



# Edith Cowan University

## Campus Waste Audits

Prepared for Edith Cowan University

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- Appendix C Detailed Waste Audit Data – Joondalup Campus
- Appendix D Detailed Waste Audit Data – Mount Lawley Campus
- Appendix E Detailed Waste Audit Data – South West Campus

# 1 Introduction

## 1.1 Background

Edith Cowan University (ECU) is Western Australia's second largest university with approximately 23,000 students. ECU has two campuses located in the Perth Metropolitan Area (Joondalup and Mount Lawley) and one regional campus located in the South West (Bunbury).

The Faculties and Services Department of ECU developed an Environmental Improvement Program (EIP) in 2008. The objective of this program is to *"reduce waste to landfill as a result of activities under the control of Facilities and Services."*

In 2008, Cardno (WA) Pty Ltd (Cardno) prepared a Waste Management Strategy (WMS) for the three ECU campuses. The objective of each WMS was to review the current waste management practices at the campus, and to develop some broad strategies for ECU to improve the efficiency and sustainability of their waste management services based on the following areas:

- Avoidance and Reuse;
- Recycling;
- Waste Education and Awareness; and
- Waste Management Service Packages.

To help ECU achieve the objective identified within their EIP, and to obtain data which can be used as a baseline to assess the effectiveness of strategies implemented as part of the WMS, Cardno was commissioned to undertake a waste audit at each of the three campuses.

### 1.1.1 Environmental Improvement Plan

The EIP was developed in 2008, and subsequently updated in September 2009. The following targets were developed to work towards the EIP's objective to reduce waste to landfill as a result of activities under the control of Facilities and Services:

- Reduce waste to landfill (tonnes) by 5% per annum;
- Reduce recyclables to landfill (tonnes) by 5% per annum;
- Establish measures of waste to landfill by 2010; and
- Establish a measure of recycled materials by 2010.

Performance Indicators were established to assess compliance with these targets. The Performance Indicators included the:

- Percentage of recyclable waste sent to landfill per annum;
- Tonnes sent to landfill per annum; and
- Tonnes recycled per annum.

## 1.2 Project Objectives

The primary objective of the audit was to establish a baseline at each of the campuses in relation to the refuse that is currently being disposed of to landfill. The baseline will be used to monitor future performance of each of the three campuses, in particular, in relation to their performance against the waste reduction targets established within the EIP.

To establish the baseline the following characteristics of the refuse stream from each campus were examined during the audit:

1. The composition of the refuse generated from Buildings and External bins at each campus;

2. The quantity of waste generated annually at each campus; and
3. The quantity of recyclables currently being sent to landfill from Buildings and External bins around campus.

### **1.3 Scope of Report**

To satisfy the objectives of the study, the report has been broken down into the following chapters:

- Chapter 2: Waste Collection Services;
- Chapter 3: Waste Audit Methodology;
- Chapters 4-7: Audit Results;
- Chapter 8: Amalgamated Data and Analysis; and
- Chapter 9: Summary and Conclusions.

## 2 Waste Collection Services

This section outlines the key waste collection services for the metropolitan campuses (Joondalup and Mount Lawley) and the South West campus.

### 2.1 Metropolitan Campuses

Waste management services at the Joondalup and Mount Lawley campuses are coordinated by ISS Cleaning (ISS) who are contracted by the Facilities and Services Department. Facilities and Services are responsible for supplying waste management services for the following waste streams:

- Refuse;
- Recyclables;
  - Comingled;
  - Paper; and
  - Cardboard.

#### 2.1.1 Refuse

Small refuse bins are provided within offices, classrooms and lecture theatres and are emptied by ISS cleaners daily. Larger, approximately 60L bins, are located in common areas within buildings and on campus grounds. These bins are lined with black plastic bags and are collected and relined by ISS on a daily basis.

All refuse is disposed of into 3 – 4.5m<sup>3</sup> front lift bins, predominantly by the ISS cleaners. These bins are provided by SITA Environmental Solutions (SITA) and are emptied on a daily basis.

#### 2.1.2 Recyclables

Comingled recycling bins are provided in kitchens situated in the two main administration buildings (Buildings 1 and 2), the library (Building 31) and Health and Wellness building (Building 21) at the Joondalup campus. The comingled recyclables kitchen bins have not been extensively introduced at the Mount Lawley campus. Kitchen bins allow for the disposal of:

- Paper takeaway cups (Liquid Paper Board);
- Glass bottles and jars;
- Plastic bottles;
- Food tins; and
- Milk and juice cartons.

ISS cleaners collect the comingled kitchen bin recyclables and deposit these materials into 120L or 240L Mobile Garbage Bins (MGBs) on a daily basis.

There are also a number of recycling stations located around the campus grounds in proximity to cafeterias. These contain three 120L comingled recyclables MGBs and one 120L refuse MGB. The comingled MGBs are collected by VISY on a weekly basis, while the refuse MGBs are emptied daily, similar to the other refuse bins.

Paper and cardboard recycling options are also provided to staff at the metropolitan campuses. Desk-side paper recycling boxes are provided to dispose of mixed paper. These are emptied into internal MGBs located centrally within buildings. Flattened cardboard may also be placed beside these MGBs. The bins are removed weekly by the cleaners and placed at designated points around campus for collection by Western Recycling. Cardboard is moved daily by ISS cleaners to front lift bins, which are emptied on a weekly basis by SITA.

## 2.2 South West Campus

Waste management services at the South West campus are directly coordinated by the Facilities and Services Department. The South West ECU directly employs cleaners to collect and manage waste streams on campus, rather than contracting such activities out. Common waste management services are provided to Faculties and Schools at the campus that deal with the following waste streams:

- Refuse;
- Recyclables;
  - Comingled;
  - Paper; and
  - Cardboard.

### 2.2.1 Refuse

Consistent with the metropolitan campuses, small refuse bins are provided within offices, classrooms and lecture theatres at the South West campus and are emptied by the cleaners daily. Larger, approximately 60L bins, have been placed in common areas within buildings. These bins are lined with black plastic bags and are collected and relined by ECU cleaners on a daily basis.

External bins are located around the campus to provide refuse disposal options outside of buildings. All refuse is disposed into 240L MGBs supplied by the City of Bunbury. These are collected three times a week.

### 2.2.2 Recyclables

Desk-side paper recycling boxes are provided for staff at ECU's South West campus to dispose of mixed paper for recycling. These are emptied into larger boxes located in common areas and these larger boxes are subsequently emptied by ECU cleaners into 240L comingled recycling MGBs on a weekly basis. While these MGBs accept comingled recyclables, they are generally filled with paper.

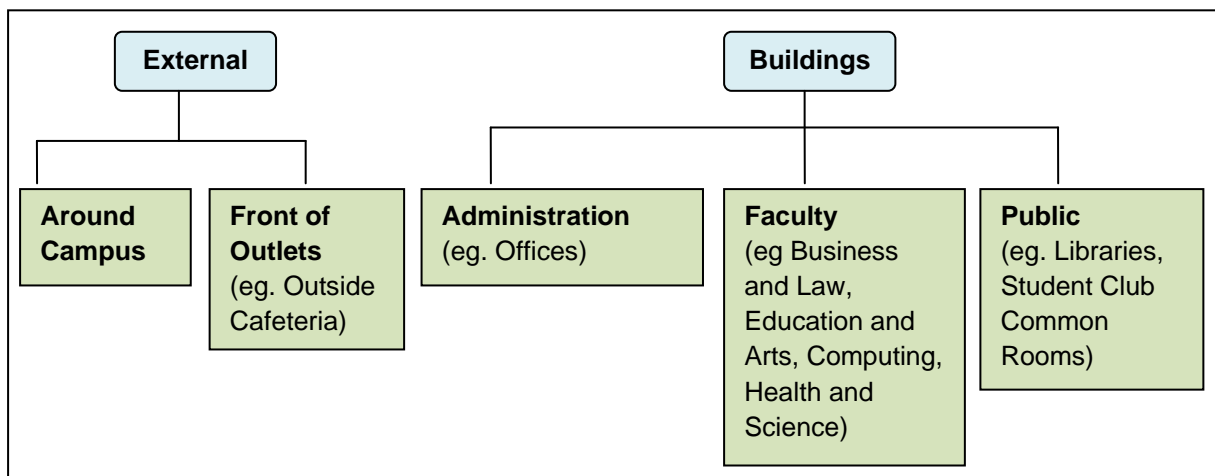
### 3 Methodology

This section details the methodology that was utilised in undertaking the waste audit of the ECU campuses.

#### 3.1 Sample Identification

Prior to conducting the audit, the key waste generation sources at each of the campuses were classified as either External or Buildings. External bins were categorised as either 'Front of Outlets', which included bins located outside cafeterias, or 'Around Campus' which included bins located at other areas on campus.

Buildings were classified in accordance with their main function or activity, and were grouped as either 'Public' (including libraries and computer labs), 'Administration' (including offices) or 'Faculty' (including lecture theatres and teaching blocks). The division of campuses into the various sources and categories for the purpose of the waste audit is outlined below in **Figure 3-1**.



**Figure 3-1 Waste Sources and Categories**

Using the knowledge of ECU staff, specific external bins from both categories (Around Campus and Front of Outlets) were selected from each campus for auditing. In addition, buildings from each category (Administration, Faculty, Public) were selected from each campus to be included in the audit. These bins and the buildings selected are shown in **Table 3-1**.

**Table 3-1 Classification of Waste Sources**

Campus	Source	Category	Building / Location
Joondalup	External	Around Campus	-
		Front of Outlets	BC, Aroma, C6
	Buildings	Public	E-lab, 31
		Administration	18, 1
		Faculty	19, 21, 4, 30, 8, 5, 17, 2, 10, 7
Mount Lawley	External	Around Campus	-
		Front of Outlets	Aroma, Cluster
	Buildings	Public	E-lab, 8
		Administration	3
		Faculty	18, 17, 2, 16, 14, 1, 15
South West	External	Around Campus	-
		Front of Outlets	Outside cafe
	Buildings	Public	3
		Administration	1, 7
		Faculty	2, 5, 6
		Building 4*	-

Note: \* - Building 4 has been categorised separately as the activities carried out within the building do not fall into other category definitions.

As can be seen in **Table 3-1**, no building or description of location is given for the bins classified as Around Campus. This is due to the bins being located in areas around campus, however not directly in front of any building or outlet. The building/location name given for bins in the Front of Outlets category is the name of the cafeteria or outlet each bin was located in front of.

### 3.2 Sample Collection

Cardno provided an estimation of the number of bags to be collected at each campus from each source, based on previous waste audit experience. This data was used by the cleaners to approximate the quantity of waste required from each source and category for the purpose of the audit.

The waste to be audited at each campus was collected by the cleaners as part of their usual service, as summarised in **Section 2**. As instructed by the ECU Facilities and Services Department staff, the cleaners left these bags at the designated area and separated them into the relevant categories (as identified in **Table 3-1**).

The waste collected for the audit was labelled with the source (Location or Building number) by the cleaners to assist in the data recording exercises.

### 3.3 Waste Audit Layout, Equipment and Team

At each campus an enclosed area, such as maintenance sheds or storage areas, were designated as the sorting area for the audit. As mentioned previously, the collected samples were placed around the sorting area within the relevant predetermined categories.

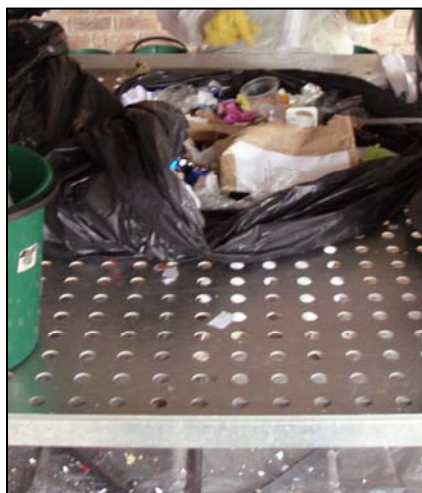
The waste audit table was situated in the middle of the sorting area and surrounded by the various designated receptacles for each of the materials listed within the Waste Classification System. Materials that were large in size and/or high in volume were designated 120L MGBs as receptacles for the audit. The remaining materials were all designated 10L buckets. The layout of the waste sorting area is shown below in **Plate 1**.

The waste audit table was specifically designed with 20mm diameter holes on its surface to allow small materials to pass through the table. Materials that passed through these holes were swept up at the end of each audit and were classified as Fine Residues <20mm. The edges of the surface of the table are raised to contain the materials on the table. The waste audit table is shown below in **Plate 1** and **Plate 2**.

A digital weighing scales with a range of 10 grams to 150kg was utilised to record to measurements during the auditing process. The scale also had a built in spirit level to ensure that the weighing bed was flat when recording weights. The digital scale utilised during the ECU campus audits is shown in **Plate 3**.



**Plate 1 Waste Sorting Area**



**Plate 2 Waste Audit Table**



**Plate 3 Digital Weighing Scales**

The Waste Audit Team was headed by a Lead Auditor (Ronan Cullen) and an Audit Supervisor (Michelle Kent). The waste audit team also included members of the ECU Facilities and Services Department staff.

### 3.4 Auditing Technique

This section outlines the process that was undertaken at each of the campuses to complete the audit including sorting, the waste classification system utilised and the disposal of the waste materials audited.

#### 3.4.1 Sorting

The sorting process was conducted according to the various sources and categories as outlined in **Figure 3-1**. Individual bags of waste from the particular sources were weighed on the digital scales prior to being opened on the waste auditing table. The waste was then manually sorted on the table in accordance with the Waste Classification System (**Appendix A**) that was devised for the project. The sorted materials were then placed into designated receptacles.

During the audit, some of the receptacles would fill and at this stage, they were weighed and the data recorded prior to being disposed within the designated disposal point. Once all, or the required number of bags from a particular source has been audited, the weight of each of the receptacles containing waste was recorded. The Fine Residue <20mm material under the waste audit table was then swept up, placed into buckets, weighed and recorded. Once their weights were recorded the receptacles were emptied into the disposal receptacle (MGB or bin bags) or taken directly to the disposal point.

At the completion of the waste audit, the MGBs and a number of buckets were weighed while empty to determine the average weight of the receptacles. This data was used during the data entry phase of the project to calculate the tare weight of the waste within each of the receptacles recorded during the audit.

#### 3.4.2 Waste Classification System

The Waste Classification System adopted for the waste audit was predominantly based upon the Australian Waste Database Codes (Cooperative Research Centre for Waste Management and Pollution Control, 1993). This database was adjusted to include some additional entries to provide greater detail for use in the compositional analysis. These alterations were based upon a literature review of waste classification systems utilised within Western Australia and internationally, including:

- Department of Environment and Conservation (2008) Kerbside Waste and Recycling Audit Manual; Perth, Western Australia;
- Environmental Protection Agency (2006) Non-household Waste Characterisation Survey Manual; Co. Wexford, Ireland;
- Environmental Protection Agency (2005) Programme for Municipal Waste Characterisation Surveys; Co. Wexford, Ireland; and
- Canadian Council of Ministers of the Environment – Waste Characterization Sub Committee (1999) Recommended Waste Characterization Methodology for Direct Waste Analysis Studies in Canada; Ontario, Canada.

The Waste Classification System devised and utilised for this waste audit is provided in **Appendix A** and outlines examples of the various materials classified and also the waste stream that each material has been classified within for the purpose of this study.

### 3.4.3 Disposal of Sorted Waste

Once sorted and weighed, the waste was transferred to the designated refuse disposal points. At the Joondalup campus, this involved transferring the waste into 120L MGBs which were then emptied into front lift bins. Waste at the Mount Lawley campus was put into black plastic bags and left beside the waste sorting area for collection by the cleaners. At the South West campus, the waste was deposited into 240L MGBs for collection through the waste collection service provided by the City of Bunbury.

## 3.5 Occupational Health and Safety

A project specific Occupation Health and Safety Plan (OHS Plan) was prepared for the ECU waste audits. The OHS Plan provided an analysis of the potential OHS hazards and risks relating to the audit and provides management measures to ensure that these were all controlled to an acceptable level. The OHS Plan is attached in **Appendix B**.

Prior to the commencement of the audit, the Lead Auditor inducted the team to the project and the days ahead. During the induction, the Team were informed of the potential hazards associated with the works and how these would be managed to ensure that exposure to risks was mitigated. Refresher inductions were undertaken at the beginning of each subsequent day of auditing.

Throughout each day of auditing, all sorters were provided with access to the required Personal Protection Equipment (PPE) which included heavy duty gloves, safety goggles, cover-alls and dust masks. In addition, a first aid kit was on site for use, if required.

## 3.6 Data Analysis

All of the compositional data collected during the waste audits was entered into Microsoft Excel spreadsheets. Once entered, all data was checked to ensure the integrity of the digitised data. Data for each of the sources and categories at each of the three campuses audited were represented in their own separate spreadsheet, and relevant compositional analysis undertaken and shown in Tables and Pie-charts. In addition, the compositional data for the various sources audited (External and Buildings) was amalgamated for each campus to give an average composition of the waste stream currently arising from each of these sources. The detailed compositional breakdown for each of the sources and categories audited are presented in Tables and Figures contained within **Appendix C**.

## 4 Audit Results

The following section outlines the findings of the quantitative and compositional analysis phases of the waste audit data collected on the refuse stream from each of the campuses. The waste audit data was initially broken down in relation to the three specific campuses that were audited, including:

- Joondalup campus (Tuesday);
- Mount Lawley campus (Wednesday); and
- South West campus (Thursday).

The methodology used for the collection and reporting of this data is described below.

### 4.1 Presentation of Audit Data

**Sections 5, 6 and 7** present the audit results from each source at the three campuses. Quantitative data is presented for each source and category. The compositional data from each of the categories has been amalgamated and only the compositional breakdown for each source is presented. The Tables and Figures illustrate the weight recorded for each material type and the corresponding percentage value of the total sample. The compositional breakdown of each category at the three campuses is given within the detailed data report in **Appendix C**.

Further information on the quantitative and compositional data is given in the following Sections.

#### 4.1.1 Quantitative

At each campus, the waste was classified into five different categories (Around Campus, Front of Outlets, Administration Buildings, Faculty Buildings, and Public Buildings) as described in **Section 3.1**. The weight of each of the sample bags within each source and category was recorded during the audit. This data identified how many bags were collected from each category on the day of the audit and the average weight per bag from that source. Subsequently, this data was used to project annual waste volumes generated at each of the campuses.

At the Joondalup and Mount Lawley campuses, the samples audited were from selective external bins and buildings as decided by the ECU Facilities and Services staff. At the South West campus, all waste generated from all buildings and outdoor bins was audited. The composition of the bags not collected/audited has been assumed to be similar to those which were sorted as part of the audit.

#### 4.1.2 Compositional

The composition of the waste sampled from each of the categories mentioned above was initially analysed by material type, in accordance with the Waste Classification System devised for the study. These material types were then grouped into key material groupings including:

- Paper;
- Compostable Organics;
- Other Organics;
- Glass;
- Plastics;
- Ferrous;
- Non-ferrous;
- Hazardous;
- Earth based;
- Residues; and
- Miscellaneous.

Examples of the various materials that are contained within each of the material groupings are shown in the Waste Classification System (**Appendix A**).

The material types have also been grouped into the four key waste streams: Recyclable, Compostable, Hazardous and Refuse. The classification of each material type into these streams is also shown in the Waste Classification System (**Appendix A**).

## 5 Joondalup Campus Audit Results

This section presents the quantitative and compositional data collected during the audit at the Joondalup campus. To simplify the results, the results from each category have been amalgamated to form a single data set for each source (External and Buildings). The compositional data from each category is given in the detailed report contained in **Appendix C**.

### 5.1 Quantitative

The number of bags collected from each source and category and the average bag weight is shown in **Table 5-1**. Due to time constraints, not all of the bags delivered by the cleaners to the waste audit area were able to be sorted. However, the weight of these bags was still recorded. The results shown in **Table 5-1** incorporates both the bags which were sorted (composition given in **Section 5.2**) and those which were not sorted. **Table 5-1** also shows the number of bags generated from each source and category on a daily basis.

**Table 5-1 Average weight of samples from sources and categories at Joondalup campus**

Source	Category	Building	Number of bins/bags	Average weight (kg)
External	Around Campus	-	7	1.14
	Front of Outlets	BC	3	0.67
		Aroma	2	1.53
		C6	3	0.84
Buildings	Administration	18	8	1.46
		1	12	2.54
	Faculty	19	10	2.67
		21	21	2.07
		4	4	1.23
		30	2	2.36
		8	7	1.87
		5	6	1.25
		17	5	1.47
		2	17	1.10
		7	2	1.80
		10	2	2.41
	Public	E-lab	5	1.15
		31	23	1.66

Based on the data recorded during the audit, it was identified that the average weight of bags from external bins was 1.05kg. The average weight of bags from buildings was identified to be 1.75kg.

### 5.2 Compositional

#### 5.2.1 External

**Table 5-2** and **Figure 5-1** show the compositional breakdown of the refuse from External sources which was achieved through the amalgamation of the Around Campus and Front of Outlets audit data at the Joondalup campus.

Table 5-2 Composition of External refuse at the Joondalup campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.04	0.28%
Magazines	A02	0.16	1.10%
Packaging	A03	0.80	5.40%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.22	1.50%
Liquid Paper Board	A06	1.49	10.04%
Disposables	A07	0.72	4.86%
Office Paper	A08	0.26	1.77%
Composite mainly Paper	A09	0.33	2.24%
<b>SUBTOTAL - PAPER</b>		<b>4.05</b>	<b>27.21%</b>
Food/Kitchen	B01	1.90	12.78%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>1.90</b>	<b>12.78%</b>
Wood Packaging	C011	0.03	0.21%
Other Wood	C012	0.00	0.01%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.89	6.01%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.93</b>	<b>6.23%</b>
Glass Packaging	D01	1.87	12.59%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>1.87</b>	<b>12.59%</b>
PET	E01	1.87	12.59%
HDPE	E02	0.00	0.00%
PVC	E03	0.14	0.97%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.72	11.58%
PP	E05	0.35	2.38%
Polystyrene	E06	0.45	3.05%
Composite mainly Plastic	E07	0.11	0.77%
Other Rigid Plastic	E08	0.16	1.10%
Other Plastic	E09	0.12	0.83%
<b>SUBTOTAL - PLASTIC</b>		<b>4.95</b>	<b>33.27%</b>
Steel Packaging	F01	0.15	1.02%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.15</b>	<b>1.02%</b>
Aluminium Cans	G011	0.79	5.33%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.79</b>	<b>5.33%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.00	0.00%
Miscellaneous	Misc	0.23	1.57%
<b>TOTAL - ALL MATERIALS</b>		<b>14.89</b>	<b>100.00%</b>

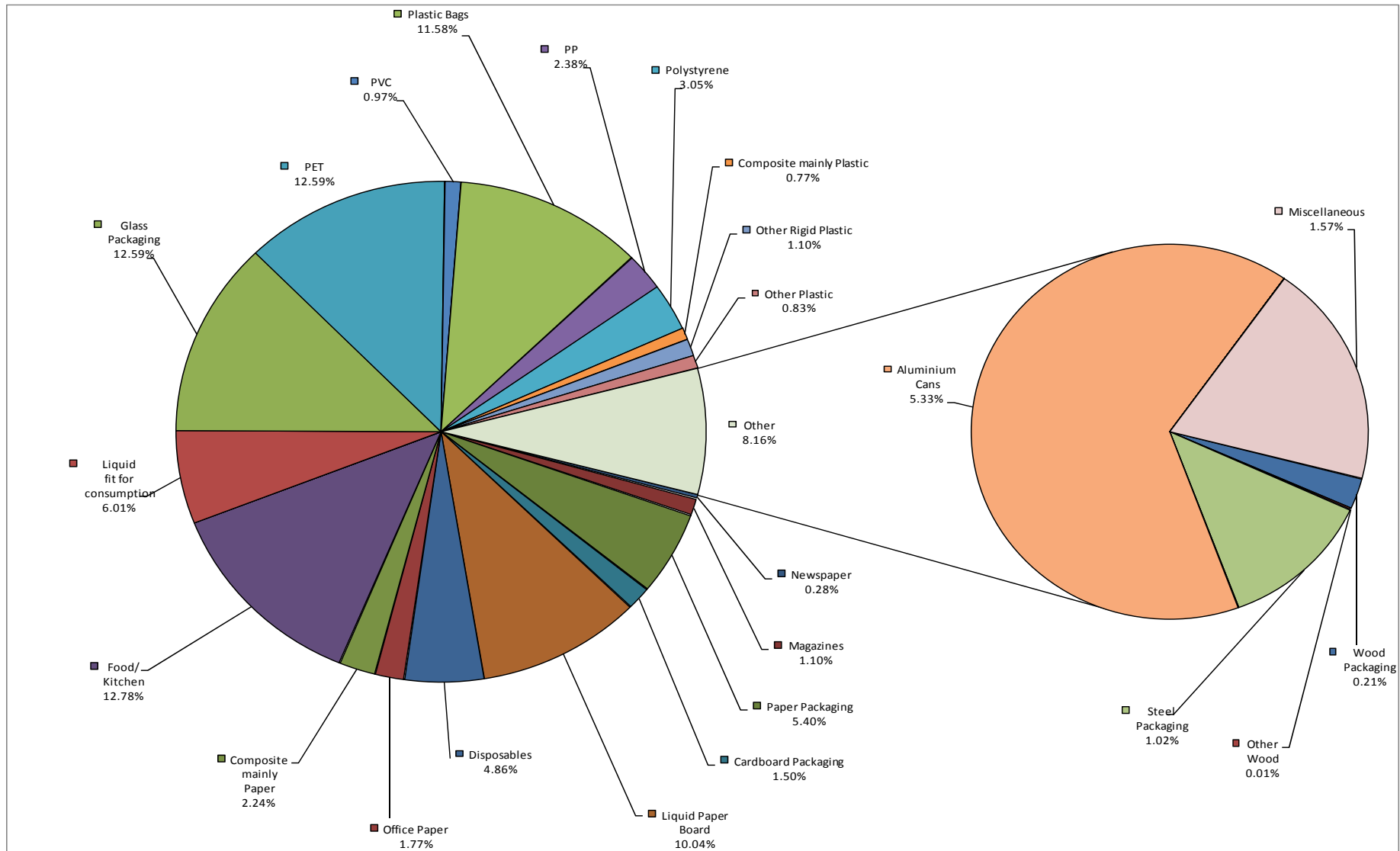
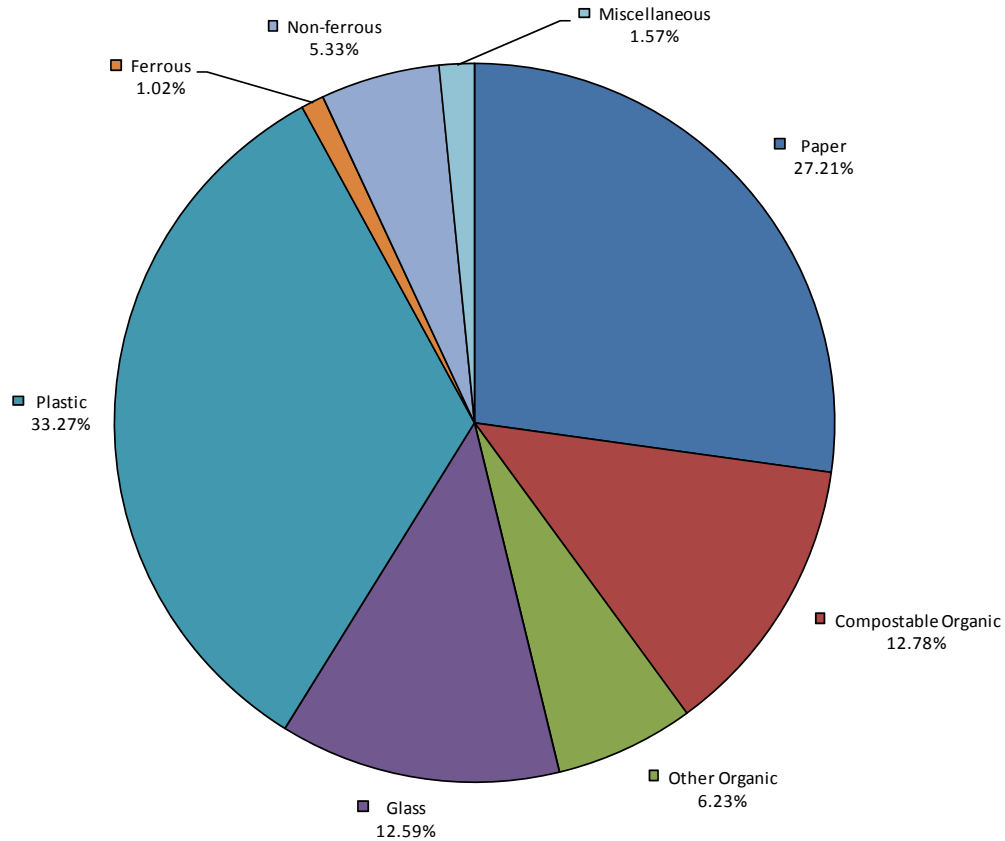


Figure 5-1 Composition of External refuse at the Joondalup campus

In the audited sample from External sources at the Joondalup campus, PET plastic, glass packaging and food/kitchen waste materials each made up approximately 13% of the refuse stream. In addition, plastic bags represented 12% and liquid paper board 10% of the total weight sampled.

