightlife of the big city.
ACORN 3 – COMFORTABLY OFF – U.K. AVERAGE 28.1%
This category contains much of 'middle-of-the-road' Britain. Most people are comfortably off. They may not be wealthy, but they have few major financial worries. All life stages are represented in this category. Younger singles and couples, just starting out on their careers, are the dominant group in some areas. Other areas have mostly stable families and empty nesters, especially in suburban or semi-rural locations. Comfortably off pensioners, living in retirement areas around the coast or in the countryside, form the other main group in this category. Most people own their own home, with owner occupation exceeding 80%. Most houses are semidetached or detached. Employment is in a mix of professional and managerial, clerical and skilled occupations. Educational qualifications tend to be in line with the national average. This category incorporates the home-owning, stable and fairly comfortable backbone of modern Britain.
ACORN 4 – MODERATE MEANS – U.K. AVERAGE 13.2%
This category contains much of what used to be the country's industrial heartlands. Many people are still employed in traditional, blue-collar occupations. Others have become employed in service and retail jobs as the employment landscape has changed. In the better off areas, incomes are in line with the national average and people have reasonable standards of living. However, in other areas, where levels of qualifications are low, incomes can fall below the national average. There are also some isolated pockets of unemployment and long-term illness. This category also includes some neighbourhoods with very high concentrations of Asian families on low incomes. Most housing is terraced, with two or three bedrooms, and largely owner occupied. It includes many former council houses, bought by their tenants in the 1980s. Overall, the people in this category have modest lifestyles, but are able to get by.
ACORN 5 – HARD PRESSED – U.K. AVERAGE 21.7%
This category contains the poorest areas of the UK. Unemployment is well above the national average. Levels of qualifications are low and those in work are likely to be employed in unskilled occupations. Household incomes are low and there are high levels of long-term illness in some areas. Housing is a mix of low-rise estates, with terraced or semi-detached houses, and purpose built flats, including high-rise blocks. Properties tend to be small and there is much overcrowding. Over 50% of the housing is rented from the local Council or a housing association. There are a large number of single adult households, including many single Pensioners and lone parents. In some neighbourhoods, there are high numbers of black and Asian residents. These people are experiencing the most difficult social and economic conditions in the whole country, and appear to have limited opportunity to improve their circumstances.

[1] http://www.caci.co.uk/download.aspx?path=/libraries/document/394.pdf

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