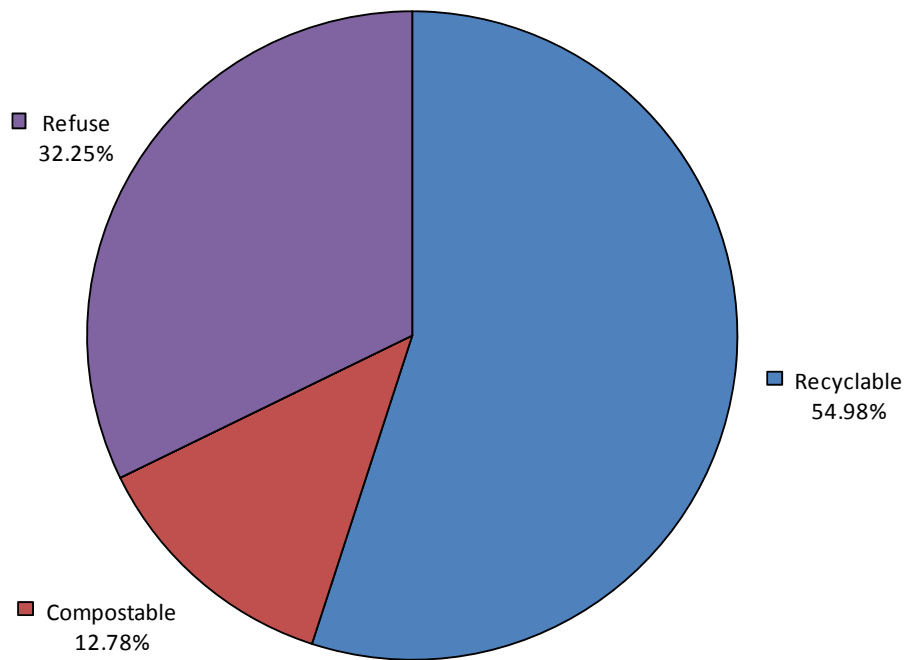
The compositional breakdown of refuse from External sources into material groupings is shown in **Figure 5-2**.



**Figure 5-2** Material groupings of External refuse at the Joondalup campus

As can be seen in **Figure 5-2**, the largest material group identified within the refuse stream was plastic at 33% of the total weight sampled. Paper made up the next largest fraction of the refuse stream at 27%, followed by compostable organics and glass which both represented 13%.

The breakdown of materials into the key waste streams, in accordance with the Waste Classification System, is shown in **Figure 5-3**.



**Figure 5-3 Key Waste Streams of External refuse at the Joondalup campus**

Recyclable materials made up 55% of the waste audited from External bins, which means that the majority of the material could potentially be recovered through the introduction of a comingled collection service. Compostable materials represented approximately 13% of the waste stream and materials classified as refuse made up 32%.

### 5.2.2 Buildings

For the purpose of this report, all the Building categories were amalgamated to form one data set from the Building source. Detailed data on all Building categories is provided within **Appendix C**. **Figure 5-4** shows the compositional breakdown of refuse from the Building source at the Joondalup campus by material type.

**Table 5-3 Composition of Building refuse from the Joondalup campus**

<b>MATERIALS</b>	<b>CODE</b>	<b>Weight (kg)</b>	<b>%</b>
Newspaper	A01	4.30	2.12%
Magazines	A02	3.40	1.68%
Packaging	A03	6.42	3.17%
Corrugated Cardboard	A04	4.96	2.45%
Cardboard Packaging	A05	4.09	2.02%
Liquid Paper Board	A06	9.68	4.78%
Disposables	A07	19.66	9.70%
Office Paper	A08	29.00	14.31%
Composite mainly Paper	A09	1.64	0.81%
<b>SUBTOTAL - PAPER</b>		<b>83.16</b>	<b>41.03%</b>
Food/Kitchen	B01	42.27	20.86%
Garden Waste	B02	0.58	0.29%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>42.85</b>	<b>21.14%</b>
Wood Packaging	C011	0.03	0.02%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.63	0.31%
Leather	C03	0.02	0.01%
Rubber	C04	0.03	0.02%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	16.99	8.38%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>17.71</b>	<b>8.74%</b>
Glass Packaging	D01	3.72	1.83%
Other Glass	D02	0.09	0.05%
<b>SUBTOTAL - GLASS</b>		<b>3.81</b>	<b>1.88%</b>
PET	E01	10.98	5.42%
HDPE	E02	1.27	0.62%
PVC	E03	0.68	0.33%
LDPE	E041	0.20	0.10%
Plastic Bags	E042	12.65	6.24%
PP	E05	2.79	1.38%
Polystyrene	E06	2.58	1.27%
Composite mainly Plastic	E07	0.49	0.24%
Other Rigid Plastic	E08	1.45	0.71%
Other Plastic	E09	5.24	2.58%
<b>SUBTOTAL - PLASTIC</b>		<b>38.32</b>	<b>18.91%</b>
Steel Packaging	F01	2.38	1.17%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.24	0.12%
<b>SUBTOTAL - FERROUS</b>		<b>2.62</b>	<b>1.29%</b>
Aluminium Cans	G011	4.91	2.42%
Other Non-Ferrous	G02	0.16	0.08%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>5.07</b>	<b>2.50%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.02	0.01%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.06	0.03%
Other Hazardous	H06	0.01	0.01%
E-Waste	H07	0.20	0.10%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.30</b>	<b>0.15%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	2.64	1.30%
Miscellaneous	Misc	6.20	3.06%
<b>TOTAL - ALL MATERIALS</b>		<b>202.68</b>	<b>100.00%</b>

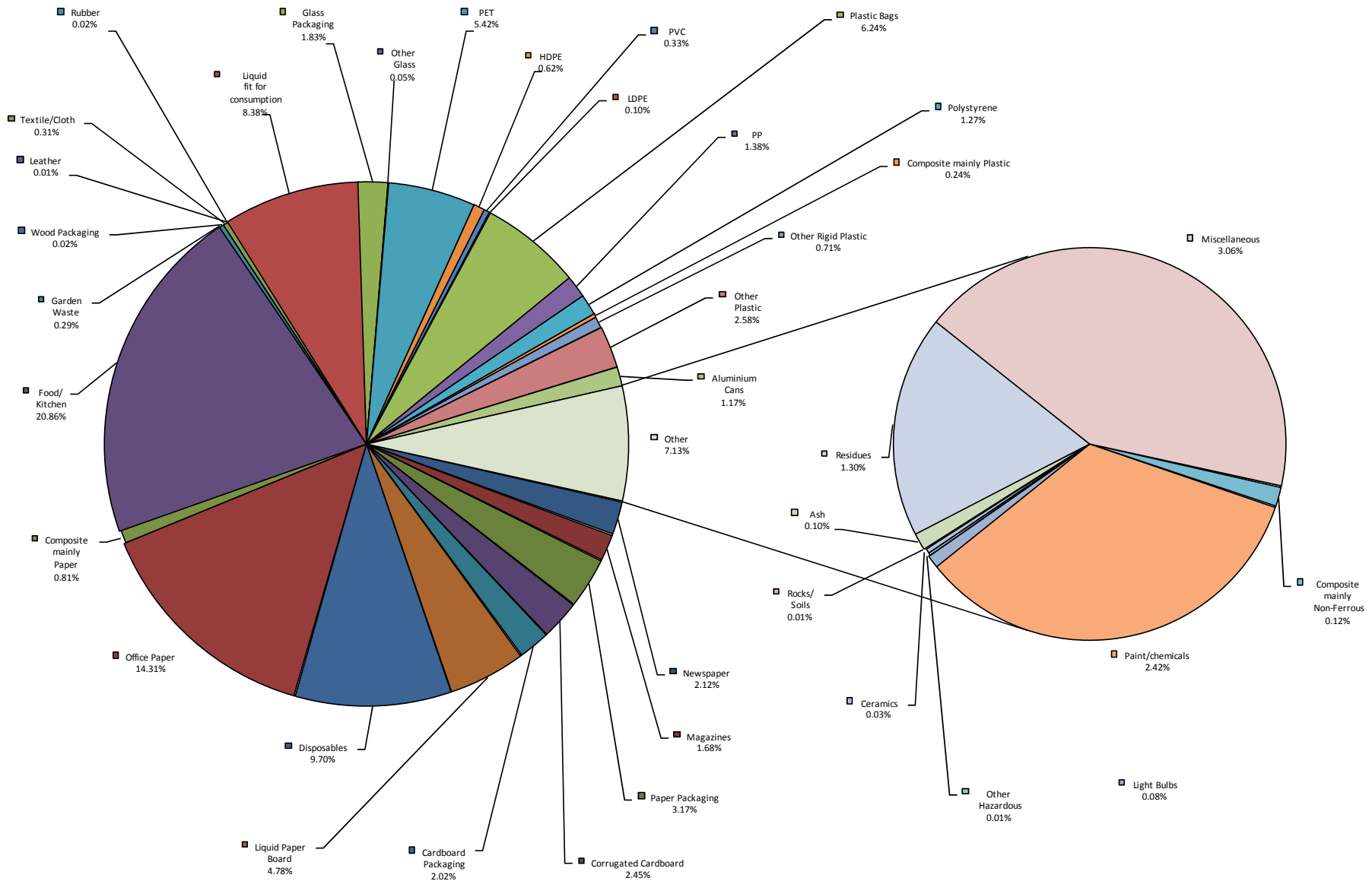
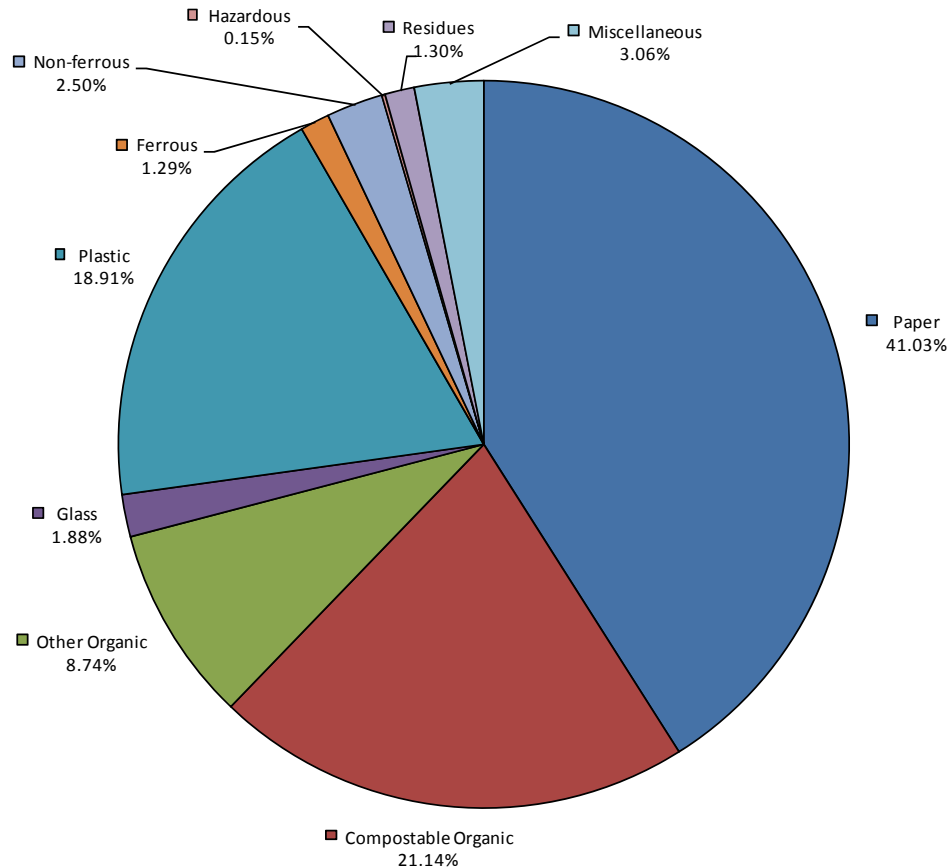


Figure 5-4 Composition of Building refuse at the Joondalup campus

Food/kitchen waste represented the largest proportion of the refuse stream from buildings, making up 21% of the total weight sampled. The second largest material type was office paper at 14% followed by disposable paper at 10% and liquid fit for consumption at 8%.

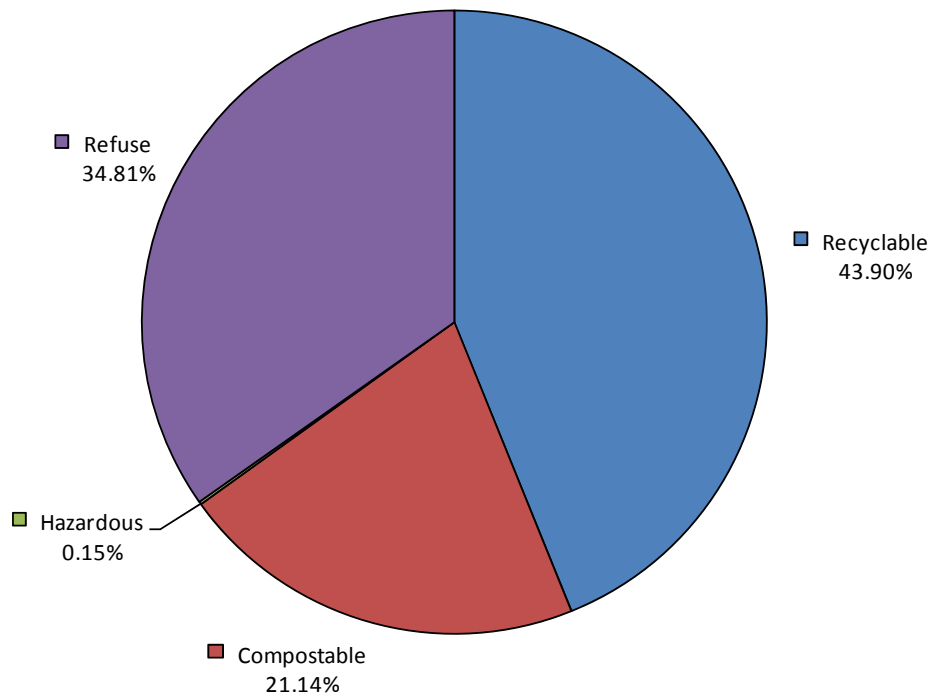
The compositional breakdown of Building refuse by material group is shown in **Figure 5-5**.



**Figure 5-5 Material groupings of Building refuse at the Joondalup campus**

It can be seen from **Figure 5-5** above that paper materials represented the largest proportion of the waste stream, at 41% of the total weight sampled. Compostable organics and plastic materials also represented significant proportions of the waste stream, at 21% and 19% respectively.

The proportion of the waste stream which is classified under each of the key waste streams is shown in **Figure 5-6**.



**Figure 5-6 Key Waste Streams of Building refuse at the Joondalup campus**

44% of the materials identified within the Building waste stream were recyclable. Compostable materials made up a further 21% of the total waste sampled whilst 35% was refuse.

## 6 Mount Lawley Campus Audit Results

This section presents the qualitative and compositional data obtained from the audit conducted at the Mount Lawley campus. As for the data presented from the Joondalup campus, the data from the different categories have been amalgamated into the two sources, External and Buildings. The compositional data for each category is presented in the detailed report contained within **Appendix C**.

### 6.1 Quantitative

The number of bags collected from each source and category and their average bag weight is shown in **Table 6-1**. As at the Joondalup campus, due to time constraints, bags were not collected from every bin/building at the campus.

**Table 6-1 Average weight of samples from sources and categories at Mount Lawley campus**

Source	Category	Building	Number of bins/bags	Average weight (kg)
External	Around Campus	-	8	2.26
	Front of Outlets	Aroma	8	3.04
		Cluster	4	1.22
Buildings	Administration	3	11	4.87
	Faculty	18	7	1.85
		17	3	3.58
		2	2	2.79
		16	4	3.90
		14	3	3.14
		1	8	2.75
		Public	8	6
	E-lab	4	2.79	

From the average bag weight of each of the categories shown in **Table 6-1**, the average weight of bags from each source was determined. From External sources, average bag weight was found to be 2.17kg, and from the Building source, average bag weight was 3.16kg.

### 6.2 Compositional

The following sections present the compositional breakdown of refuse audited at the Mount Lawley campus grouped into External and Building sources.

#### 6.2.1 External

The composition of refuse from External sources, including both the Around Campus and Front of Outlet categories at the Mount Lawley campus, is shown in **Table 6-2** and illustrated in **Figure 6-1**.

Table 6-2 Composition of External refuse at the Mount Lawley campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.35	0.73%
Packaging	A03	2.43	4.99%
Corrugated Cardboard	A04	0.34	0.70%
Cardboard Packaging	A05	0.72	1.49%
Liquid Paper Board	A06	2.66	5.46%
Disposables	A07	0.85	1.75%
Office Paper	A08	0.39	0.80%
Composite mainly Paper	A09	0.11	0.23%
<b>SUBTOTAL – PAPER</b>		<b>7.86</b>	<b>16.15%</b>
Food/Kitchen	B01	20.19	41.47%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL – COMPOSTABLE ORGANICS</b>		<b>20.19</b>	<b>41.47%</b>
Wood Packaging	C011	1.13	2.33%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	1.14	2.35%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	5.28	10.85%
<b>SUBTOTAL – OTHER ORGANICS</b>		<b>7.56</b>	<b>15.53%</b>
Glass Packaging	D01	1.47	3.03%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL – GLASS</b>		<b>1.47</b>	<b>3.03%</b>
PET	E01	1.80	3.70%
HDPE	E02	0.17	0.35%
PVC	E03	0.18	0.38%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.99	4.09%
PP	E05	2.04	4.19%
Polystyrene	E06	1.11	2.28%
Composite mainly Plastic	E07	0.03	0.07%
Other Rigid Plastic	E08	0.12	0.25%
Other Plastic	E09	0.45	0.93%
<b>SUBTOTAL – PLASTIC</b>		<b>7.90</b>	<b>16.24%</b>
Steel Packaging	F01	0.18	0.38%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.07	0.15%
<b>SUBTOTAL – FERROUS</b>		<b>0.26</b>	<b>0.53%</b>
Aluminium Cans	G011	1.23	2.53%
Other Non-Ferrous	G02	0.14	0.30%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL – NON-FERROUS</b>		<b>1.37</b>	<b>2.82%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.06	0.13%
<b>SUBTOTAL – HAZARDOUS</b>		<b>0.06</b>	<b>0.13%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL – EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.21	0.44%
Miscellaneous	Misc	1.78	3.66%
<b>TOTAL – ALL MATERIALS</b>		<b>48.68</b>	<b>100.00%</b>

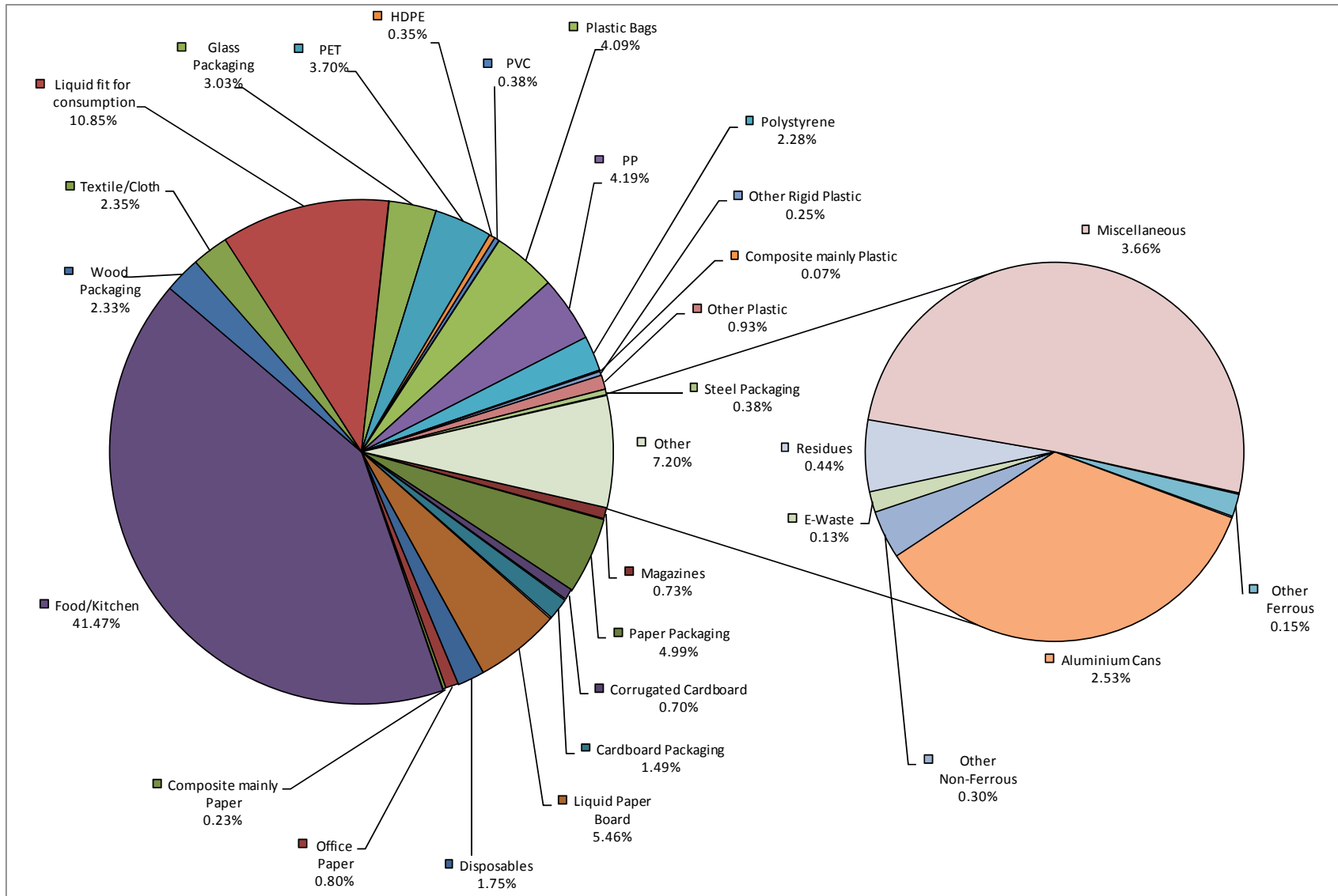
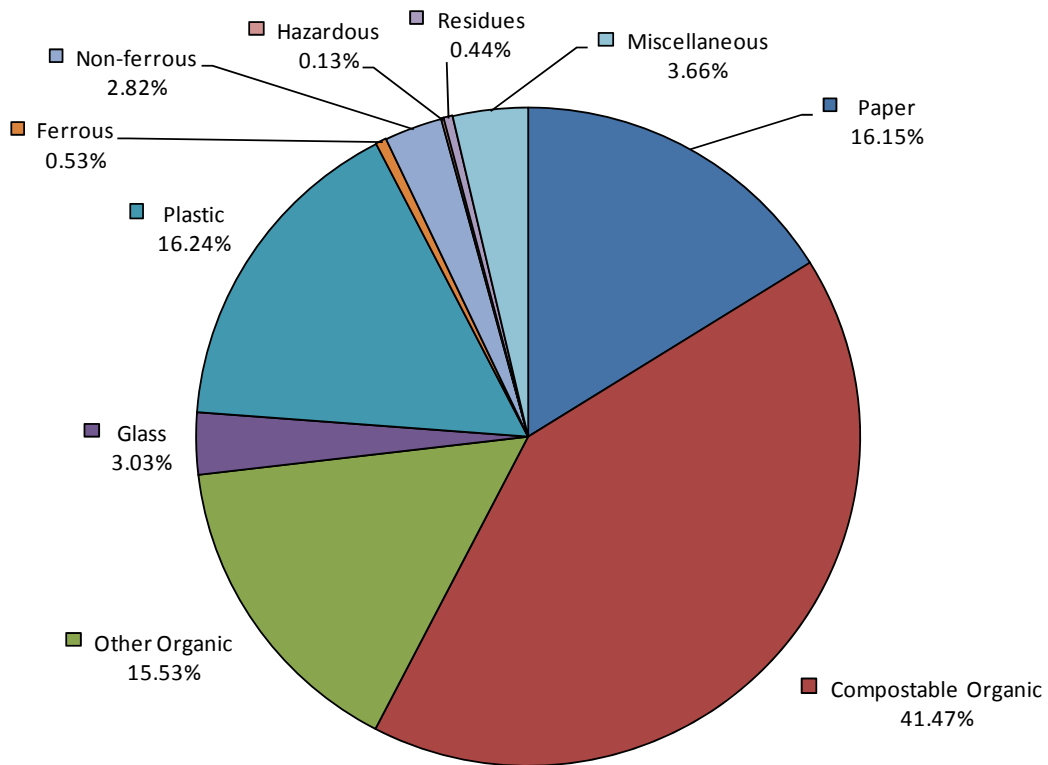


Figure 6-1 Composition of External refuse at the Mount Lawley campus

Food/kitchen waste made up the largest proportion of the total refuse sampled at 41%. Liquid fit for consumption was the second largest material type at 11%. All other material types represented less than 5% of the total waste stream.

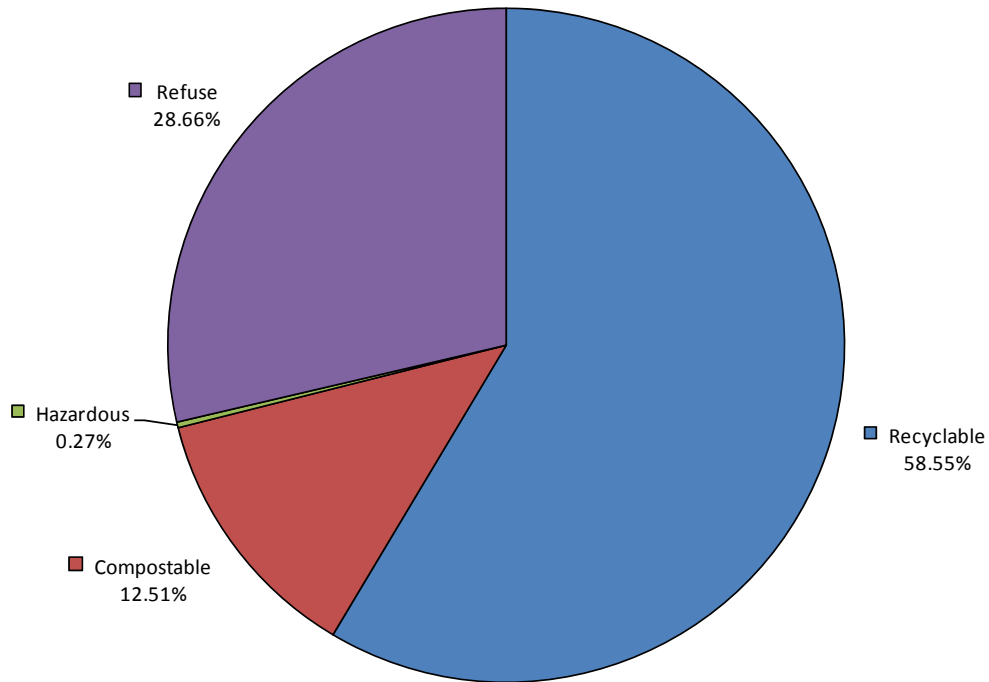
The compositional breakdown of External refuse by material group is shown below in **Figure 6-2**.



**Figure 6-2** Material groupings of External refuse at the Mount Lawley campus

Due to the high quantity of food/kitchen waste present in the waste stream, compostable organics were the largest material group with 41% of the total weight sampled. The paper, plastic and other organic materials groups each represented approximately 16% of the refuse audited.

The materials were also classified in accordance with the Waste Classification System into the key waste streams. **Figure 6-3** shows the materials identified within the External waste stream grouped into these key waste streams.



**Figure 6-3** Key Waste Streams of External refuse at the Mount Lawley campus

As can be seen in **Figure 6-3**, compostables made up the largest waste stream representing 41% of total External source refuse audited. Recyclable materials accounted for approximately 29%. Refuse also made up approximately 29% and hazardous materials less than 1%.

### 6.2.2 Buildings

Similar to the Joondalup campus, all Building categories were amalgamated, culminating in one data set for all Building refuse audited at the Mount Lawley campus.

**Table 6-3** and **Figure 6-4** show the compositional breakdown of the refuse audited from the Building source at Mount Lawley into the different material types.

**Table 6-3 Composition of Building refuse at the Mount Lawley campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	4.06	2.19%
Magazines	A02	3.94	2.13%
Packaging	A03	3.61	1.95%
Corrugated Cardboard	A04	27.20	14.67%
Cardboard Packaging	A05	3.68	1.98%
Liquid Paper Board	A06	7.28	3.93%
Disposables	A07	9.87	5.32%
Office Paper	A08	34.12	18.41%
Composite mainly Paper	A09	1.41	0.76%
<b>SUBTOTAL – PAPER</b>		<b>95.17</b>	<b>51.34%</b>
Food/Kitchen	B01	23.13	12.48%
Garden Waste	B02	0.06	0.03%
Other Organics	B03	0.04	0.02%
<b>SUBTOTAL – COMPOSTABLE ORGANICS</b>		<b>23.23</b>	<b>12.53%</b>
Wood Packaging	C011	0.06	0.03%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.84	0.45%
Leather	C03	0.00	0.00%
Rubber	C04	0.03	0.02%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	19.04	10.27%
<b>SUBTOTAL – OTHER ORGANICS</b>		<b>19.97</b>	<b>10.77%</b>
Glass Packaging	D01	6.64	3.58%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL – GLASS</b>		<b>6.64</b>	<b>3.58%</b>
PET	E01	9.10	4.91%
HDPE	E02	1.23	0.66%
PVC	E03	0.37	0.20%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	9.48	5.11%
PP	E05	2.27	1.22%
Polystyrene	E06	1.46	0.79%
Composite mainly Plastic	E07	0.72	0.39%
Other Rigid Plastic	E08	0.38	0.20%
Other Plastic	E09	1.20	0.65%
<b>SUBTOTAL – PLASTIC</b>		<b>26.20</b>	<b>14.13%</b>
Steel Packaging	F01	0.88	0.47%
Composite mainly Ferrous	F02	0.30	0.16%
Other Ferrous	F03	0.39	0.21%
<b>SUBTOTAL – FERROUS</b>		<b>1.57</b>	<b>0.85%</b>
Aluminium Cans	G011	3.58	1.93%
Other Non-Ferrous	G02	0.21	0.11%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL – NON-FERROUS</b>		<b>3.79</b>	<b>2.04%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.02	0.01%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.48	0.26%
<b>SUBTOTAL – HAZARDOUS</b>		<b>0.51</b>	<b>0.27%</b>
Ceramics	I01	1.00	0.54%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL – EARTH BASED</b>		<b>1.00</b>	<b>0.54%</b>
Fine residues <20mm	Res	1.78	0.96%
Miscellaneous	Misc	5.53	2.98%
<b>TOTAL – ALL MATERIALS</b>		<b>185.38</b>	<b>100.00%</b>

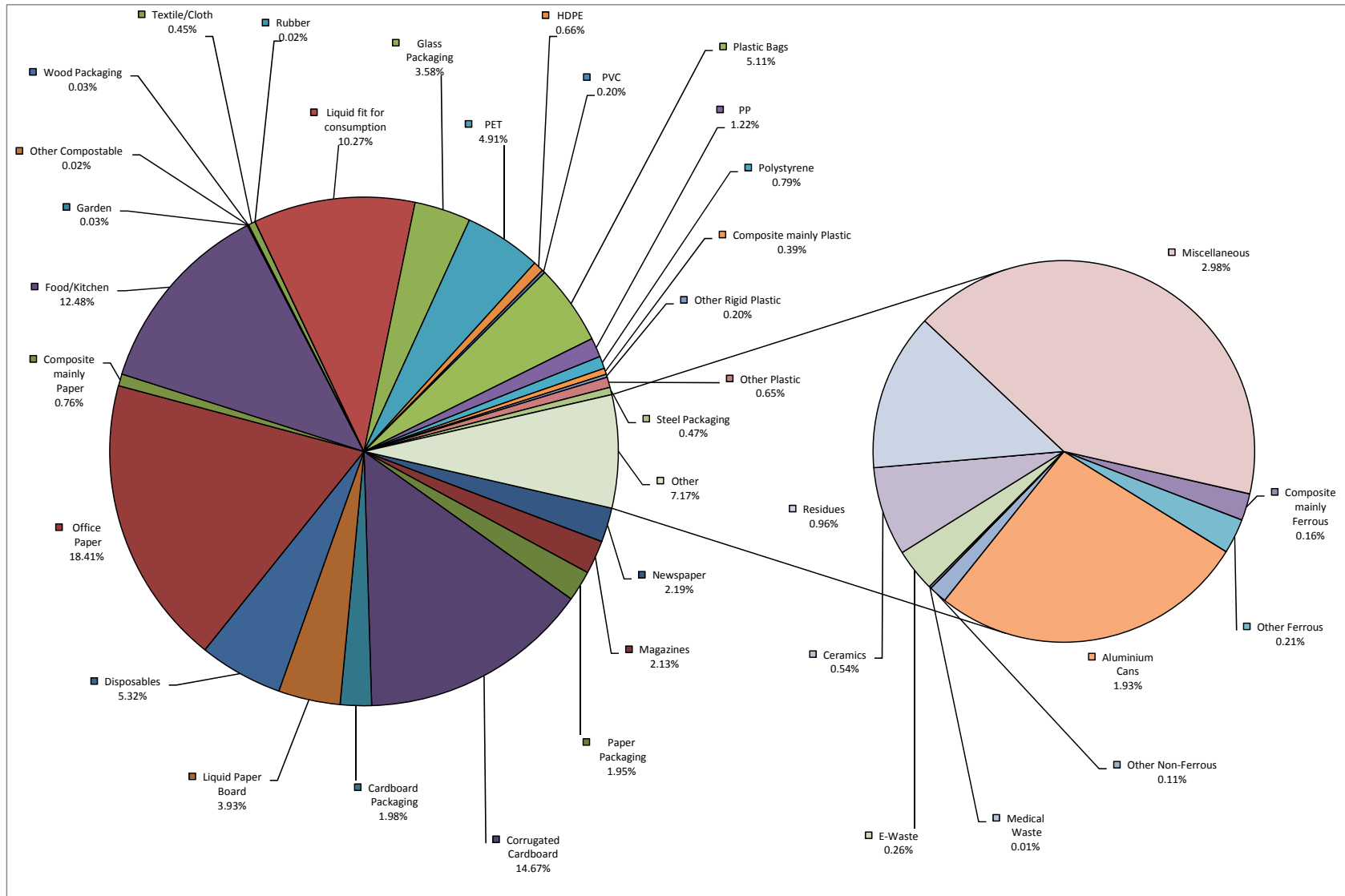
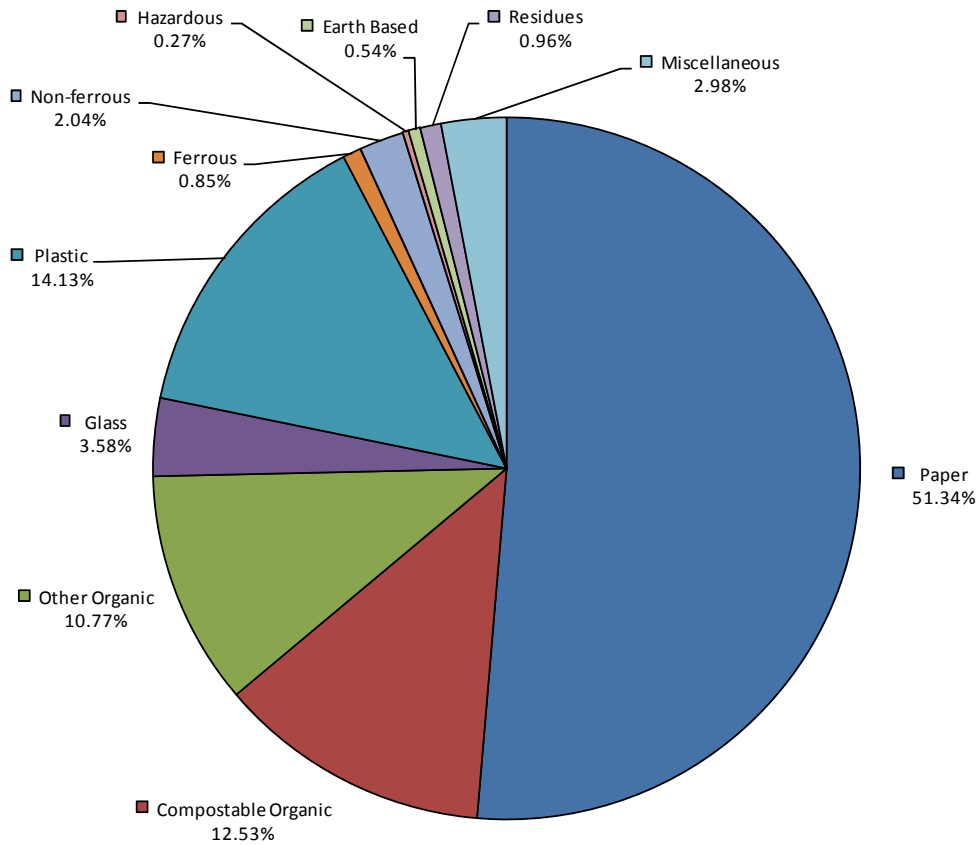


Figure 6-4 Composition of Building refuse at the Mount Lawley campus

As can be seen in **Figure 6-4**, 18% of the total weight sampled from the Building source was office paper, whilst 15% was corrugated cardboard. Food/kitchen waste made up 13% of the refuse and liquid fit for consumption 10%. All other material types represented 5% or less of the total weight sampled.

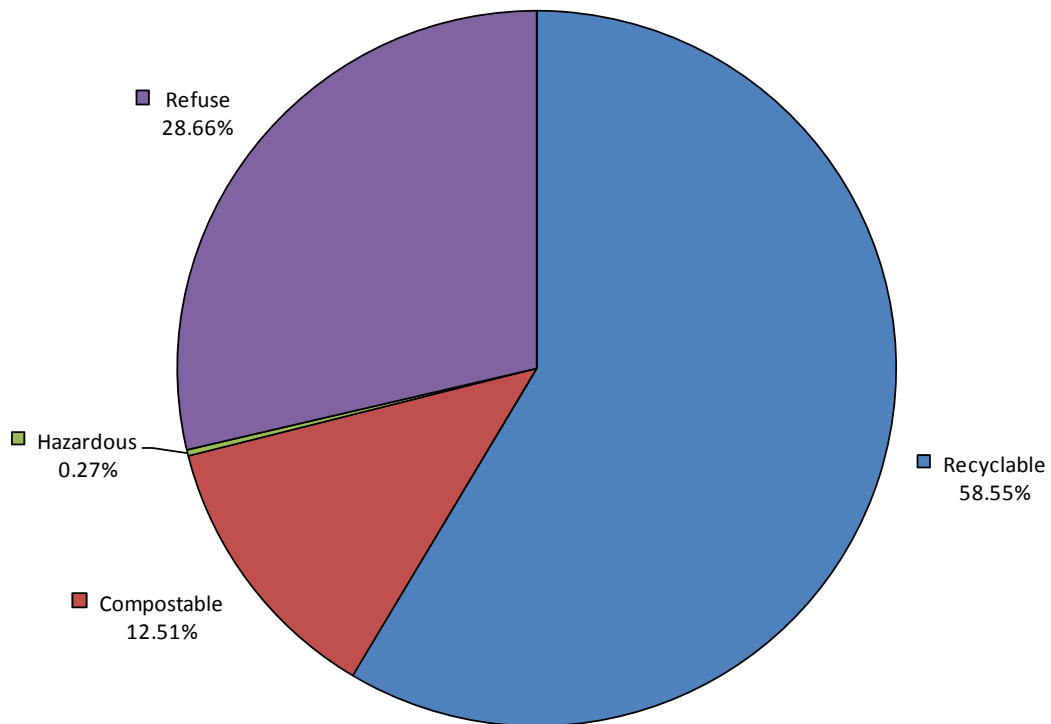
The compositional breakdown of Building refuse into material groups is shown below in **Figure 6-5**.



**Figure 6-5** Material groupings of Building refuse at the Mount Lawley campus

It can be seen that Paper materials make up the majority of the waste stream with 51%. Plastic materials contribute 14%, compostable Organics 13% and Other Organics 11% of the total weight sampled.

**Figure 6-6** shows the breakdown of refuse from the Building source into key waste streams.



**Figure 6-6 Key Waste Streams of Building refuse at the Mount Lawley campus**

From **Figure 6-6**, it can be seen that 59% of the materials audited from the Building source at the Mount Lawley campus were classified as recyclables. Compostable materials made up 13% of the total waste sampled followed by refuse at 29%.

## 7 South West Campus Audit Results

This section presents the quantitative and compositional data collected during the audit conducted at the South West campus. As for the metropolitan campuses, the data from each category has been amalgamated into the two sources (External and Buildings). **Appendix C** contains the compositional breakdown of refuse from each of the different categories.

The South West campus is the smallest of the three ECU campuses. At the time of the audit, students were involved in exams and it was indicated by ECU staff that waste generation was expected to be lower than average. Therefore, it is anticipated that the samples collected during the audit may not be representative of the average waste stream generated at the campus under normal circumstances. However, this data has been used to give an estimation on the quantity and composition of the refuse stream generated.

### 7.1 Quantitative

**Table 7-1** shows the weight of the bag/bin from each of the sources categories. As only one bag was collected from each source, this data may not provide a good representation of average bag weight on an average day.

**Table 7-1** Average weight of samples from sources and categories at South West campus

Source	Category	Building	Number of bins/bags	Average weight (kg)
External	Around Campus	-	1	5.39
	Front of Outlets	Café	1	2.42
Buildings	Administration	3	1	6.88
	Faculty	1	1	4.30
		7	1	1.41
		2	1	1.69
	Public	5	1	3.40
		6	1	0.24
		Building 4	4	1

From the average bag weights displayed in **Table 7-1**, the average weight of bags from External sources was found to be 3.91kg. From the Building source, the average bag weight was 4.55kg.

### 7.2 Compositional

As mentioned previously, the compositional data from each category has been grouped into each source. The compositional breakdown of the waste from each source, External and Buildings, is presented in the following sections.

#### 7.2.1 External

**Table 3-1** and **Figure 7-1** show the material types identified within the refuse sampled from the External source.

Table 7-2 Composition of External refuse at the South West campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.00	0.00%
Packaging	A03	0.37	4.47%
Corrugated Cardboard	A04	0.23	2.77%
Cardboard Packaging	A05	0.21	2.56%
Liquid Paper Board	A06	0.53	6.38%
Disposables	A07	0.17	2.08%
Office Paper	A08	0.34	4.11%
Composite mainly Paper	A09	0.05	0.62%
<b>SUBTOTAL - PAPER</b>		<b>1.92</b>	<b>22.99%</b>
Food/Kitchen	B01	1.52	18.21%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>1.52</b>	<b>18.21%</b>
Wood Packaging	C011	0.03	0.38%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.45	5.40%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.47	5.66%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.96</b>	<b>11.45%</b>
Glass Packaging	D01	0.49	5.90%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.49</b>	<b>5.90%</b>
PET	E01	1.00	11.92%
HDPE	E02	0.04	0.50%
PVC	E03	0.04	0.50%
LDPE	E041	0.03	0.38%
Plastic Bags	E042	0.46	5.54%
PP	E05	0.07	0.88%
Polystyrene	E06	0.16	1.96%
Composite mainly Plastic	E07	0.04	0.50%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.09	1.12%
<b>SUBTOTAL - PLASTIC</b>		<b>1.95</b>	<b>23.32%</b>
Steel Packaging	F01	0.08	0.98%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.08</b>	<b>0.98%</b>
Aluminium Cans	G011	0.25	3.03%
Other Non-Ferrous	G02	0.03	0.38%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.29</b>	<b>3.42%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.07	0.86%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.07</b>	<b>0.86%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.02	0.29%
Miscellaneous	Misc	1.05	12.59%
<b>TOTAL - ALL MATERIALS</b>		<b>8.37</b>	<b>100.00%</b>

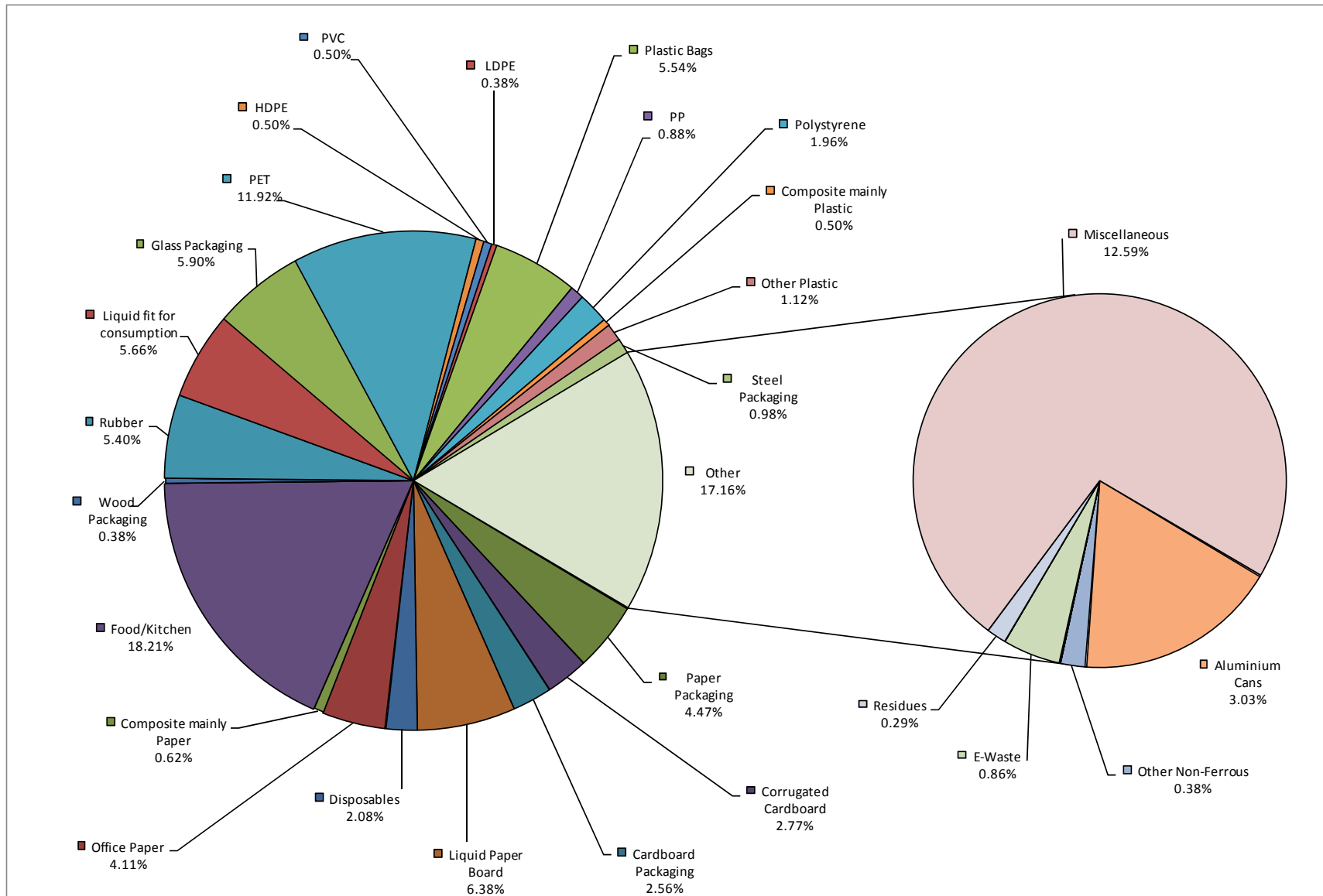
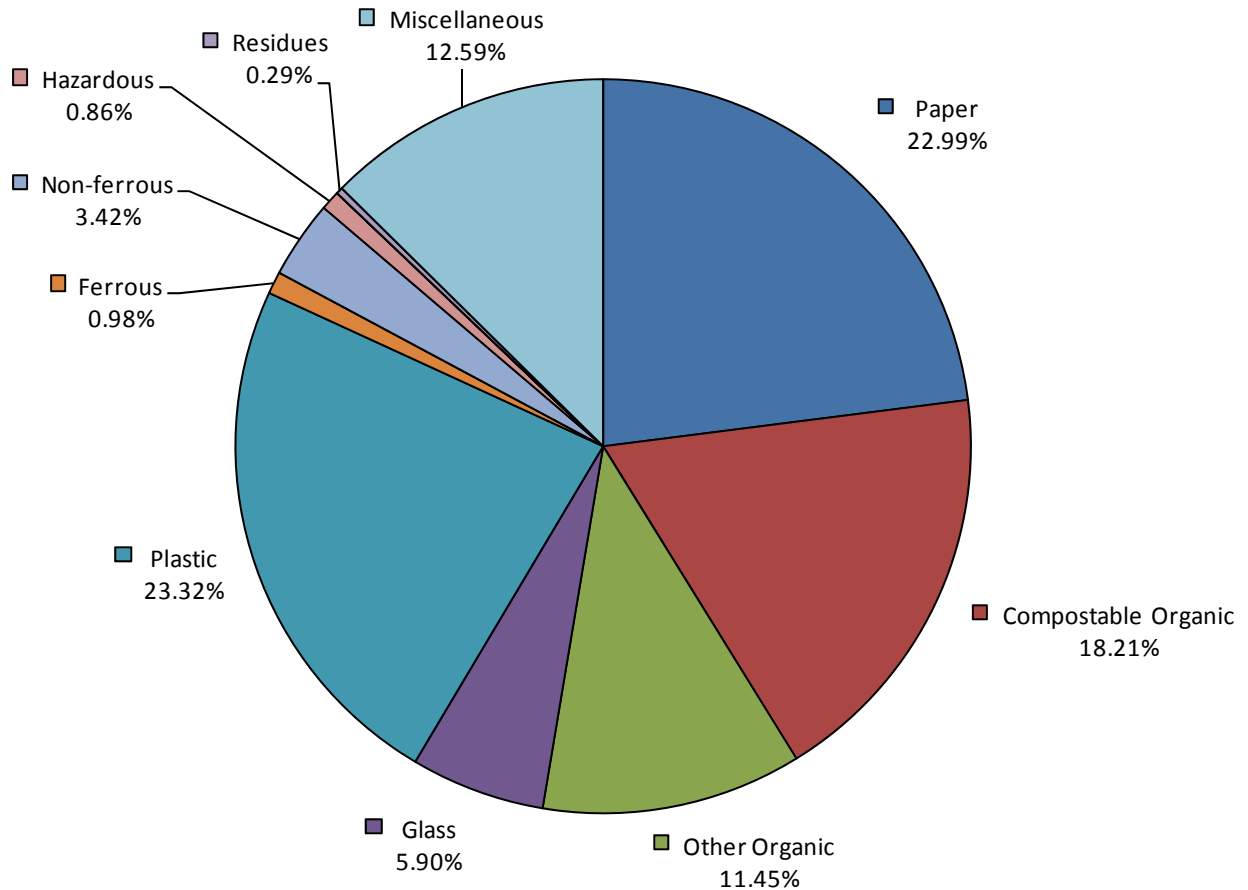


Figure 7-1 Composition of External refuse at the South West campus

Food/Kitchen waste accounted for the largest proportion of the waste stream at 18% of the total waste sampled from the External source. A large proportion of the waste stream (13%) was made up of Miscellaneous materials. PET plastic was another significant material type with 12% of the total weight sampled.

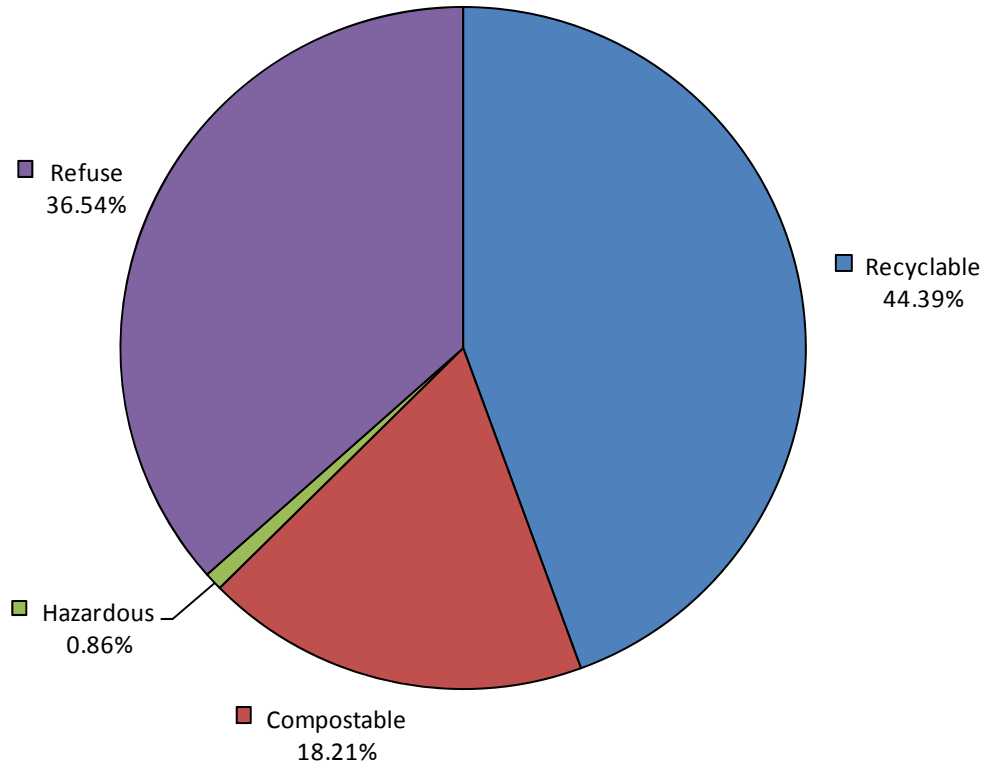
The compositional breakdown of External refuse into the material groupings is shown in **Figure 7-2**.



**Figure 7-2** Material groupings of External refuse at the South West campus

As can be seen in **Figure 7-2**, plastics and Paper materials were the largest material groups, each making up 23% of the waste stream. Compostable organics represented 18% of the total weight sampled.

The grouping of materials into the key waste streams is shown in **Figure 7-3**.



**Figure 7-3 Key Waste Streams of External refuse at the South West campus**

The majority of the materials were classified as recyclable, representing 44% of the total waste audited from the External source. Refuse made up 37% and Compostable materials 18% of the total weight sampled.

### 7.2.2 Buildings

This section presents the amalgamated data from the Building source which combines data from the three categories (Administration, Faculty, Public).

**Figure 7-4** below show the compositional breakdown of refuse sampled from Building source at the South West campus.

Table 7-3 Composition of Building refuse at the South West campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.04	0.22%
Magazines	A02	0.47	2.42%
Packaging	A03	0.25	1.29%
Corrugated Cardboard	A04	0.32	1.68%
Cardboard Packaging	A05	0.54	2.81%
Liquid Paper Board	A06	0.45	2.33%
Disposables	A07	2.01	10.46%
Office Paper	A08	1.75	9.10%
Composite mainly Paper	A09	0.15	0.77%
<b>SUBTOTAL - PAPER</b>		<b>5.98</b>	<b>31.07%</b>
Food/Kitchen	B01	3.48	18.09%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>3.48</b>	<b>18.09%</b>
Wood Packaging	C011	0.06	0.33%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.32	1.67%
Leather	C03	0.00	0.00%
Rubber	C04	0.05	0.28%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.00	0.00%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.44</b>	<b>2.29%</b>
Glass Packaging	D01	2.01	10.46%
Other Glass	D02	0.05	0.27%
<b>SUBTOTAL - GLASS</b>		<b>2.06</b>	<b>10.73%</b>
PET	E01	0.40	2.07%
HDPE	E02	0.04	0.22%
PVC	E03	0.15	0.76%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.24	6.45%
PP	E05	0.17	0.87%
Polystyrene	E06	0.17	0.87%
Composite mainly Plastic	E07	2.22	11.55%
Other Rigid Plastic	E08	0.04	0.22%
Other Plastic	E09	0.31	1.61%
<b>SUBTOTAL - PLASTIC</b>		<b>4.74</b>	<b>24.62%</b>
Steel Packaging	F01	0.19	0.97%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.02	0.11%
<b>SUBTOTAL - FERROUS</b>		<b>0.21</b>	<b>1.08%</b>
Aluminium Cans	G011	0.09	0.49%
Other Non-Ferrous	G02	0.04	0.22%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.14</b>	<b>0.71%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	1.86	9.65%
<b>SUBTOTAL - HAZARDOUS</b>		<b>1.86</b>	<b>9.65%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.07	0.38%
Miscellaneous	Misc	0.27	1.39%
<b>TOTAL - ALL MATERIALS</b>		<b>19.24</b>	<b>100.00%</b>

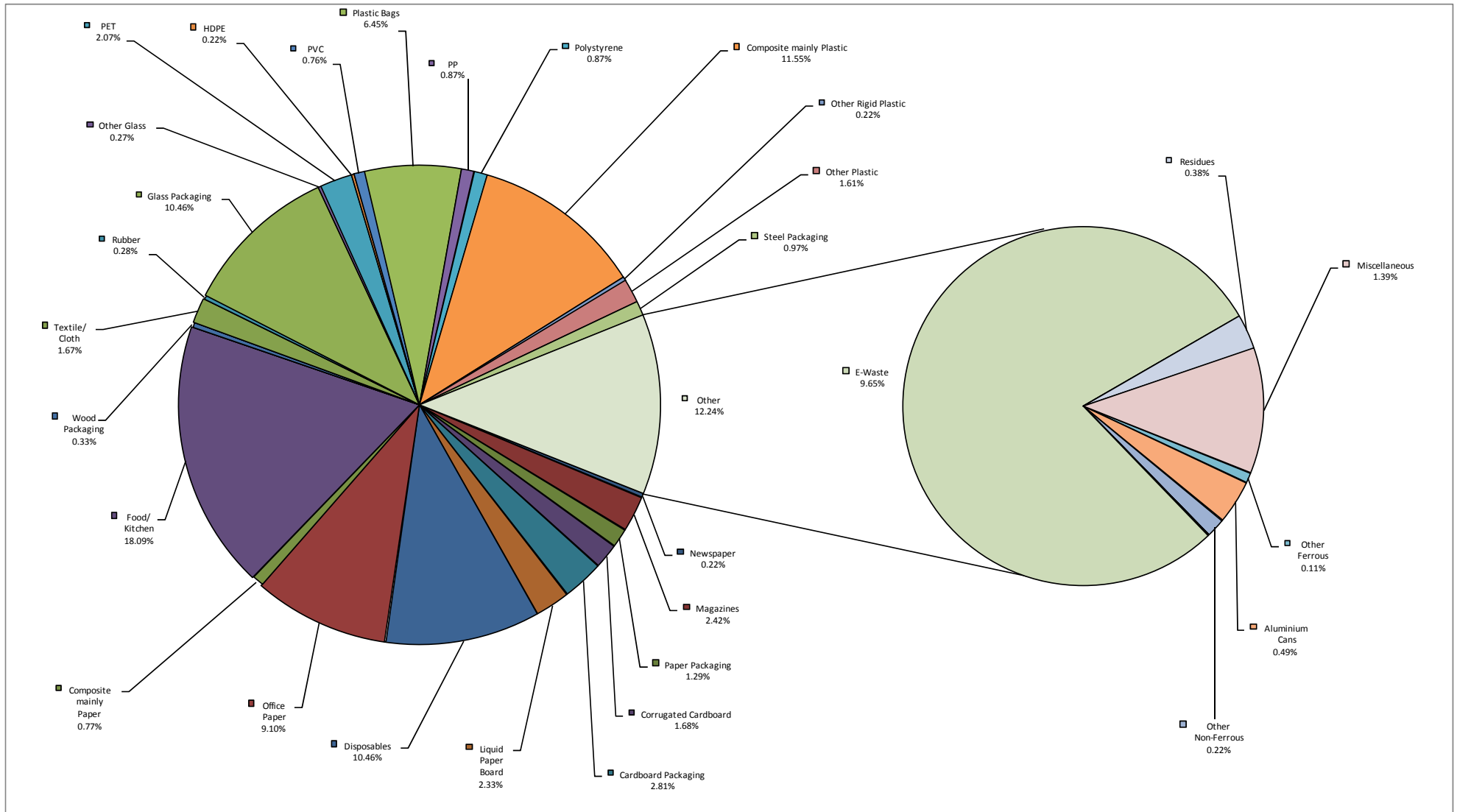
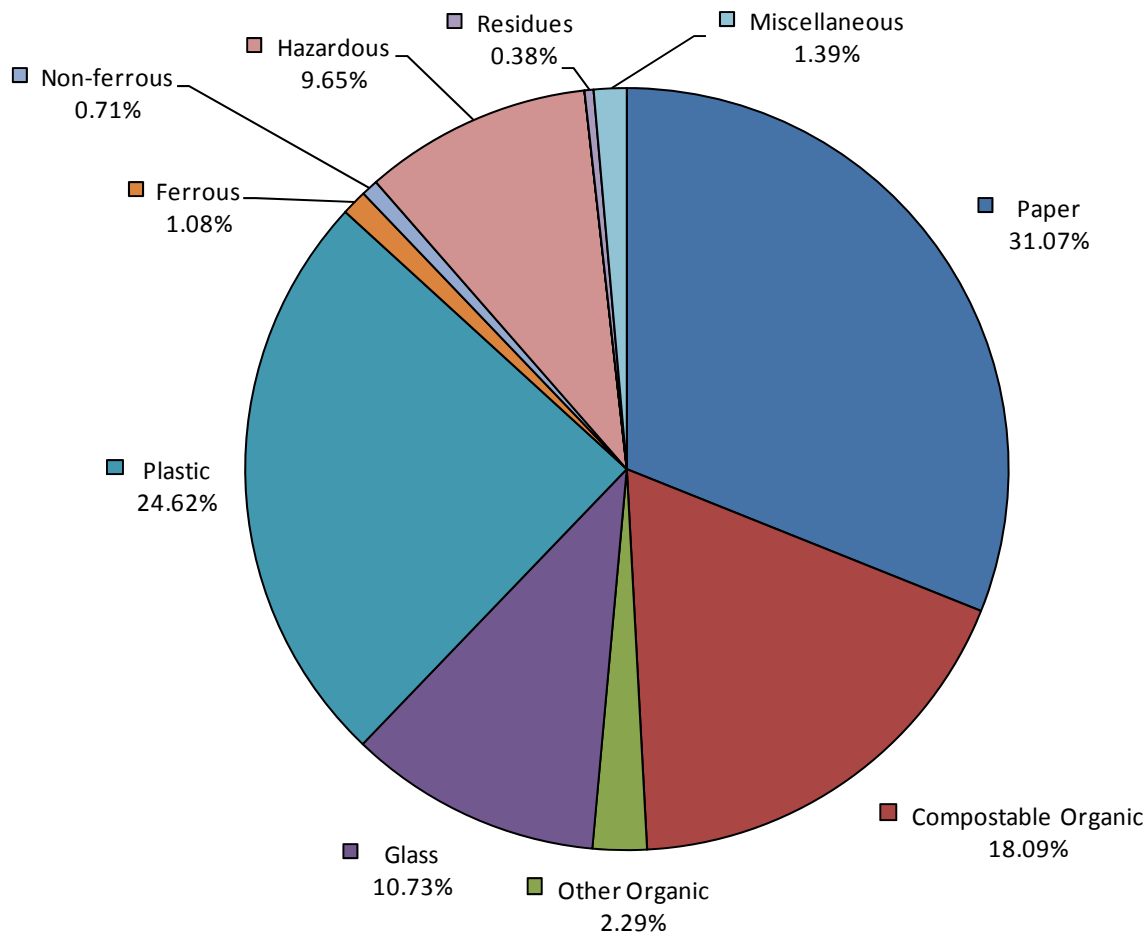


Figure 7-4 Composition of Building refuse at the South West campus

Food/kitchen waste was the material type which made up the largest proportion of the waste stream, with 18% of the total weight sampled. Composite mainly plastic materials made up 12% of the waste stream, whilst glass packaging, disposables and e-waste represented 10%.

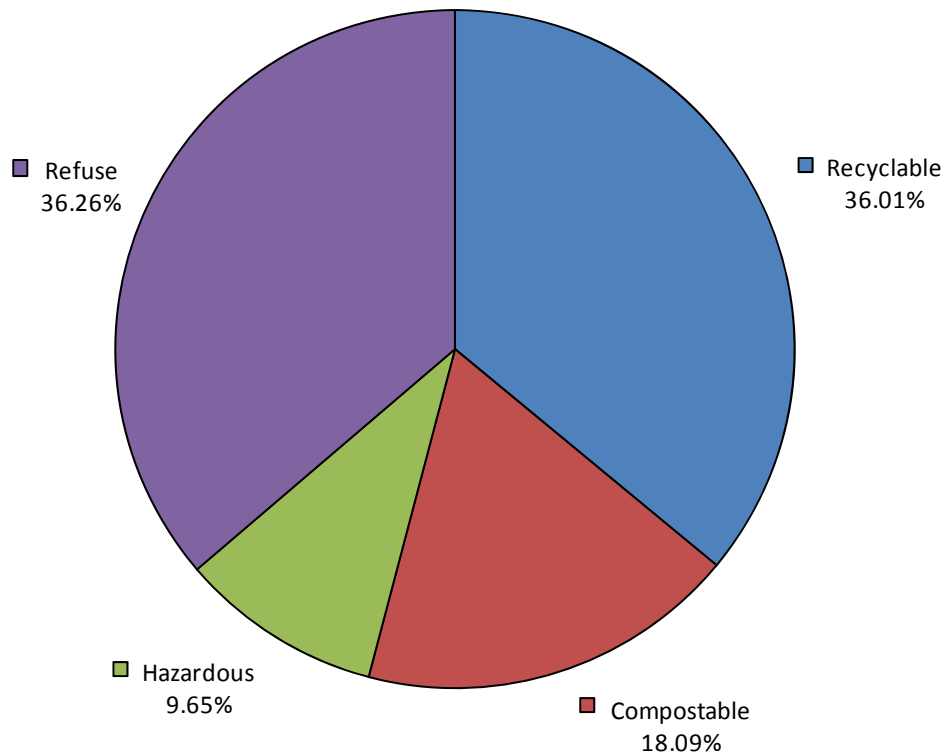
The compositional breakdown of Building refuse by material groups is shown in **Figure 7-5**.



**Figure 7-5** Material groupings of Building refuse at the South West campus

Paper materials made up the largest proportion of the waste stream with 31%. This was followed by plastics with 25% and compostable organics with 18%.

The compositional breakdown of the waste audited from the Building source at the South West campus is shown in **Figure 7-6** below.



**Figure 7-6 Key Waste Streams of Building refuse at the South West campus**

Recyclable materials made up 36% of the total weight sampled, while compostable materials represented 18%. A relatively large amount of e-waste in the sample resulted in the proportion of hazardous materials being approximately 10%. The remaining 36% of the sample consisted of materials classified as refuse.

## 8 Amalgamated Data and Analysis

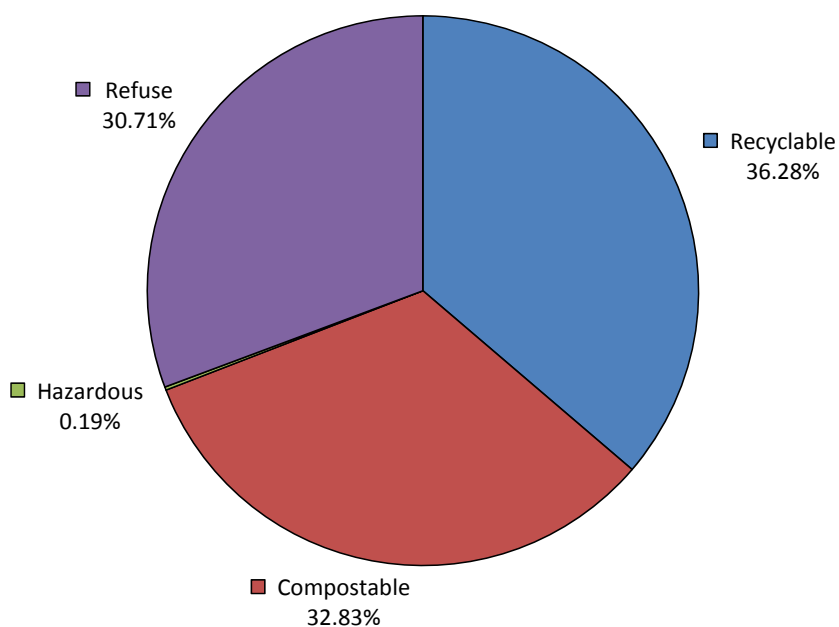
### 8.1 Amalgamated Results

To obtain a greater understanding of the composition of refuse generated from External and Building sources across all three campuses, Cardno amalgamated all the individual campus' data recorded. The amalgamated data was then analysed in relation to the key waste streams including recyclables, compostables, hazardous and refuse. The following sections present the findings of the analysis of the amalgamated data.

#### 8.1.1 External

The breakdown of refuse into the key waste streams generated across all three campuses from the External source is shown below in **Figure 8-1**.

**Figure 8-1** Key Waste Streams of External refuse from all ECU campuses



As can be seen in **Figure 8-1**, materials classified as recyclable represented the largest proportion (36%) of the refuse stream from the External source. Of the total weight sampled across all campuses, compostable and refuse materials made up 33% and 31% respectively. Hazardous materials accounted for less than 1% of the total weight sampled.

#### 8.1.2 Buildings

**Figure 8-2** shows the breakdown of the refuse stream from the Building source broken down into the key waste streams.

Figure 8-2 Key Waste Streams of Building refuse from all ECU campuses

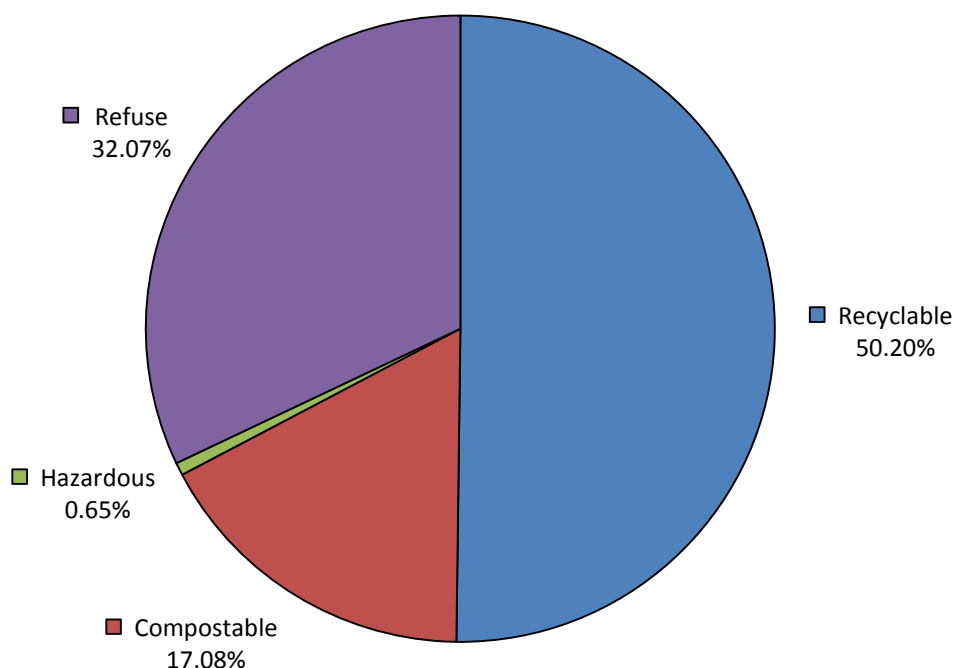


Figure 8-2 shows that recyclable materials made up 50% of the refuse audited from the Building source across all campuses. Refuse material represented 32% and compostable material 17% of the total weight sampled. Hazardous materials made up less than 1%.

## 8.2 Data Analysis

The data collected during the waste audits has been used to obtain estimated values for the quantity of recyclables generated from each source at the three campuses, and the quantity of recyclable materials being sent to landfill.

As identified from the waste audit results, refuse generated from each of the campuses contained a proportion of materials which may be recycled, however have been placed in a refuse MGB and accordingly landfilled. As stated previously, the Facilities and Services Department of ECU has developed an Environmental Improvement Program which contains targets based on the following Performance Indicators:

- Percentage of recyclable waste sent to landfill per annum;
- Tonnes sent to landfill per annum; and
- Tonnes recycled per annum.

Using the data collected during the waste audits, baseline values have been established to aid the ECU Facilities and Services Department to assess current and future performance against these targets. Data on total refuse generation has been used to determine tonnes sent to landfill per annum. To determine the percentage of recyclable waste sent to landfill per annum, data on the quantity of recyclable materials which are recycled is required, which was not collected as part of this audit. However, the proportion of the refuse stream composed of recyclable materials has been determined and this data may be used as a baseline figure for future audits, with the aim of reducing the percentage of recyclables in the refuse stream.

The following sections outline the process and results of quantifying the refuse generation and recyclables sent to landfill.

### 8.2.1 Refuse Generation

Following the quantitative and compositional analysis, the audit data was used to estimate annual refuse generation from each of the sources and categories at each campus. The process and assumptions used to obtain this data are described below.

Firstly, the data from each category (Around Campus, Front of Outlets, Public, Faculty and Administration) was grouped by the overarching source (External or Buildings). The composition of this grouped data was assumed to represent the average composition of all bins/bags generated from each source. The average weight of these bags and the number collected on the day of the audit was also assumed to represent the average weight and number of all bags generated from each source. These covered the building and external sources that were included within the audit. Additional information was obtained from ECU staff in relation to the quantity of bags generated at buildings and bins not included in the audit. This allowed an estimation of the total refuse generation per day at each campus. To project this data to an annual figure, it was agreed with ECU staff that for the purpose of projecting the quantities, each campus was operational 6 days a week, 50 weeks a year. The projected annual waste generation figures for all campuses are shown in **Table 8-1** below.

**Table 8-1 Estimated annual waste generation at each campus**

Campus	Source	Average bag weight (kg)	Average no. of bags per day	Estimated total daily weight (kg)	Estimated annual waste generation (kg)
Joondalup	External	1.05	15	15.7	4,708
	Buildings	1.79	139	248.5	74,547
	Total	1.42	154	264.2	79,255
Mount Lawley	External	2.17	20	43.5	13,045
	Buildings	3.16	82	259.2	77,760
	Total	2.67	102	302.7	90,805
South West	External	3.91	4*	15.6	4,686
	Buildings	4.55	12*	54.6	16,375
	Total	4.23	16*	70.2	21,061
<b>TOTAL ALL CAMPUSES</b>		<b>2.77</b>	<b>272</b>	<b>637.1</b>	<b>191,121</b>

Note: \* - Following discussions with the cleaners at the South West campus, the quantity of bags has been doubled as it was noted that due to the time of year, less students were present on campus and as a result waste generated was estimated to be less than 50% of average quantities.

As can be seen in **Table 8-1**, according to the data collected during the waste audits, the Mount Lawley campus generates the largest quantity of waste with approximately 91 tonnes per annum (tpa). The Joondalup campus generates 79 tpa whilst the smaller South West campus generates 21 tpa. At both metropolitan campuses, the majority of the waste is generated from the Building source. In total, approximately 191 tonnes is generated at ECU campuses annually.

### 8.2.2 Recyclables Landfilled

The percentage of materials identified within the refuse stream which are classified as recyclable (in accordance with the Waste Classification System), is shown below in **Table 8-2**. Using this percentage, and the average daily weight of waste generated from each source and category, the

quantity of recyclables generated within the daily refuse stream has been calculated. This percentage has been used to estimate the quantity of recyclables sent to landfill annually, again assuming the campuses are operational for 6 days a week, 50 weeks a year.

**Table 8-2 Estimated annual recyclables generation at each campus**

Campus	Source	Estimated total daily weight (kg)	Recyclables %	Estimated quantity of recyclables per day (kg)	Estimated annual recyclables to landfill (kg)
Joondalup	External	15.7	54.98%	8.6	2,588
	Buildings	248.5	43.90%	109.1	32,727
	<b>Total</b>	<b>264.2</b>	<b>44.56%</b>	<b>117.7</b>	<b>35,315</b>
Mount Lawley	External	43.5	29.17%	12.7	3,805
	Buildings	259.2	58.55%	151.8	45,531
	<b>Total</b>	<b>302.7</b>	<b>54.33%</b>	<b>164.5</b>	<b>49,336</b>
South West	External	15.6*	44.39%	6.9	2,080
	Buildings	54.6*	36.01%	19.7	5,896
	<b>Total</b>	<b>70.2*</b>	<b>38.55%</b>	<b>26.6</b>	<b>7,976</b>
<b>TOTAL ALL CAMPUSES</b>		<b>637.1</b>	<b>48.84%</b>	<b>308.8</b>	<b>92,627</b>

Note: \* - As in **Table 8-1** above, average daily quantity of waste generated has been doubled to give a more accurate representation of average quantities generated.

The percentage of recyclables found within the refuse stream was relatively high from each source at all three campuses. The average percentage recyclables found within the refuse stream was 45%. At the Joondalup campus, 45% of materials landfilled are recyclable, at the Mount Lawley campus 54% and at the South West campus 39%. It is estimated that across all three campuses, approximately 93 tonnes of recyclable materials are sent to landfill annually.

## 9 Summary and Conclusions

This section presents a summary of the objectives and results of the waste audits conducted at the three ECU campuses. From these results, Cardno has drawn a number of conclusions regarding future waste management at ECU.

### 9.1 Summary

- The objectives of the audits were to:
  - Determine the composition of the refuse generated at each campus;
  - Estimate the quantity of waste generated annually at each campus; and
  - Estimate the quantity of recyclables currently being sent to landfill.
- The primary waste management service provided under the control of the ECU Facilities and Services Department is the refuse collection from each campus.
- Recycling services are provided in limited areas at each campus mainly concentrated at offices for ECU staff.
- For the purpose of the audit, the campuses were broken down into waste generation sources and categories (External – Around Campus and Front of Outlets; Buildings – Administration, Faculty and Public).
- The waste was audited in accordance with the Waste Classification System, contained within **Appendix A**. The auditing was also undertaken in relation to the OHS Plan devised for the study. The OHS Plan is contained within **Appendix B**.

#### JOONDALUP AUDIT RESULTS

- A total of 15 bags of refuse were audited from External sources at the Joondalup campus. These bags had an average weight of 1.05kg. Using average bag weights from each External category and the total number of bags of refuse generated at the campus per day supplied by ECU staff, it was estimated that 4,700 tonnes of refuse are generated annually.
- From the External source a total of 14.9kg of refuse was audited. The key materials identified within this stream were PET plastic, glass packaging and food/kitchen waste which each accounted for 13% of the total weight audited.
- The average proportion of recyclable materials within the External refuse stream was 55%, indicating that annually, approximately 2,600 tonnes of recyclables are sent to landfill from External refuse sources.
- From the Building source at the Joondalup campus, a total of 103 bags were audited with an average weight of 1.79kg. Average bag weights from each of the Building categories was used to estimate the annual refuse generation from these sources, which equated to approximately 75,000 tonnes. Of these materials, approximately 44% was classified as recyclable, resulting in approximately 32,700 tonnes of recyclable being sent to landfill annually.
- A total of 202.7kg of refuse from the Building source was audited. Food/kitchen waste represented 21% and office paper 14% of the refuse stream.
- In total, at the Joondalup campus it is estimated that 79,000 tonnes of refuse is generated annually, of which 35,000 tonnes is recyclable material which may be recovered.

#### MOUNT LAWLEY AUDIT RESULTS

- At the Mount Lawley campus, a total of 20 bags of refuse generated from the External source were audited, with an average weight of 2.17kg. The number of bags generated daily and the average weights for each category were used to estimate the annual refuse generation from this source. It was found that annually, approximately 13,000 tonnes of refuse is generated from External bins, which includes 3,800 tonnes of recyclable material.

- From the External source at the Mount Lawley campus, a total of 48.7kg of refuse was audited. Food/kitchen waste made up the largest proportion of the refuse stream at 41%, followed by Liquid for consumption at 11%.
- A total of 48 bags of refuse generated from the Building source were audited at the Mount Lawley campus. These had an average weight of 3.16kg. Annual refuse generation from this source was estimated at 77,800 tonnes, of which approximately 45,500 tonnes (59%) is recyclable.
- A total of 185.4kg of refuse was audited from the Building source. Office paper represented 18%, corrugated cardboard 15% and food/kitchen waste 12% of the refuse stream.
- At the Mount Lawley campus, a total of 90,800 tonnes of refuse is estimated to be generated each year. It is estimated that 49,000 tonnes is recyclable material which may be recovered.

## **SOUTH WEST AUDIT RESULTS**

- At the South West campus, only 2 bags of refuse from the External source were collected for auditing. These had an average weight of 2.99kg. Annual refuse generation was estimated to be approximately 4,700 tonnes which contains 2,080 tonnes (44%) recyclable materials.
- A total of 8.4kg of refuse was audited from the External source at the South West campus. Food/kitchen waste made up 18% of the total weight audited, miscellaneous materials 13% and PET plastic 12%.
- From the Building source, 7 bags of refuse were audited, with an average weight of 4.55kg. It was estimated that 16,400 tonnes of refuse are generated annually from this source, which contains approximately 5,900 tonnes of (36%) recyclable materials.
- From the Building source, a total of 19.2kg of refuse was audited. This stream included 18% food/kitchen waste, and 12% composite mainly plastic materials.
- At the South West campus, it is estimated that a total of 21,000 tonnes of refuse is generated annually. Approximately 8,000 tonnes (39%) of this material is classified as recyclable which may be recovered.

## **AMALGAMATED DATA AND ANALYSIS**

- From the External source, recyclable materials accounted for 36% of the refuse audited over all three campuses. Compostable materials made up 33% and refuse 31%.
- From the Building source, 50% of the materials audited were classified as recyclable. Refuse materials accounted for 32% and compostables 17%.
- Over the three campuses, it is estimated that 191 tonnes of refuse, including approximately 93 tonnes of recyclable materials are generated per annum, with this material currently being sent to landfill.

## **9.2 Conclusions**

From the waste audit undertaken at each of the three ECU campuses, the following conclusions have been drawn:

- Due to the high proportion of the refuse stream composed of recyclable materials at all campuses, there is a large potential for reducing the quantity of recyclables sent to landfill annually. It is anticipated that further education is needed to inform staff, students and visitors of the availability of recycling bins and acceptable materials into the various receptacles.
- At the Joondalup and Mount Lawley campuses, the majority of the waste was generated within the Building source. Efforts to minimise waste and reduce the recyclable portion of the refuse stream would therefore be most effective when targeted at the waste generated from buildings.
- To obtain a more accurate representation of the quantity and compositional breakdown of the waste generated at each campus, further waste audits may be conducted. Where additional audits are conducted, the results of these would be more representative if conducted over several days.

- The results obtained from this audit can potentially be used as a baseline dataset for subsequent waste audits.



## Appendix A

# Waste Classification System



## Waste Classification System

Material Group	AWD Codes	Waste Stream Class *	Material	Examples
Paper	A01	Recyclable	Newspaper & Brochures	Newspapers, Newsprint advertising material
	A02	Recyclable	Magazines & Glossy Papers	Magazines, catalogues, glossy advertising material
	A03	Recyclable	Paper Packaging	Paper bags, wrapping paper, egg cartons, fast food wrapping
	A04	Recyclable	Corrugated Cardboard	Packaging cardboard
	A05	Recyclable	Cardboard Packaging (Flat)	Cereal boxes, toy boxes, cleaning product cartons
	A06	Recyclable	Liquid Paper Board	Tetra Pak, Coffee Cups
	A07	Refuse	Disposal Paper Products	Tissues, paper towels
	A08	Recyclable	Printing / Office Paper	Envelopes, documents
	A09	Refuse	Composite Mostly Paper	Paper packaging with plastic wrapping
Organic - Compostable	B01	Compostable	Food / Kitchen Waste	Bread, fruit and vegetables, meat and fish, pet food, tea bags
	B02	Compostable	Garden / Landscaping Waste	Grass, soil, leaves, branches
	B03	Compostable	Other Biodegradable Waste	
Other Organics	C011	Refuse	Wood Packaging	Corks, cork packaging
	C012	Refuse	Other Wood	Fencing, off-cuts
	C02	Refuse	Textile / Rags / Cloths	Rags, upholstery, nets for fruits and vegetables, carpet, towels
	C03	Refuse	Leather	Belts, watch straps, leather shoes
	C04	Refuse	Rubber	Tyres,
	C05a	Refuse	Engine Oil	Engine Oil, Lubricants
	C05b	Refuse	Cooking Oil	Vegetable oil
Glass	C06	Refuse	Liquid fit for human consumption	Liquid contained in drink and milk containers
	D01	Recyclable	Glass Packaging Containers	Jars, Beer bottles, Wine bottles
Plastic	D02	Refuse	Miscellaneous Glass / Others	Glass panes, mirrors, cookware, drinking glasses, broken glass
	E01	Recyclable	PET (Polyethylene Terephthalate)	Soft-drink and juice bottles
	E02	Recyclable	HDPE (High Density Polyethylene)	Milk bottles
	E03	Recyclable	PVC	Food trays, cling film, shampoo bottles, plumbing pipe
	E041	Refuse	Rigid LDPE (Low Density Polyethylene)	Squeezy water bottles
	E042	Refuse	Plastic Bags	Shopping bags, food packaging
	E05	Recyclable	PP (Polypropylene)	Plant pots, microwave ware

	E06	Refuse	Polystyrene	Craft models, Packaging peanuts, support packaging for fragile items, disposable cups
	E07	Refuse	Composite (mostly plastic)	Disposable razor blades, plastic plasters
	E08	Refuse	Other Rigid Plastic Packaging	
	E09	Refuse	Other Plastic	Hoses, toys, cassettes and CDs, lino, coat hangers, air freshener holders
<b>Ferrous</b>	F01	Recyclable	Steel packaging	Food cans, lids, tins
	F02	Refuse	Composite (mostly steel)	Aerosol cans
	F03	Recyclable	Other Ferrous	Keys, nails, cutlery, tools, pots and pans, paper clips, safety pins, metal shelves
<b>Non-ferrous</b>	G011	Recyclable	Aluminium Cans	Beer cans, soft drink cans
	G02	Recyclable	Other Packaging	Foil, trays, shoe polish cans
	G03	Refuse	Composite (mostly non-ferrous)	Copper piping
<b>Hazardous</b>	H01	Hazardous	Paint and Chemicals	Paint (including tin), chemicals, pesticides
	H02	Hazardous	Fluorescent Globes & Bulbs	Light bulbs
	H03	Hazardous	Dry Cell Batteries	Lead acid, Nickel cadmium, laptop batteries
	H04	Hazardous	Car Batteries	
	H05	Hazardous	Medical Waste	Syringes, needles, pharmaceuticals
	H06	Hazardous	Other Hazardous Waste	Mercury thermometers
	H07	Hazardous	E-Waste	Electronic and electrical appliances, toys, remote controls, smoke detectors, mobile phones
<b>Earth Based</b>	I01	Refuse	Ceramics	Garden pots, crockery, tiles
	I02	Refuse	Rock / Soil / Dirt / Earth	Bricks, stones, sand
	I03	Refuse	Ash	
<b>Residues</b>	Res	Refuse	Fine Residues <20mm	Glass fines, dust
<b>Miscellaneous</b>	Misc	Refuse	Miscellaneous	Soap, bones

Note \* For the purpose of this study each of the material was assigned a waste stream.

## Appendix B

# Occupational Health and Safety Plan





# OCCUPATIONAL HEALTH AND SAFETY PLAN

## ECU Waste Audits

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# OCCUPATIONAL HEALTH AND SAFETY PLAN

## ECU WASTE AUDITS

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## 1. INTRODUCTION

Cardno WA Pty (Cardno) has been commissioned by the Edith Cowan University (ECU) to undertake waste audits on waste arising within each of their three campuses: Joondalup, Mount Lawley and Bunbury. The audit will involve people manually sorting through the waste to gain a better understanding of the waste stream composition. Due to the nature of these works there are a number of potential hazards and risks will be present. This Occupational Health and Safety Plan (OHS Plan) identifies all these potential hazardous and risk associated with completing the waste audits, and summarises the management measure to be adopted to ensure that these are controlled to an appropriated level.

## 2. DESCRIPTION OF WORKS

The following section summarises the key activities involved in the waste audit process from collection of materials, sorting through to disposal. A full detailed description of the waste audit methodology is contained within the Cardno (2009) *Edith Cowan University – Waste Audit* report.

### 2.1 Collection

The waste materials that will be audited will be collected through the services of the current waste collection service provider (cleaners). It is anticipated that there will be no additional risks or hazards from the normal collections that are undertaken on a daily basis by the service providers. Therefore, it has been assumed that any potential risks associated with this aspect of the audit will be controlled through their own risk management measures.

Waste is collected in bags, which will be dropped off at the designated waste audit area by the cleaners.

### 2.2 Sorting and handling

Each bag of waste will be weighed individually prior to sorting. For sorting, waste samples will be brought onto the waste audit table. This has been specifically designed for this waste audit to contain waste, allow for efficient sorting and to prevent repetitive strain injuries. Waste will then be sorted into different material streams and separated into Mobile Garbage Bins (MGBs) and buckets. Following sorting and weighing, waste will be returned to a front lift bin or MGB for collection and disposal.

The sorting and handling section of works is where the personnel involved will be exposed to some hazards and risks.

### 2.3 Facilities and on-site resources

The following facilities are located at the site for use by the audit personnel:

- Toilet facilities
- Drinking water
- Telephone
- Designated smoking area
- Emergency assembly area

Location of these facilities will be indicated by the Waste Audit coordinator.

### 3. RISK ASSESSMENT

#### 3.1 Hazard Identification

The following hazards and the potential risks have been identified, which may arise from the various activities involved in conducting the waste audit.

##### 3.1.1 Waste Handling

<b>Risk</b>	<b>Comment</b>
<b>1.1 Skin puncture due to contact with sharp object</b>	It is expected that the waste sample will contain some objects such as broken glass and sharp pieces of metal. Without the use of protective clothing, these materials could result in outcomes from minor cuts to serious infection and/or injuries.
<b>1.2 Illness due to contact with bacterial/infectious substances</b>	The waste sample is expected to contain significant quantities of putrescible material that may have already begun decomposition. There may also be non-putrescible material that is contaminated or otherwise unclean. Handling these materials incorrectly or not adhering to appropriate hygiene standards may result in illness.
<b>1.3 Skin burn due to contact with chemicals</b>	Hazardous chemicals and liquids may be found within the waste sample. Depending on the toxicity of the particular substance, serious burns may result from skin contact with these substances.
<b>1.4 Muscle or other injury from lifting waste</b>	It is expected that bulky items will make up a small portion of the waste sample to be analysed. Incorrect handling of this material may result in injury to workers attempting to move or lift heavy objects.
<b>1.5 Eye injury due to dust/chemical</b>	Dust is expected to be present in the waste itself and also generated during the movement of waste material. Should a large amount of dust be generated during waste sorting, this may be irritating to eyes, without appropriate protection. Chemicals, particularly in liquid form, may splash into eyes, having the potential to cause serious eye damage.

##### 3.1.2 Movement of personnel

<b>Risk</b>	<b>Comment</b>
<b>2.1 Injury from slipping/fall</b>	The waste sample will be stored on the ground at the site as outlined in <b>Section 2.2</b> . Following classification, different waste streams will be stored in buckets or MGBs. This will pose a tripping hazard if workers do not exercise caution whilst moving around the site.

##### 3.1.3 Work Conditions

<b>Risk</b>	<b>Comment</b>
<b>3.1 Dehydration</b>	Due to the time of year it is possible that weather conditions could be very hot, particularly within the sheds where the audits will be conducted. Therefore maintaining adequate hydration will be extremely important to avoid detrimental physical effects during the audit.
<b>3.2 Fatigue</b>	The physical nature of the waste audit may result in physical fatigue of workers, particularly in difficult weather conditions. Waste will require moving, sorting and weighing which may be tiring when done for long periods.

### 3.1.4 Fire

Risk	Comment
<b>4.1 Burns, suffocation, smoke inhalation</b>	The site will contain significant quantities of flammable and hazardous materials during the waste audit. Should these become ignited, fire and smoke will be a hazard to all workers on site, due to the risk of burns and smoke related conditions.

## 3.2 Risk Analysis and Rating

Following identification of hazards and potential risks associated with the waste audit, these are classified according to the Risk Assessment Matrix (**Table 1**). The likelihood of the risk occurring is shown in the rows, while the severity of the outcome is displayed in the columns. Using this matrix, the risks are classified as Very High, High, Moderate or Low. Management options for each of these risks can therefore be developed, according to their rating in the table.

**Table 1 Reference Risk Matrix**

		<i>Consequence</i>				
		Insignificant	Minor	Moderate	Major	Catastrophic
<i>Probability</i>	Almost Certain	High	High	Very High	Very High	Very High
	Likely	Moderate	Moderate	High	Very High	Very High
	Possible	Low	Moderate	High	High	Very High
	Unlikely	Low	Low	Moderate	Moderate	High
	Rare	Low	Low	Low	Low	Moderate

**Table 2 Risk Matrix for Waste Audit Risks**

		<i>Consequence</i>				
		Insignificant	Minor	Moderate	Major	Catastrophic
<i>Probability</i>	Almost Certain					
	Likely					
	Possible		1.4 2.1	1.1		
	Unlikely	3.2	1.2		1.3 1.5 5.1	
	Rare		3.1			4.1

## 4. SAFETY REQUIREMENTS

The following safety requirements must be adhered to at all times while conducting the audit. This will minimise risks to personnel and ensure any incidents are appropriately managed.

## 4.1 Responsibilities

All personnel are responsible for their own safety and the safety of others. Before commencing the audit, personnel must make themselves aware of all relevant safety information including emergency procedures. Any incidents regarding worker safety must be reported immediately to the Waste Audit coordinator. All personnel are required to read and sign the Work Activity Risk Assessment Form which identifies hazards, associated potential risks and the management options in place to demonstrate their knowledge and understanding of the Occupational Health and Safety aspects of the audit.

## 4.2 Sampling procedure

Specific sampling procedures will be outlined by the Waste Audit coordinator prior to commencement of the audit. This will include instructions on handling waste, particularly regarding the use of tools and equipment. Due to the potentially hazardous nature of the waste, caution should be exercised at all times when handling waste.

## 5. RISK MANAGEMENT

This section summarises the key management strategies that will be adopted on site to ensure that all hazards and potential risks identified previously are controlled to an appropriated level, and that strategies are in place to react to any potential incidents or accidents that may occur.

Prior to the commencement of the waste audit, all staff will participate in induction training. Staff will be informed on a range of topics, including on site facilities, correct lifting procedures, waste sorting and handling procedures, all OHS management strategies listed in the following table and evacuation plans.

The following Risk Management Table (**Table 3**) summarises potential risks, the strategies that will be employed to reduce the likelihood of these risks and appropriate actions in the case of an event occurring.

**Table 3 Risk Management Table**

Hazard	Risk	Management Strategy
Waste Handling	Skin puncture due to contact with sharp object	All employees to wear protective clothing (safety glasses, boots, coveralls, gloves) when handling waste. Material that could be dangerous to be handled with appropriate tools or equipment. First aid kit provided in case of an accident. Vaccination against Hepatitis B and tetanus recommended.
Waste Handling	Illness due to contact with bacterial/infectious substances	All employees to wear protective clothing (safety glasses, face masks, coveralls, gloves) when handling waste. Employees to be advised of correct hygiene – water and soap provided on site for cleaning. Vaccination against Hepatitis A recommended.
Waste Handling	Skin burn due to contact with chemicals	All employees to wear protective clothing (safety glasses, boots, coveralls, gloves) when handling waste. Any potentially hazardous liquids to be handled with care. First aid kit provided in case of accident.

Waste Handling	Muscle or other injury from lifting waste	Employees to be trained in safe lifting techniques. Load to be lifted should be tested for weight before manual lifting occurs.
Waste Handling	Eye injury due to dust/chemical	Safety goggles to be worn when handling waste. First aid kit provided in case of accident.
Waste Handling	Breathing difficulties due to dust	Face masks to be worn when handling waste.
Waste Handling	Odorous Materials	Face masks to be worn when handling waste. Reactions to odorous samples to be monitored and a break taken if necessary.
Movement of personnel	Injury from slipping/fall	Employees to wear secure footwear and advised to move with caution. Floor swept regularly
Work Conditions	Dehydration	Water bottles to be used and water made available throughout the day. Employees to be informed on the risk.
Work Conditions	Fatigue from collection procedures	Regular breaks to be scheduled during the audit. Adequate food and water to be provided to employees.
Fire	Burns, suffocation, smoke inhalation	Fire hydrant and fire blanket to be located on site. Waste audit coordinator to advise all personnel of evacuation procedure prior to commencement of the audit.

## 6. CONTACTS

### 6.1 On-site contacts

Waste Audit Coordinator  
Ronan Cullen 0427 719 473

### 6.2 Emergency contacts

Perth Emergency Services  
(Police, Fire Ambulance) 000

Bunbury Fire Station 9721 4644  
Bunbury Police Station 9222 1111  
St John Ambulance Bunbury 9791 4999

## Appendix C

# Detailed Waste Audit Data

## Joondalup Campus

Table A3-1 Composition of 'Around Campus' refuse at the Joondalup campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.04	0.51%
Magazines	A02	0.13	1.59%
Packaging	A03	0.32	3.89%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.15	1.83%
Liquid Paper Board	A06	0.66	7.99%
Disposables	A07	0.46	5.58%
Office Paper	A08	0.15	1.83%
Composite mainly Paper	A09	0.29	3.52%
<b>SUBTOTAL - PAPER</b>		<b>2.22</b>	<b>26.75%</b>
Food/Kitchen	B01	1.90	22.96%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>1.90</b>	<b>22.96%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.02%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.63	7.63%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.63</b>	<b>7.65%</b>
Glass Packaging	D01	1.07	12.94%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>1.07</b>	<b>12.94%</b>
PET	E01	0.87	10.53%
HDPE	E02	0.00	0.00%
PVC	E03	0.11	1.35%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.79	9.56%
PP	E05	0.06	0.75%
Polystyrene	E06	0.20	2.44%
Composite mainly Plastic	E07	0.02	0.27%
Other Rigid Plastic	E08	0.07	0.87%
Other Plastic	E09	0.04	0.51%
<b>SUBTOTAL - PLASTIC</b>		<b>2.18</b>	<b>26.27%</b>
Steel Packaging	F01	0.00	0.00%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.00</b>	<b>0.00%</b>
Aluminium Cans	G011	0.23	2.80%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.23</b>	<b>2.80%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.00	0.00%
Miscellaneous	Misc	0.05	0.63%
<b>TOTAL - ALL MATERIALS</b>		<b>8.28</b>	<b>100.00%</b>

Figure A3-1 Composition of 'Around Campus' refuse at the Joondalup campus

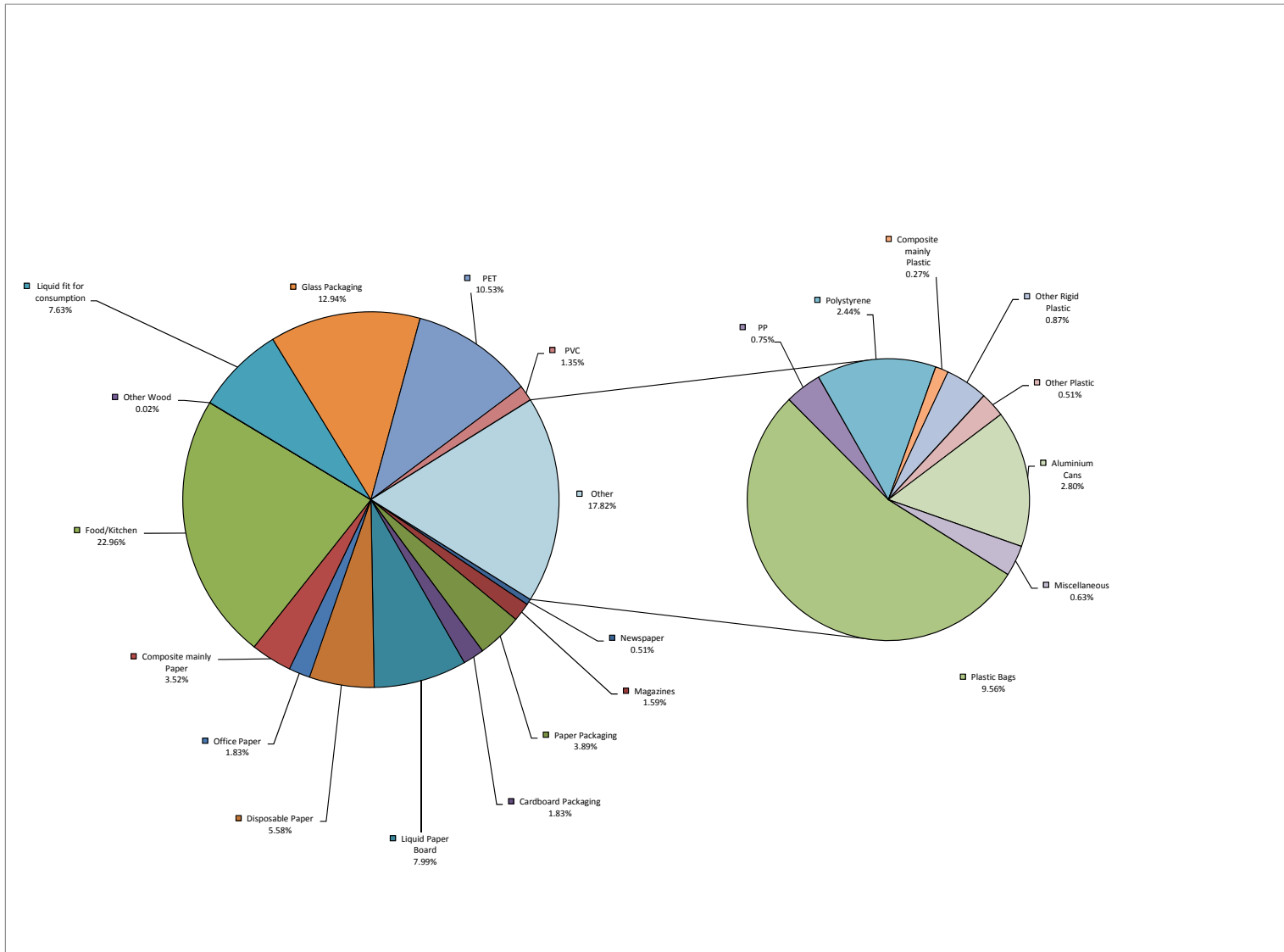


Figure A3-2 Material groupings of 'Around Campus' refuse at the Joondalup campus

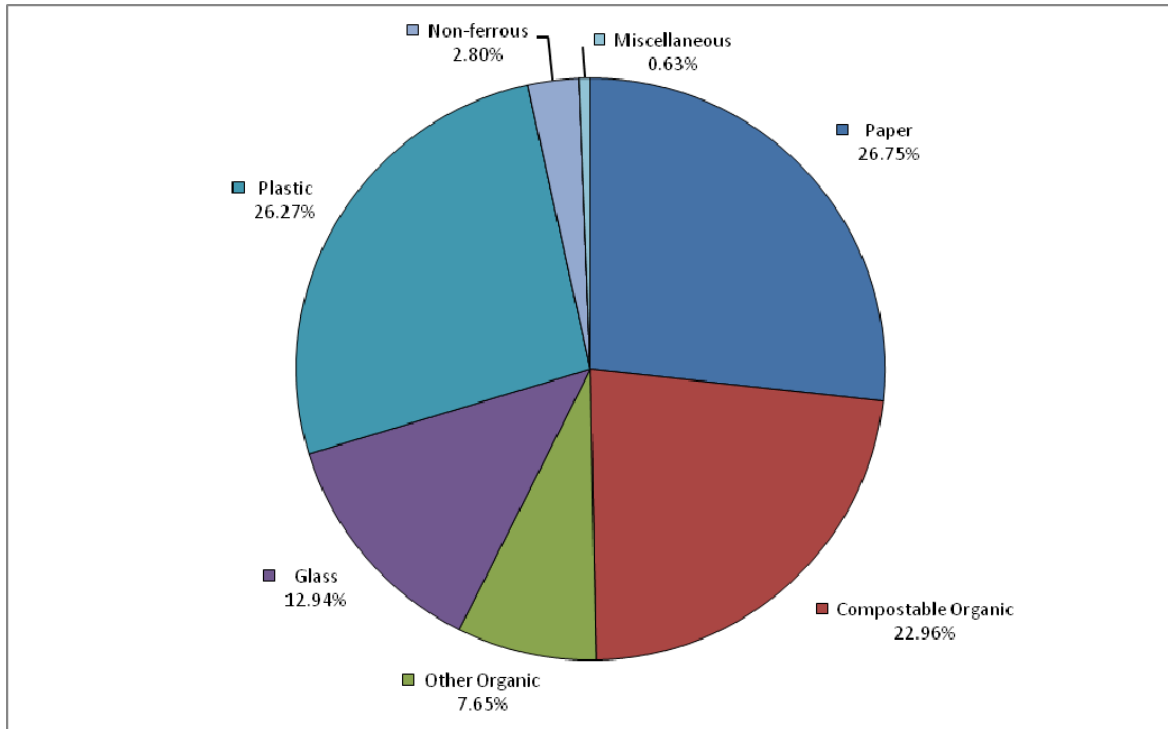


Figure A3-3 Key Waste Streams of 'Around Campus' refuse at the Joondalup campus

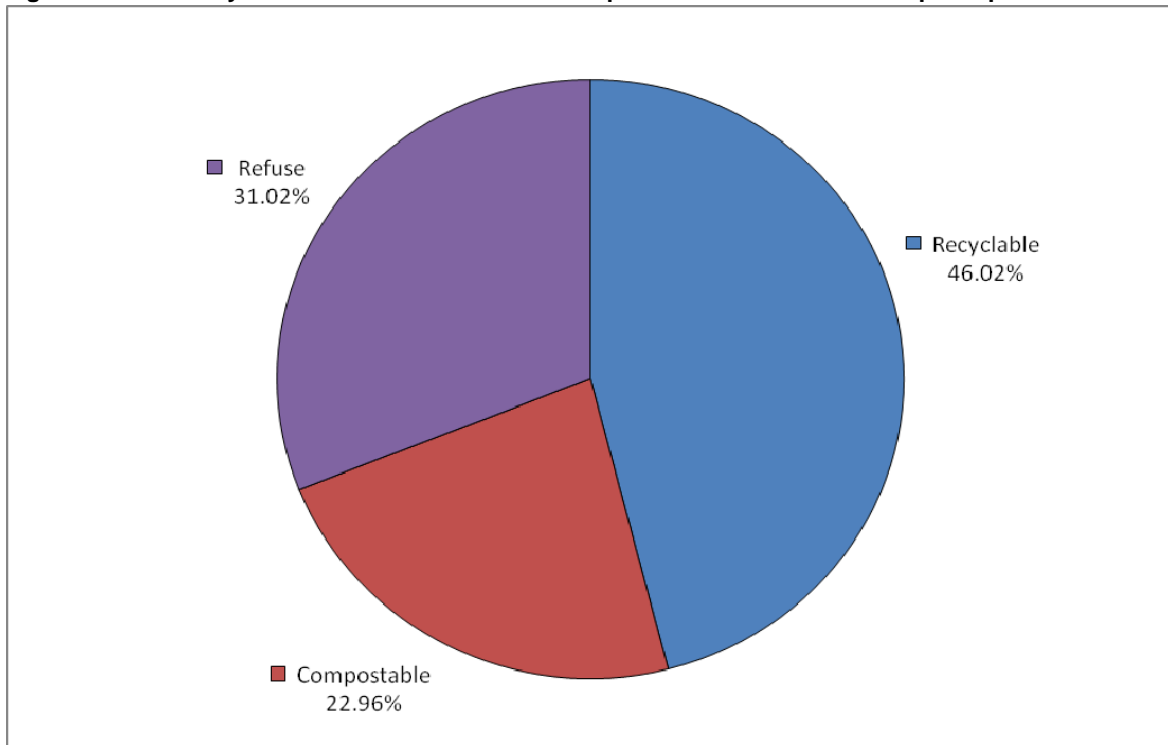


Table A3-2 Composition of 'Front of Outlets' refuse at the Joondalup campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.03	0.48%
Packaging	A03	0.48	7.30%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.07	1.09%
Liquid Paper Board	A06	0.83	12.60%
Disposables	A07	0.26	3.97%
Office Paper	A08	0.11	1.70%
Composite mainly Paper	A09	0.04	0.64%
<b>SUBTOTAL - PAPER</b>		<b>1.83</b>	<b>27.78%</b>
Food/Kitchen	B01	0.00	0.00%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>0.00</b>	<b>0.00%</b>
Wood Packaging	C011	0.03	0.48%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.26	3.97%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.29</b>	<b>4.45%</b>
Glass Packaging	D01	0.80	12.15%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.80</b>	<b>12.15%</b>
PET	E01	1.00	15.18%
HDPE	E02	0.00	0.00%
PVC	E03	0.03	0.48%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.93	14.12%
PP	E05	0.29	4.42%
Polystyrene	E06	0.25	3.82%
Composite mainly Plastic	E07	0.09	1.39%
Other Rigid Plastic	E08	0.09	1.39%
Other Plastic	E09	0.08	1.24%
<b>SUBTOTAL - PLASTIC</b>		<b>2.78</b>	<b>42.05%</b>
Steel Packaging	F01	0.15	2.30%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.15</b>	<b>2.30%</b>
Aluminium Cans	G011	0.56	8.51%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.56</b>	<b>8.51%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.00	0.00%
Miscellaneous	Misc	0.18	2.76%
<b>TOTAL - ALL MATERIALS</b>		<b>6.60</b>	<b>100.00%</b>

Figure A3-4 Composition of 'Front of Outlets' refuse at the Joondalup campus

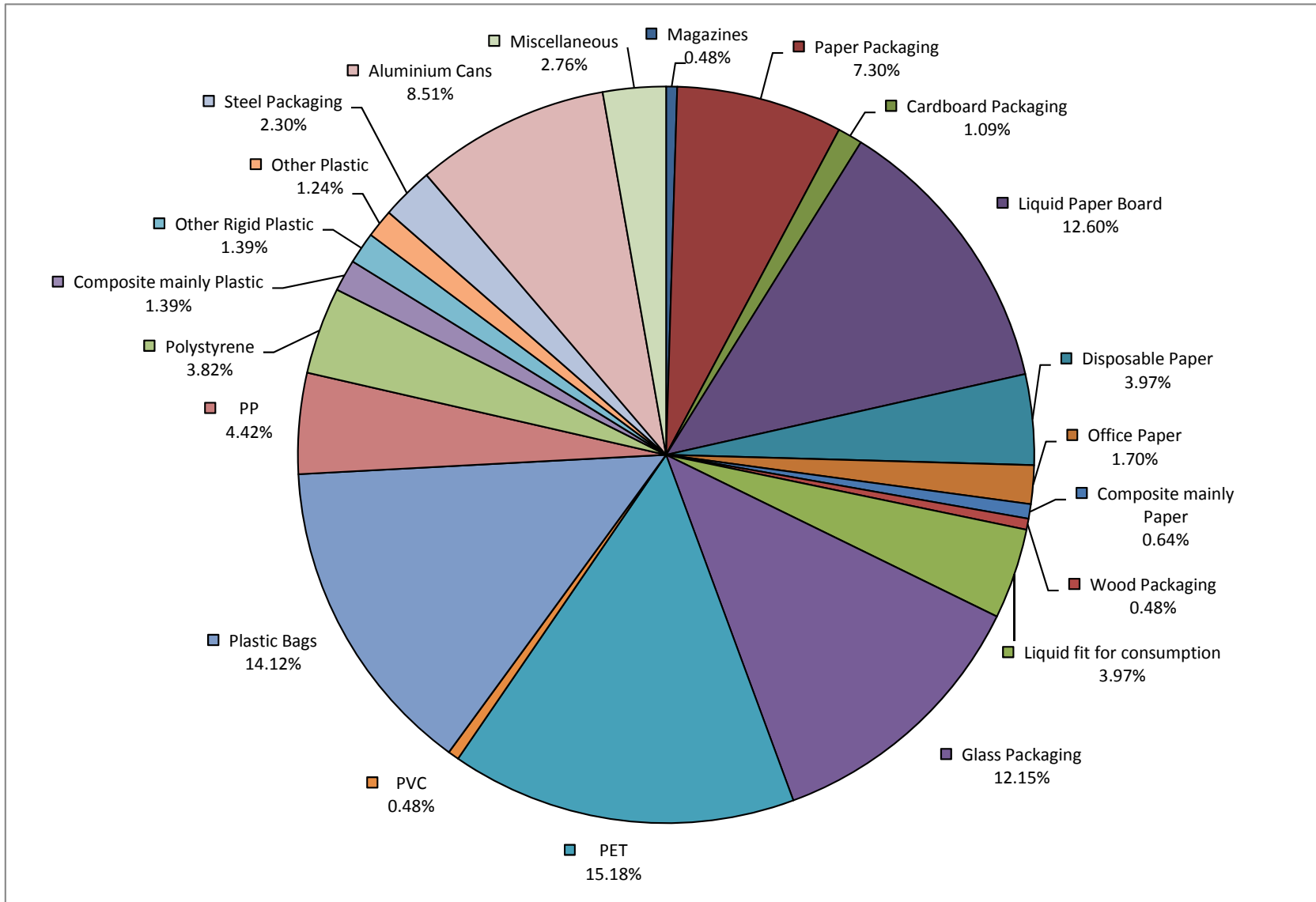


Figure A3-5 Material groupings of 'Front of Outlets' refuse at the Joondalup campus

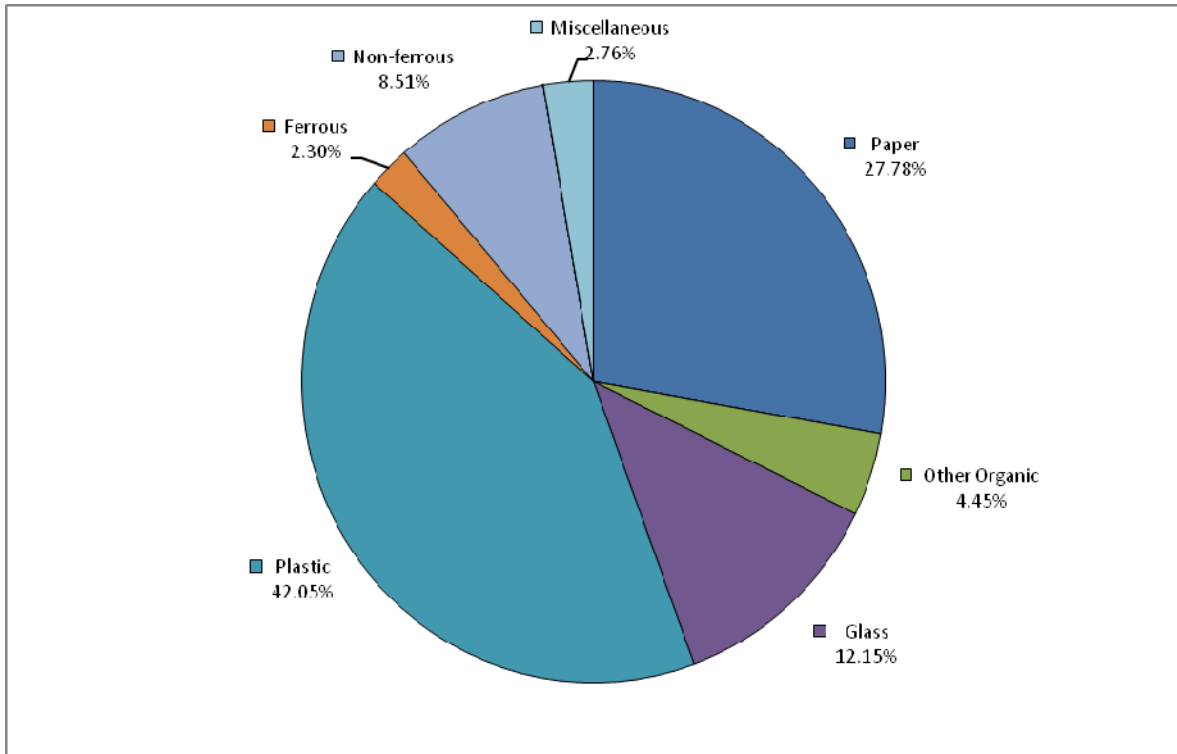


Figure A3-6 Key Waste Streams of 'Front of Outlets' refuse at the Joondalup campus

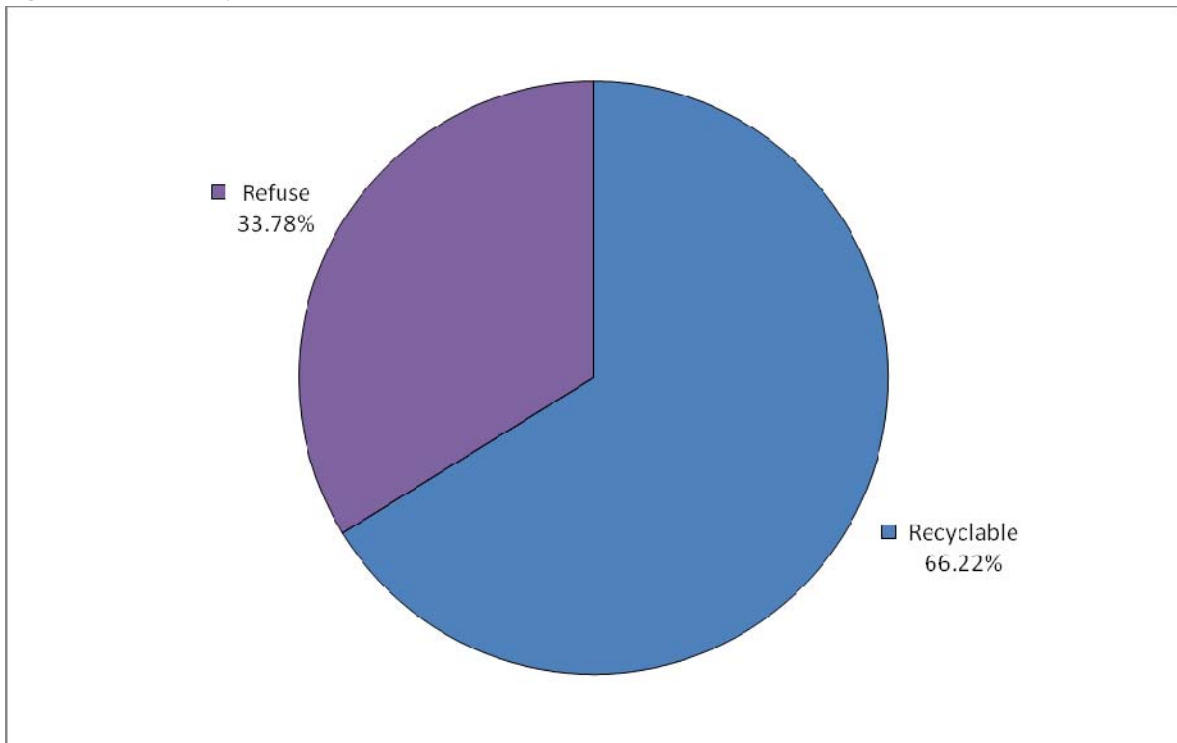


Table A3-3 Composition of Administration Building refuse at the Joondalup campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	1.14	2.69%
Magazines	A02	1.11	2.63%
Packaging	A03	0.46	1.09%
Corrugated Cardboard	A04	0.32	0.76%
Cardboard Packaging	A05	0.86	2.04%
Liquid Paper Board	A06	1.48	3.49%
Disposables	A07	5.56	13.14%
Office Paper	A08	6.96	16.44%
Composite mainly Paper	A09	0.33	0.79%
<b>SUBTOTAL - PAPER</b>		<b>18.23</b>	<b>43.07%</b>
Food/Kitchen	B01	12.54	29.63%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>12.54</b>	<b>29.63%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.05	0.12%
Leather	C03	0.02	0.05%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	1.07	2.53%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>1.15</b>	<b>2.71%</b>
Glass Packaging	D01	0.99	2.34%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.99</b>	<b>2.34%</b>
PET	E01	1.26	2.98%
HDPE	E02	0.16	0.38%
PVC	E03	0.13	0.31%
LDPE	E041	0.20	0.48%
Plastic Bags	E042	2.28	5.39%
PP	E05	0.55	1.31%
Polystyrene	E06	0.51	1.21%
Composite mainly Plastic	E07	0.18	0.43%
Other Rigid Plastic	E08	0.27	0.65%
Other Plastic	E09	0.57	1.35%
<b>SUBTOTAL - PLASTIC</b>		<b>6.13</b>	<b>14.49%</b>
Steel Packaging	F01	0.95	2.25%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.95</b>	<b>2.25%</b>
Aluminium Cans	G011	0.56	8.51%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.56</b>	<b>8.51%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.46	1.09%
Miscellaneous	Misc	1.26	2.98%
<b>TOTAL - ALL MATERIALS</b>		<b>42.33</b>	<b>100.00%</b>

Figure A3-7 Composition of Administration Building refuse at the Joondalup campus

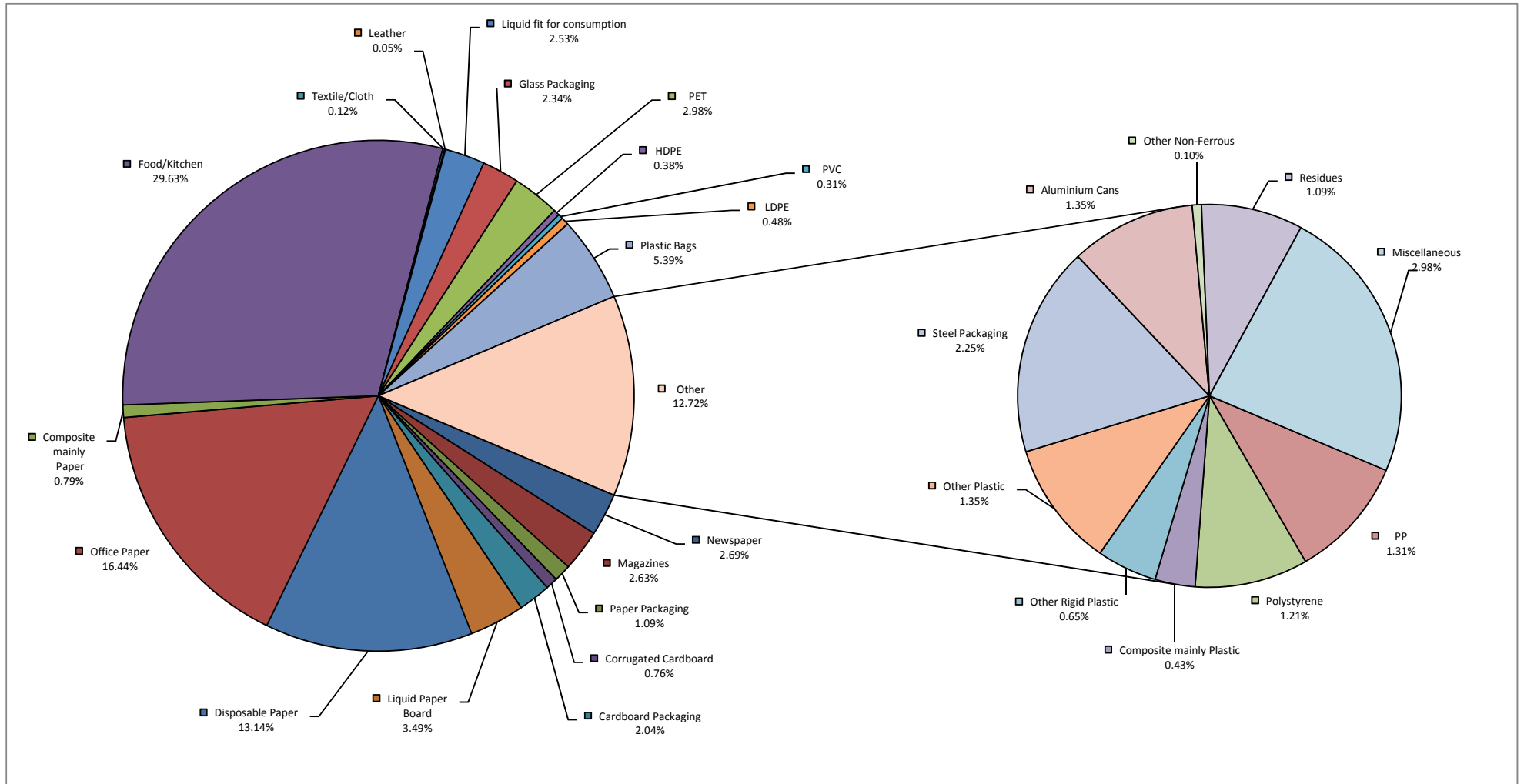


Figure A3-8 Material groupings of Administration Building refuse at the Joondalup campus

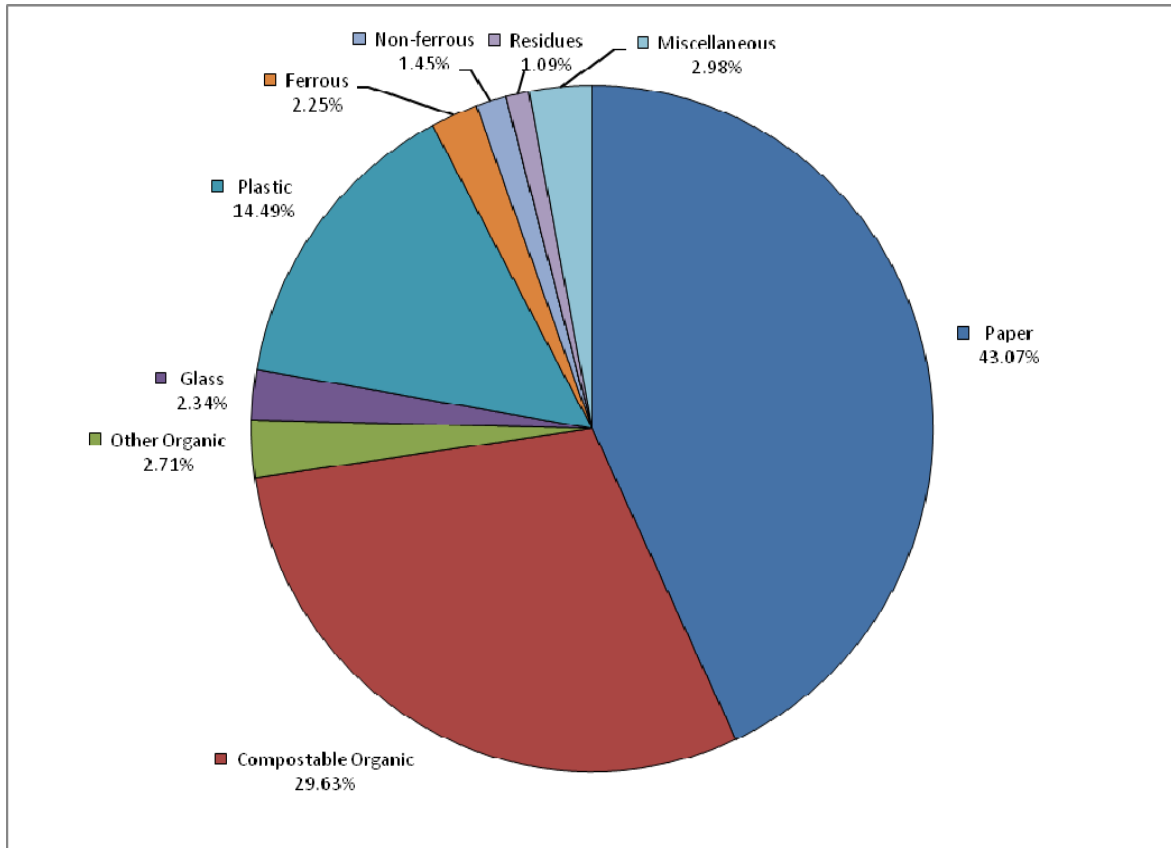


Figure A3-9 Key Waste Streams of Administration Building refuse at the Joondalup campus

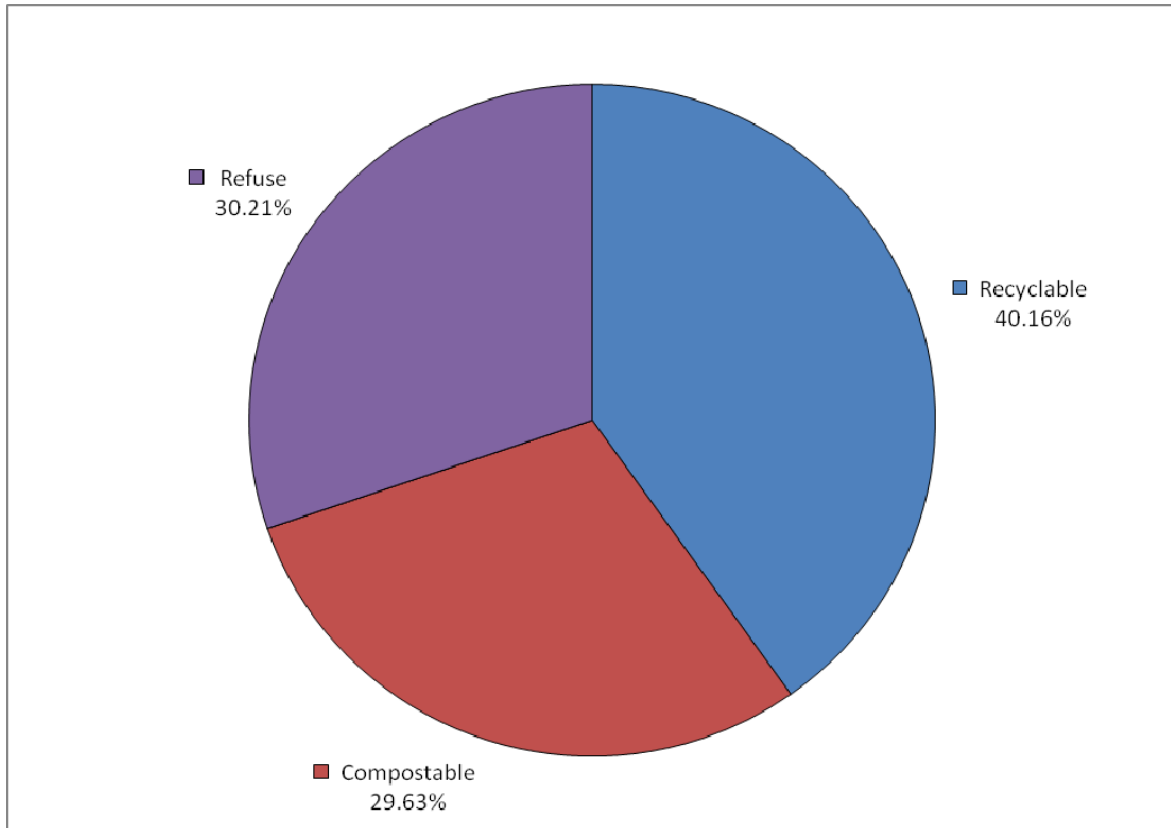


Table A3-4 Composition of Faculty Building refuse at the Joondalup campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	2.82	2.44%
Magazines	A02	2.13	1.84%
Packaging	A03	3.41	2.95%
Corrugated Cardboard	A04	3.87	3.35%
Cardboard Packaging	A05	2.18	1.88%
Liquid Paper Board	A06	4.22	3.65%
Disposables	A07	11.21	9.69%
Office Paper	A08	19.73	17.06%
Composite mainly Paper	A09	1.01	0.87%
<b>SUBTOTAL - PAPER</b>		<b>50.57</b>	<b>43.73%</b>
Food/Kitchen	B01	19.65	16.99%
Garden Waste	B02	0.30	0.26%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>19.95</b>	<b>17.25%</b>
Wood Packaging	C011	0.03	0.03%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.51	0.44%
Leather	C03	0.00	0.00%
Rubber	C04	0.03	0.03%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	12.24	10.58%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>12.82</b>	<b>11.08%</b>
Glass Packaging	D01	1.65	1.43%
Other Glass	D02	0.09	0.08%
<b>SUBTOTAL - GLASS</b>		<b>1.75</b>	<b>1.51%</b>
PET	E01	5.09	4.40%
HDPE	E02	1.01	0.88%
PVC	E03	0.39	0.34%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	6.98	6.04%
PP	E05	1.41	1.22%
Polystyrene	E06	1.29	1.11%
Composite mainly Plastic	E07	0.30	0.26%
Other Rigid Plastic	E08	0.91	0.79%
Other Plastic	E09	4.25	3.68%
<b>SUBTOTAL - PLASTIC</b>		<b>21.64</b>	<b>18.71%</b>
Steel Packaging	F01	1.20	1.03%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.17	0.15%
<b>SUBTOTAL - FERROUS</b>		<b>1.37</b>	<b>1.18%</b>
Aluminium Cans	G011	2.20	1.90%
Other Non-Ferrous	G02	0.11	0.10%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>2.31</b>	<b>2.00%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.01	0.01%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.06	0.05%
Other Hazardous	H06	0.01	0.01%
E-Waste	H07	0.20	0.17%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.29</b>	<b>0.25%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.46	1.09%
Miscellaneous	Misc	3.73	3.23%
Newspaper		<b>115.64</b>	<b>100.00%</b>

Figure A3-10 Composition of Faculty Building refuse at the Joondalup campus

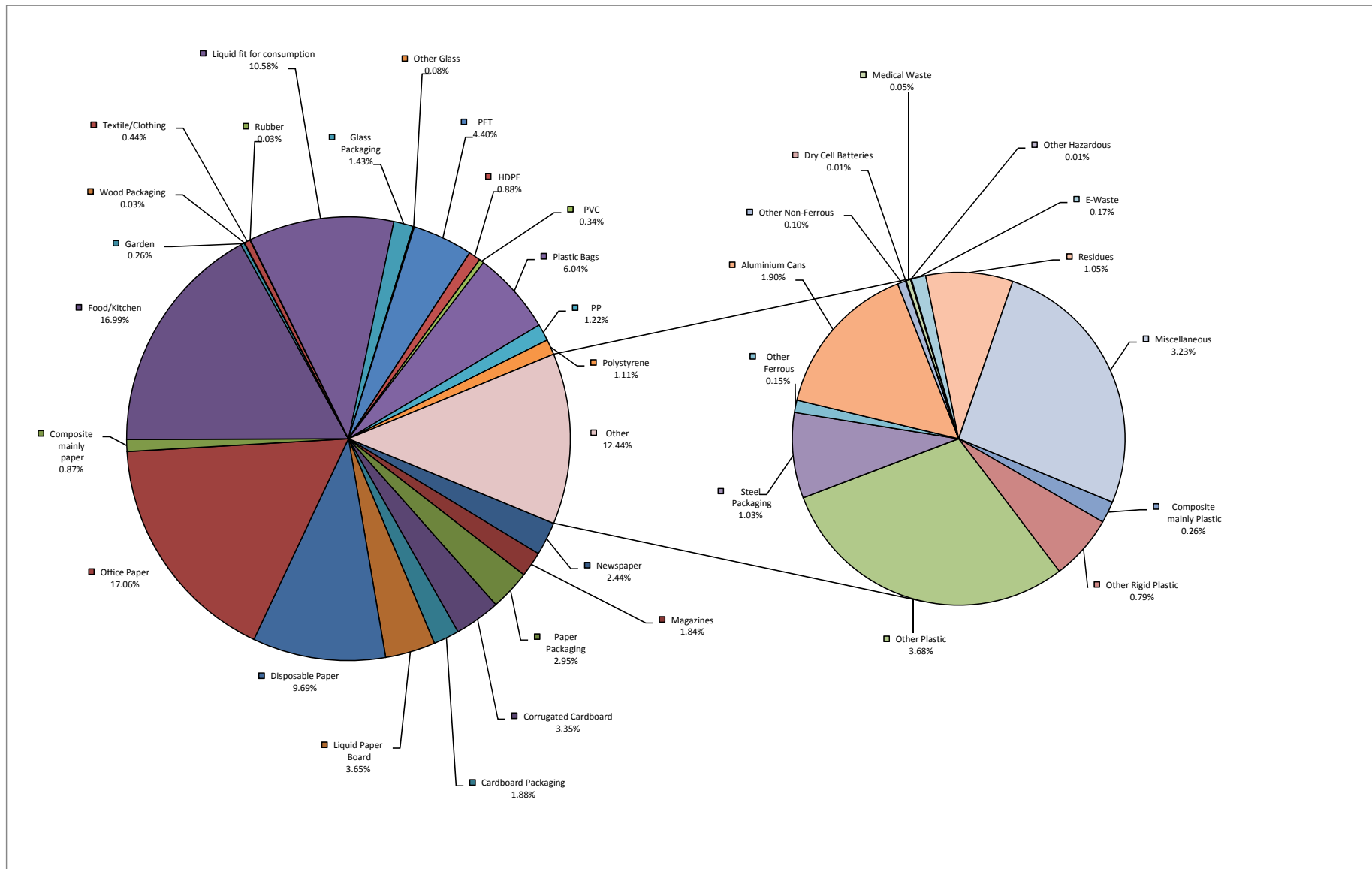


Figure A3-11 Material groupings of Faculty Building refuse at the Joondalup campus

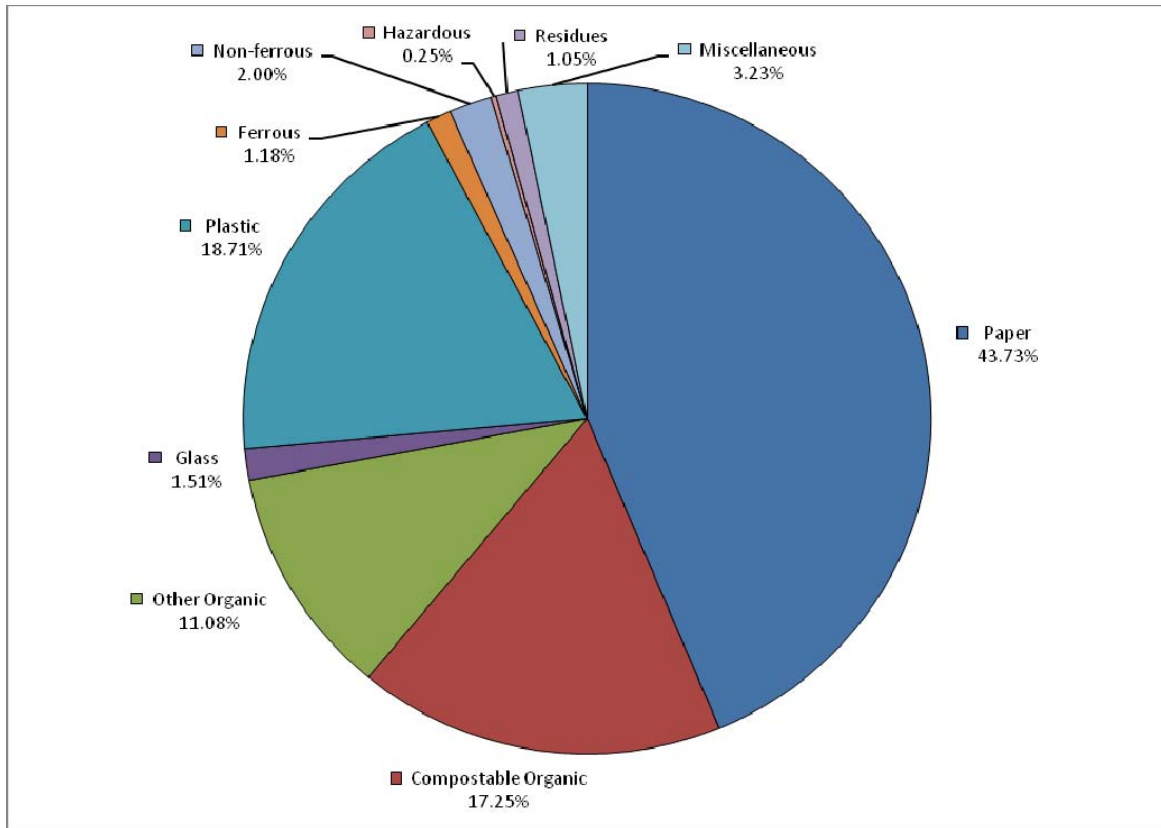
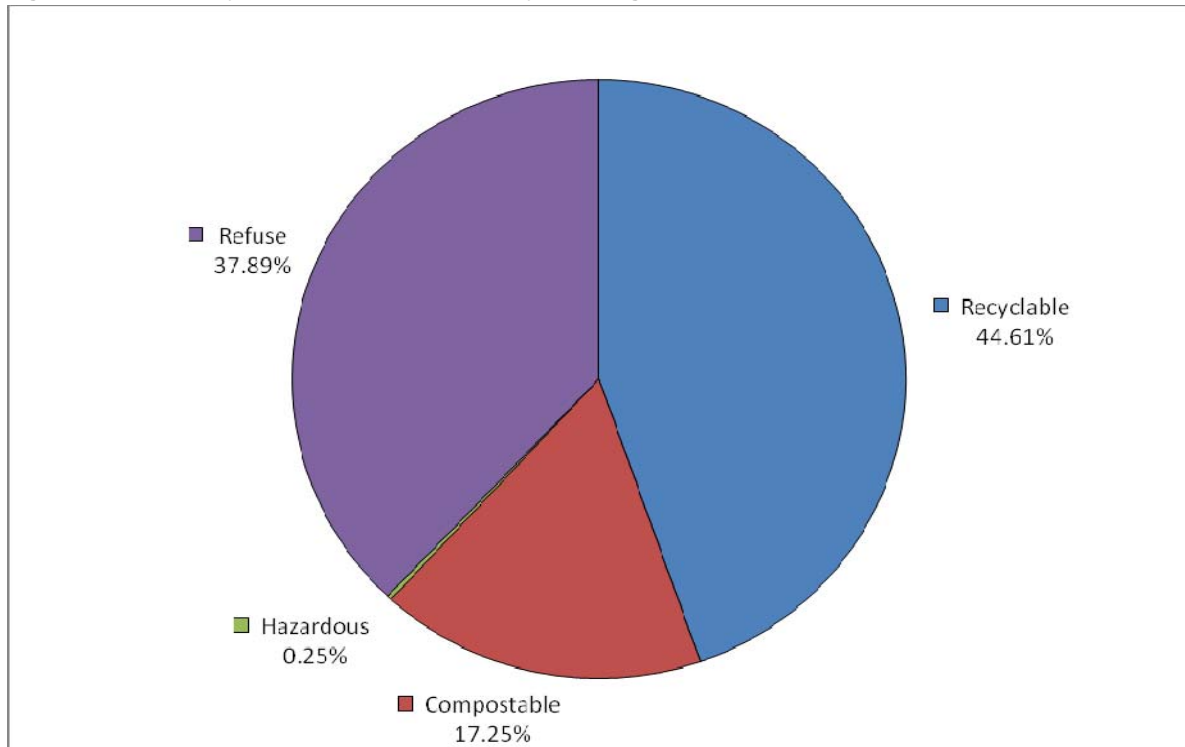


Figure A3-12 Key Waste Streams of Faculty Building refuse at the Joondalup campus



**Table A3-5 Composition of Public Building refuse at the Joondalup campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.34	0.76%
Magazines	A02	0.16	0.36%
Packaging	A03	2.56	5.72%
Corrugated Cardboard	A04	0.77	1.73%
Cardboard Packaging	A05	1.05	2.34%
Liquid Paper Board	A06	3.98	8.91%
Disposables	A07	2.89	6.46%
Office Paper	A08	2.31	5.17%
Composite mainly Paper	A09	0.30	0.68%
<b>SUBTOTAL - PAPER</b>		<b>14.36</b>	<b>32.12%</b>
Food/Kitchen	B01	10.08	22.55%
Garden Waste	B02	0.28	0.63%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>10.36</b>	<b>23.18%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.06	0.14%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	3.68	8.24%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>3.75</b>	<b>8.38%</b>
Glass Packaging	D01	1.07	2.40%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>1.07</b>	<b>2.40%</b>
PET	E01	4.63	10.36%
HDPE	E02	0.09	0.21%
PVC	E03	0.15	0.34%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	3.39	7.58%
PP	E05	0.83	1.85%
Polystyrene	E06	0.78	1.74%
Composite mainly Plastic	E07	0.00	0.00%
Other Rigid Plastic	E08	0.26	0.59%
Other Plastic	E09	0.41	0.93%
<b>SUBTOTAL - PLASTIC</b>		<b>10.54</b>	<b>23.58%</b>
Steel Packaging	F01	0.23	0.52%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.07	0.16%
<b>SUBTOTAL - FERROUS</b>		<b>0.30</b>	<b>0.68%</b>
Aluminium Cans	G011	2.14	4.79%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>2.14</b>	<b>4.79%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.01	0.03%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.01</b>	<b>0.03%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.96	2.16%
Miscellaneous	Misc	1.20	2.69%
<b>TOTAL - ALL MATERIALS</b>		<b>44.71</b>	<b>100.00%</b>

Figure A3-13 Composition of Public Building refuse at the Joondalup campus

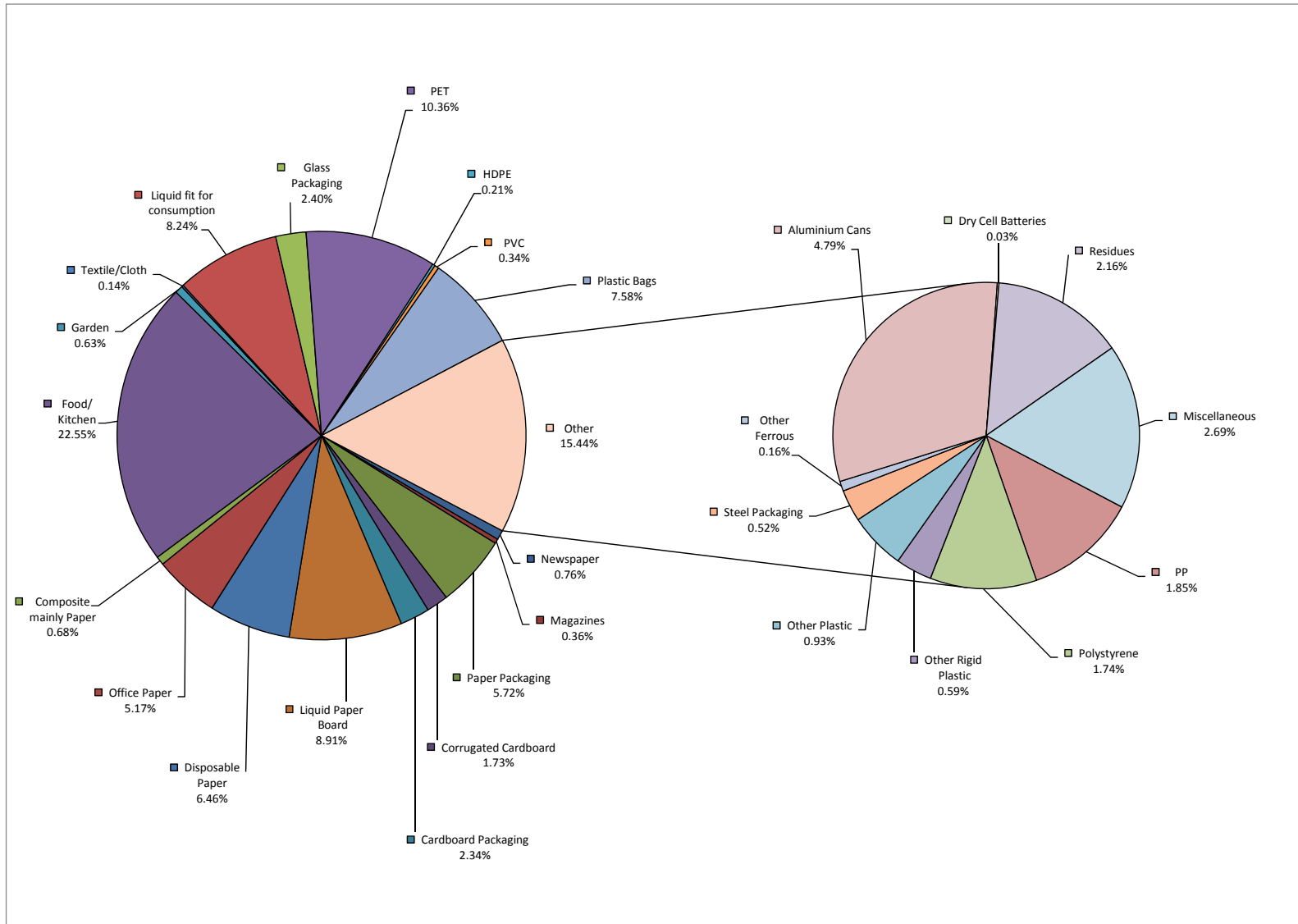


Figure A3-14 Material groupings of Public Building refuse at the Joondalup campus

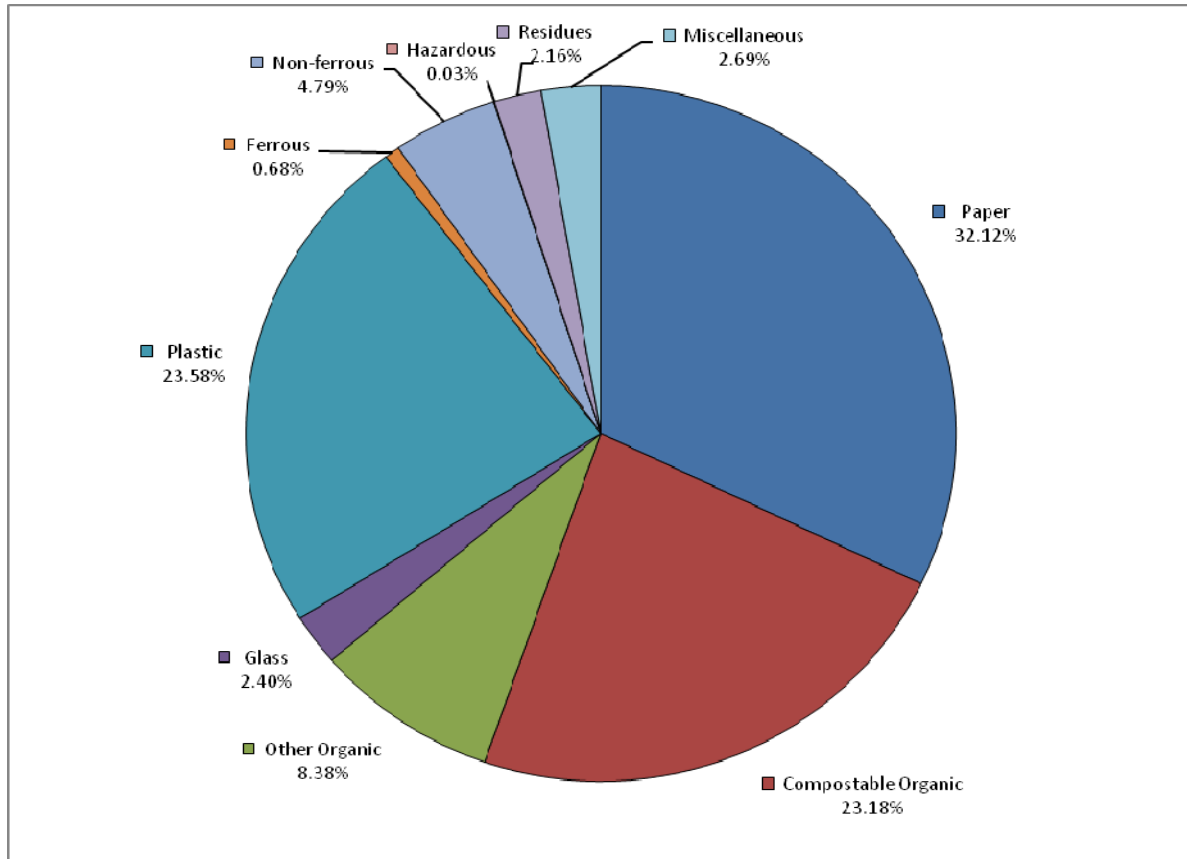
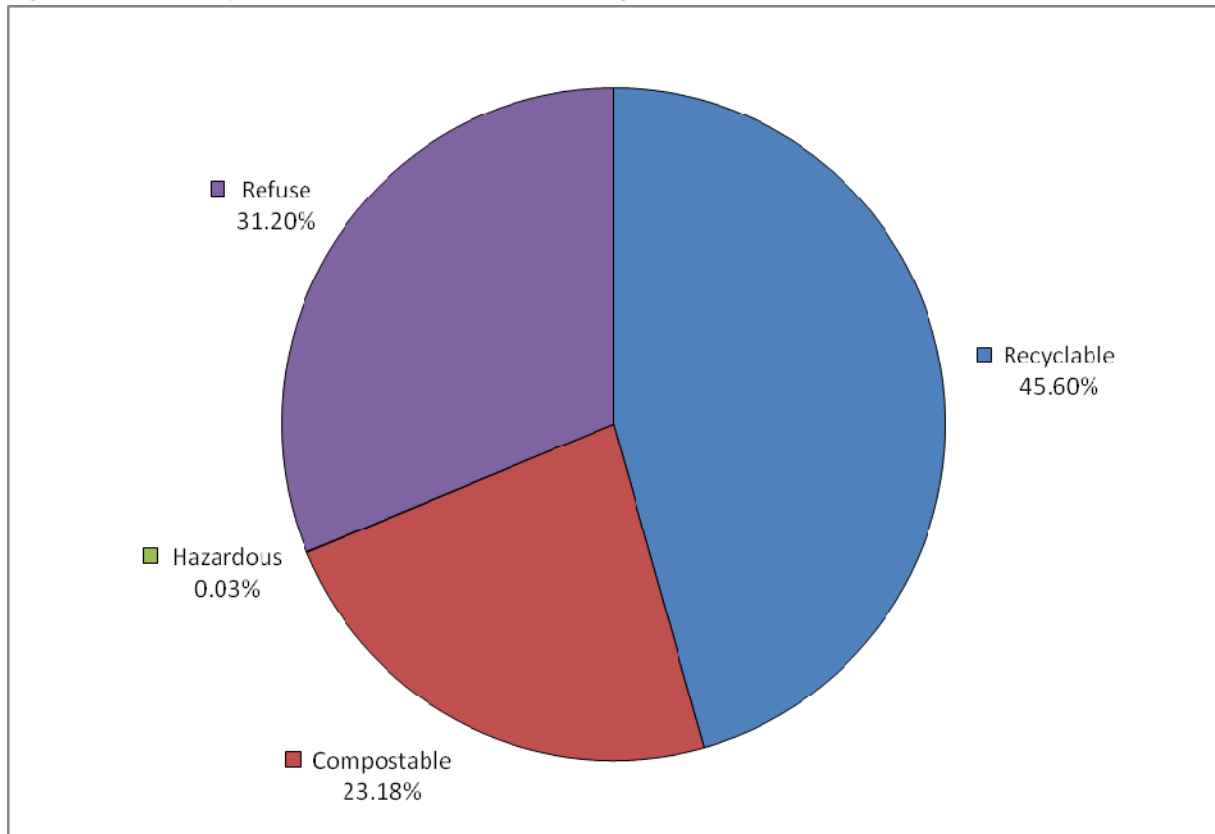


Figure A3-15 Key Waste Streams of Public Building refuse at the Joondalup campus





## Appendix D

# Detailed Waste Audit Data

# Mount Lawley Campus

Table A4-1 Composition of 'Around Campus' refuse at the Mount Lawley campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.04	0.23%
Packaging	A03	0.83	4.56%
Corrugated Cardboard	A04	0.31	1.69%
Cardboard Packaging	A05	0.27	1.49%
Liquid Paper Board	A06	0.79	4.32%
Disposables	A07	0.25	1.37%
Office Paper	A08	0.24	1.31%
Composite mainly Paper	A09	0.04	0.23%
<b>SUBTOTAL - PAPER</b>		<b>2.78</b>	<b>15.18%</b>
Food/Kitchen	B01	5.69	31.08%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>5.69</b>	<b>31.08%</b>
Wood Packaging	C011	0.03	0.17%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	1.14	6.24%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	3.39	18.53%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>4.57</b>	<b>24.94%</b>
Glass Packaging	D01	1.24	6.78%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>1.24</b>	<b>6.78%</b>
PET	E01	0.91	4.97%
HDPE	E02	0.17	0.94%
PVC	E03	0.02	0.12%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.08	5.90%
PP	E05	0.35	1.91%
Polystyrene	E06	0.08	0.45%
Composite mainly Plastic	E07	0.00	0.00%
Other Rigid Plastic	E08	0.04	0.23%
Other Plastic	E09	0.06	0.34%
<b>SUBTOTAL - PLASTIC</b>		<b>2.72</b>	<b>14.86%</b>
Steel Packaging	F01	0.05	0.28%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.07	0.39%
<b>SUBTOTAL - FERROUS</b>		<b>0.12</b>	<b>0.68%</b>
Aluminium Cans	G011	0.25	1.37%
Other Non-Ferrous	G02	0.06	0.34%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.31</b>	<b>1.70%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.07	0.39%
Miscellaneous	Misc	0.80	4.38%
<b>TOTAL - ALL MATERIALS</b>		<b>18.31</b>	<b>100.00%</b>

Figure A4-1 Composition of 'Around Campus' refuse at the Mount Lawley campus

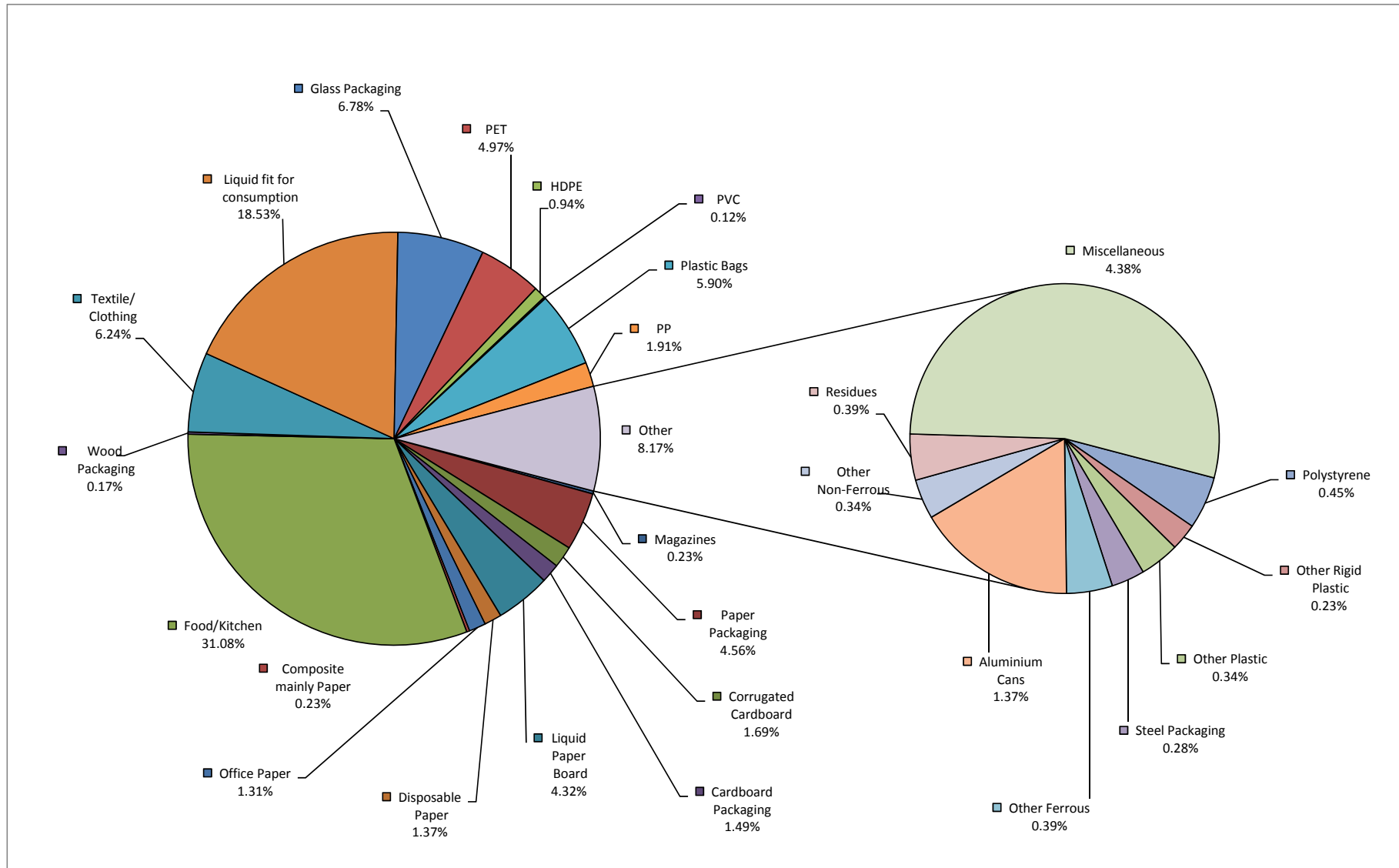


Figure A4-2 Material groupings of 'Around Campus' refuse at the Mount Lawley campus

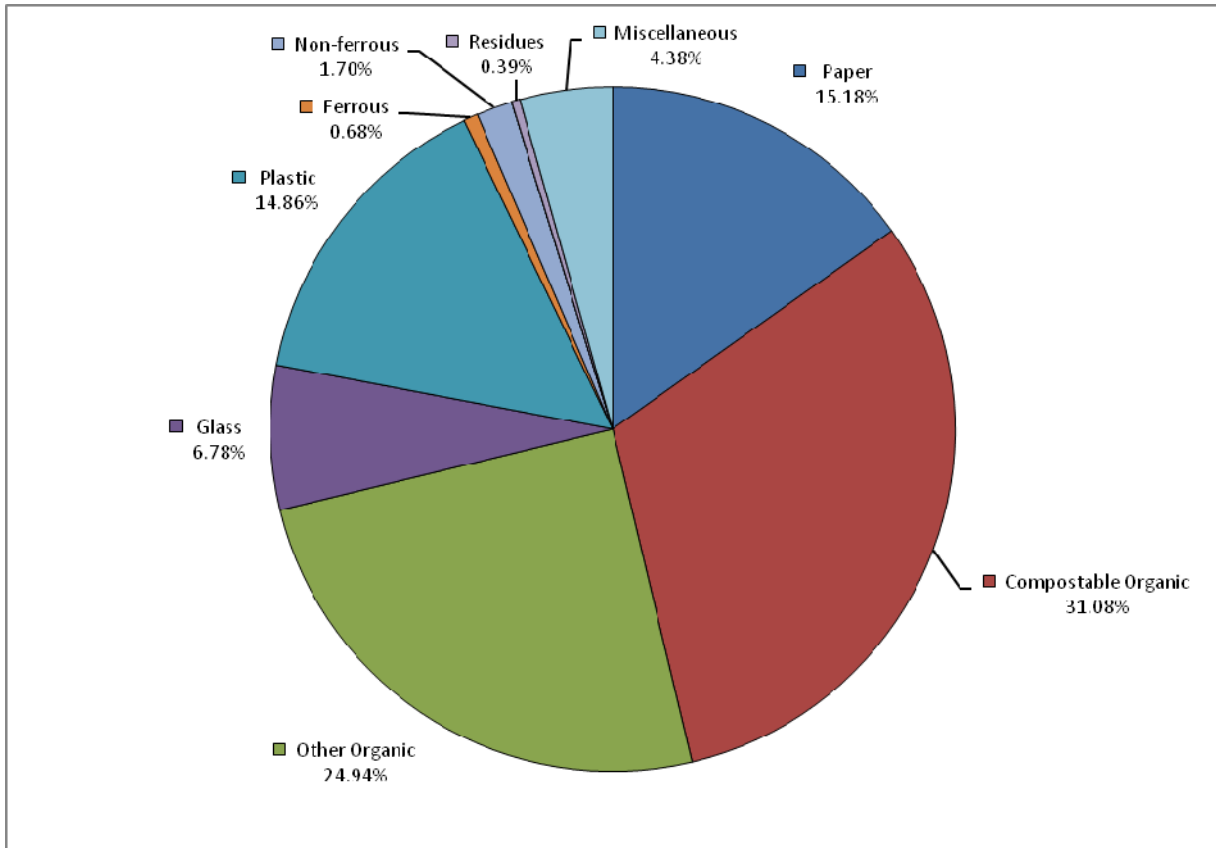


Figure A4-3 Key Waste Streams of 'Around Campus' refuse at the Mount Lawley campus

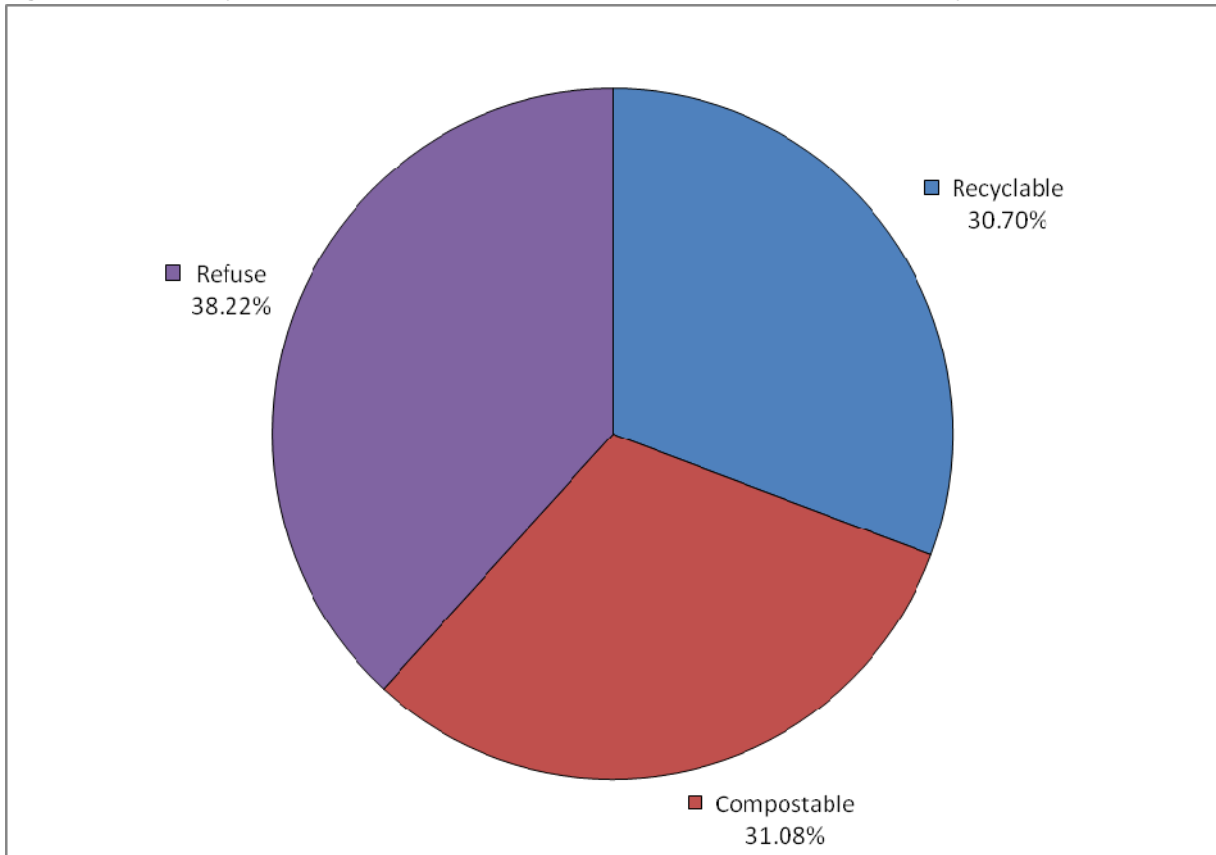


Table A4-2 Composition of 'Front of Outlets' refuse at the Mount Lawley campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.31	1.03%
Packaging	A03	1.59	5.25%
Corrugated Cardboard	A04	0.03	0.11%
Cardboard Packaging	A05	0.45	1.49%
Liquid Paper Board	A06	1.87	6.16%
Disposables	A07	0.60	1.98%
Office Paper	A08	0.15	0.49%
Composite mainly Paper	A09	0.07	0.24%
<b>SUBTOTAL - PAPER</b>		<b>5.08</b>	<b>16.73%</b>
Food/Kitchen	B01	14.50	47.74%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>14.50</b>	<b>47.74%</b>
Wood Packaging	C011	1.10	3.63%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	1.89	6.23%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>2.99</b>	<b>9.86%</b>
Glass Packaging	D01	0.23	0.76%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.23</b>	<b>0.76%</b>
PET	E01	0.89	2.93%
HDPE	E02	0.00	0.00%
PVC	E03	0.16	0.53%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.91	3.00%
PP	E05	1.69	5.56%
Polystyrene	E06	1.03	3.38%
Composite mainly Plastic	E07	0.03	0.11%
Other Rigid Plastic	E08	0.08	0.27%
Other Plastic	E09	0.39	1.29%
<b>SUBTOTAL - PLASTIC</b>		<b>5.18</b>	<b>17.07%</b>
Steel Packaging	F01	0.13	0.43%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.13</b>	<b>0.43%</b>
Aluminium Cans	G011	0.98	3.23%
Other Non-Ferrous	G02	0.08	0.27%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>1.06</b>	<b>3.50%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.06	0.20%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.06</b>	<b>0.20%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.14	0.47%
Miscellaneous	Misc	0.98	3.23%
<b>TOTAL - ALL MATERIALS</b>		<b>30.37</b>	<b>100.00%</b>

Figure A4-4 Composition of 'Front of Outlets' refuse at the Mount Lawley campus

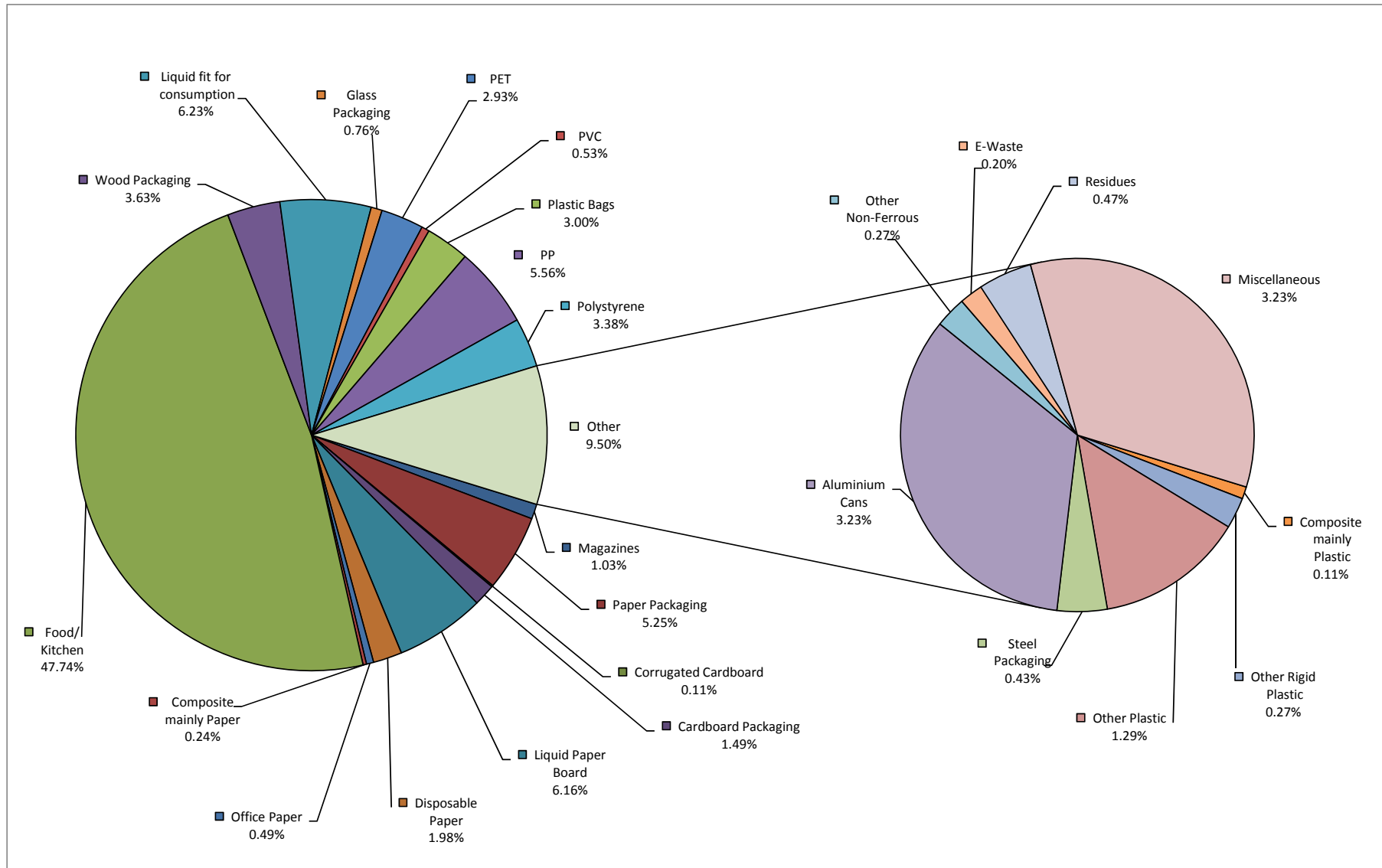


Figure A4-5 Material groupings of 'Front of Outlets' refuse at the Mount Lawley campus

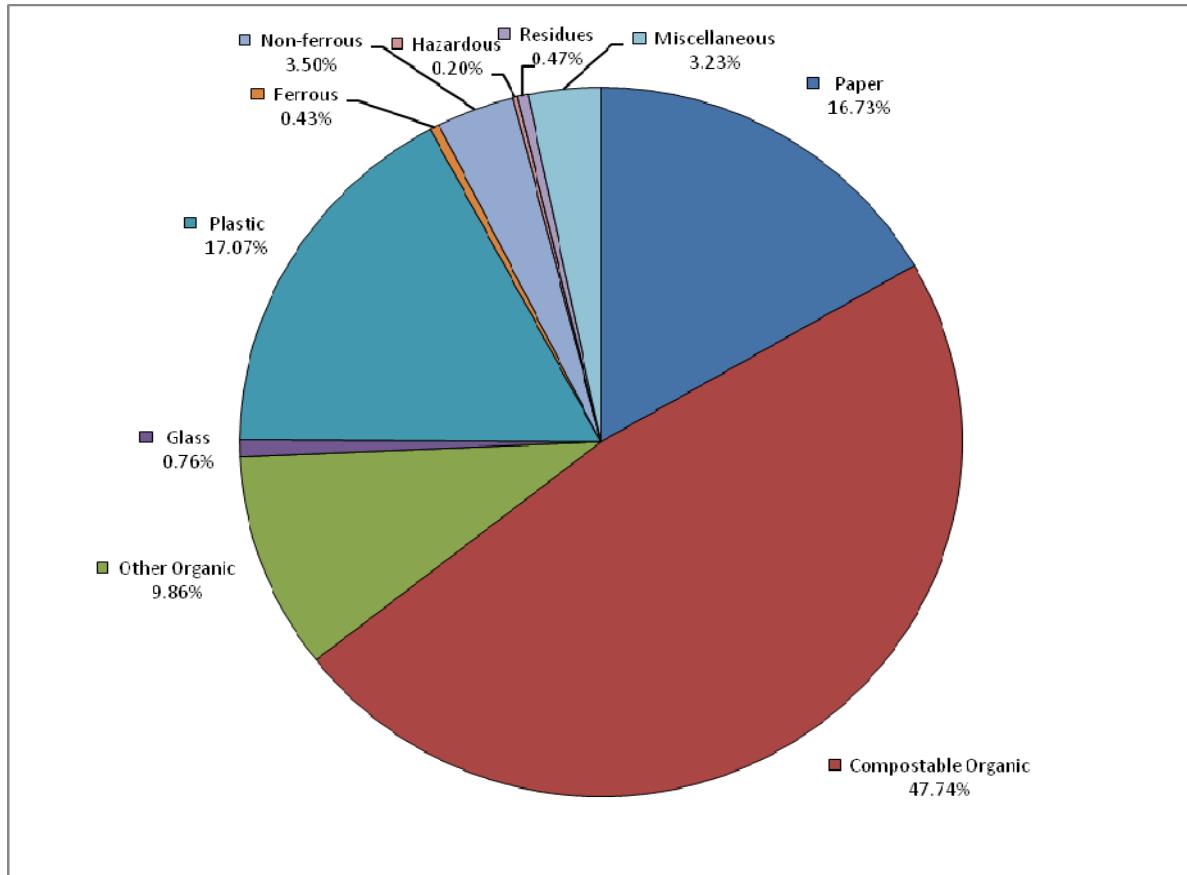
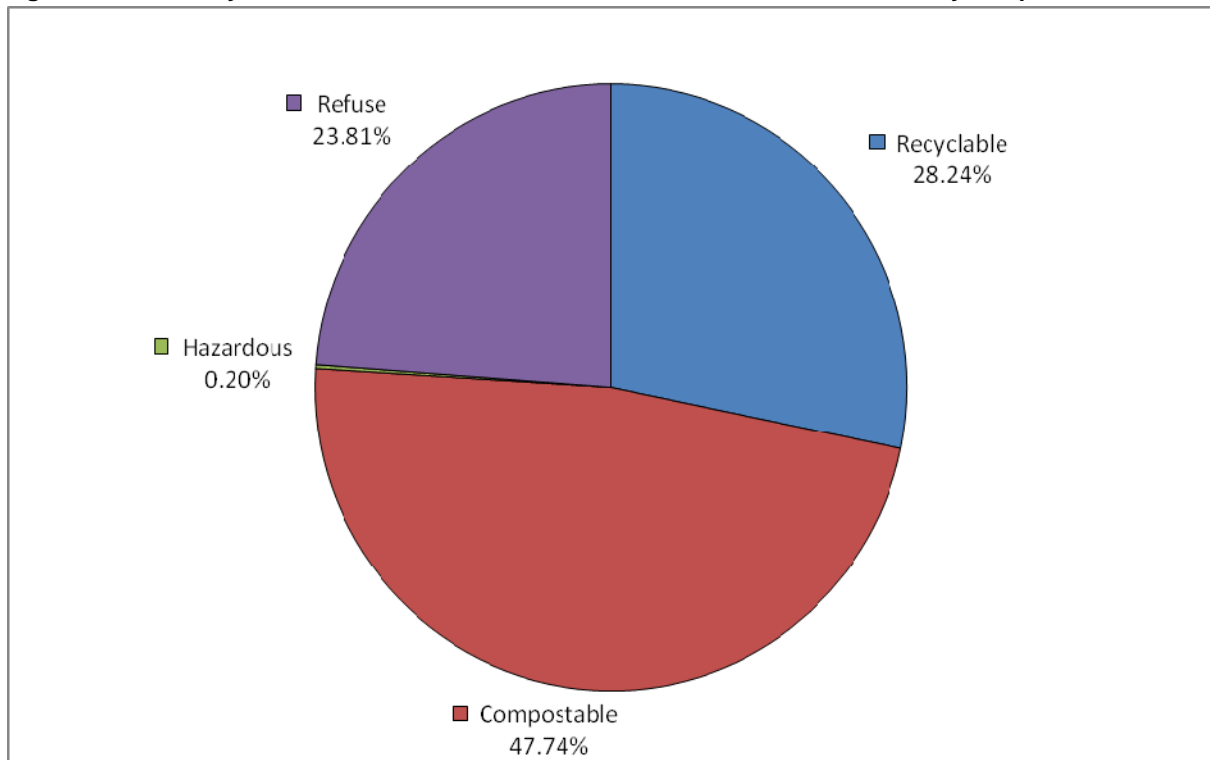


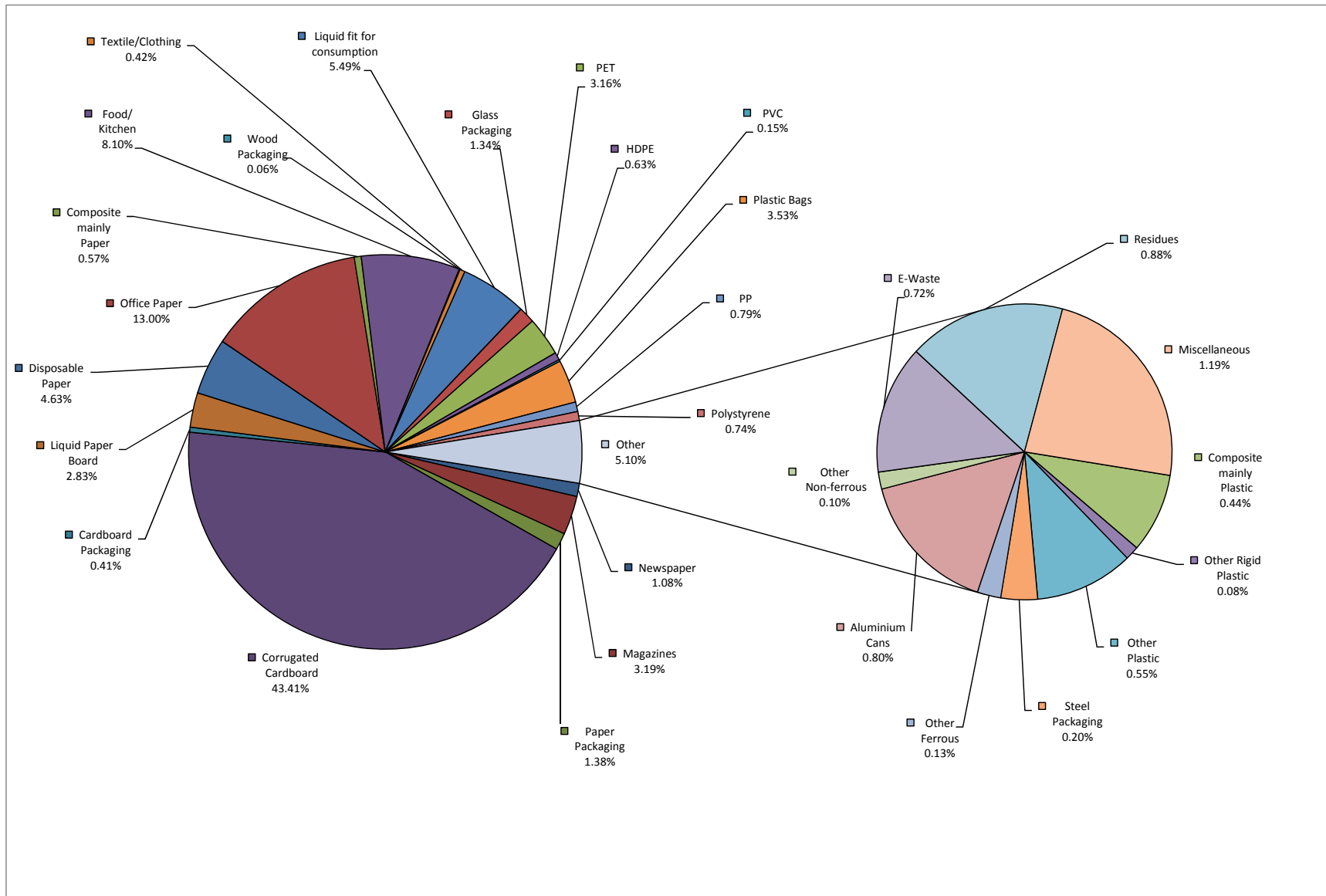
Figure A4-6 Key Waste Streams of 'Front of Outlets' refuse at the Mount Lawley campus



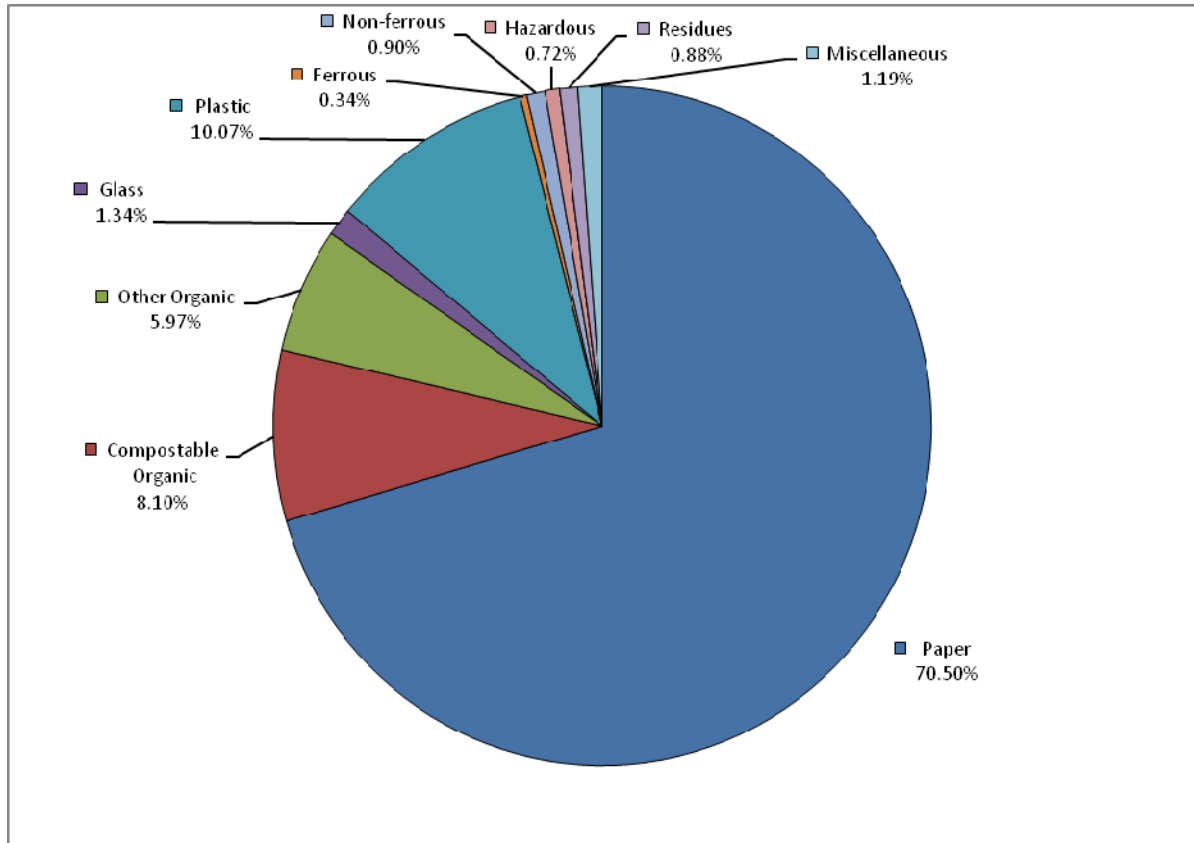
**Table A4-3 Composition of Administration Building refuse at the Mount Lawley campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.59	1.08%
Magazines	A02	1.74	3.19%
Packaging	A03	0.75	1.38%
Corrugated Cardboard	A04	23.74	43.41%
Cardboard Packaging	A05	0.22	0.41%
Liquid Paper Board	A06	1.55	2.83%
Disposables	A07	2.53	4.63%
Office Paper	A08	7.11	13.00%
Composite mainly Paper	A09	0.31	0.57%
<b>SUBTOTAL - PAPER</b>		<b>38.55</b>	<b>70.50%</b>
Food/Kitchen	B01	4.43	8.10%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>4.43</b>	<b>8.10%</b>
Wood Packaging	C011	0.03	0.06%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.23	0.42%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	3.00	5.49%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>3.27</b>	<b>5.97%</b>
Glass Packaging	D01	0.73	1.34%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.73</b>	<b>1.34%</b>
PET	E01	1.73	3.16%
HDPE	E02	0.34	0.63%
PVC	E03	0.08	0.15%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.93	3.53%
PP	E05	0.43	0.79%
Polystyrene	E06	0.40	0.74%
Composite mainly Plastic	E07	0.24	0.44%
Other Rigid Plastic	E08	0.04	0.08%
Other Plastic	E09	0.30	0.55%
<b>SUBTOTAL - PLASTIC</b>		<b>5.50</b>	<b>10.07%</b>
Steel Packaging	F01	0.11	0.20%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.07	0.13%
<b>SUBTOTAL - FERROUS</b>		<b>0.18</b>	<b>0.34%</b>
Aluminium Cans	G011	0.44	0.80%
Other Non-Ferrous	G02	0.05	0.10%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.49</b>	<b>0.90%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.39	0.72%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.39</b>	<b>0.72%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.48	0.88%
Miscellaneous	Misc	0.65	1.19%
<b>TOTAL - ALL MATERIALS</b>		<b>54.68</b>	<b>100.00%</b>

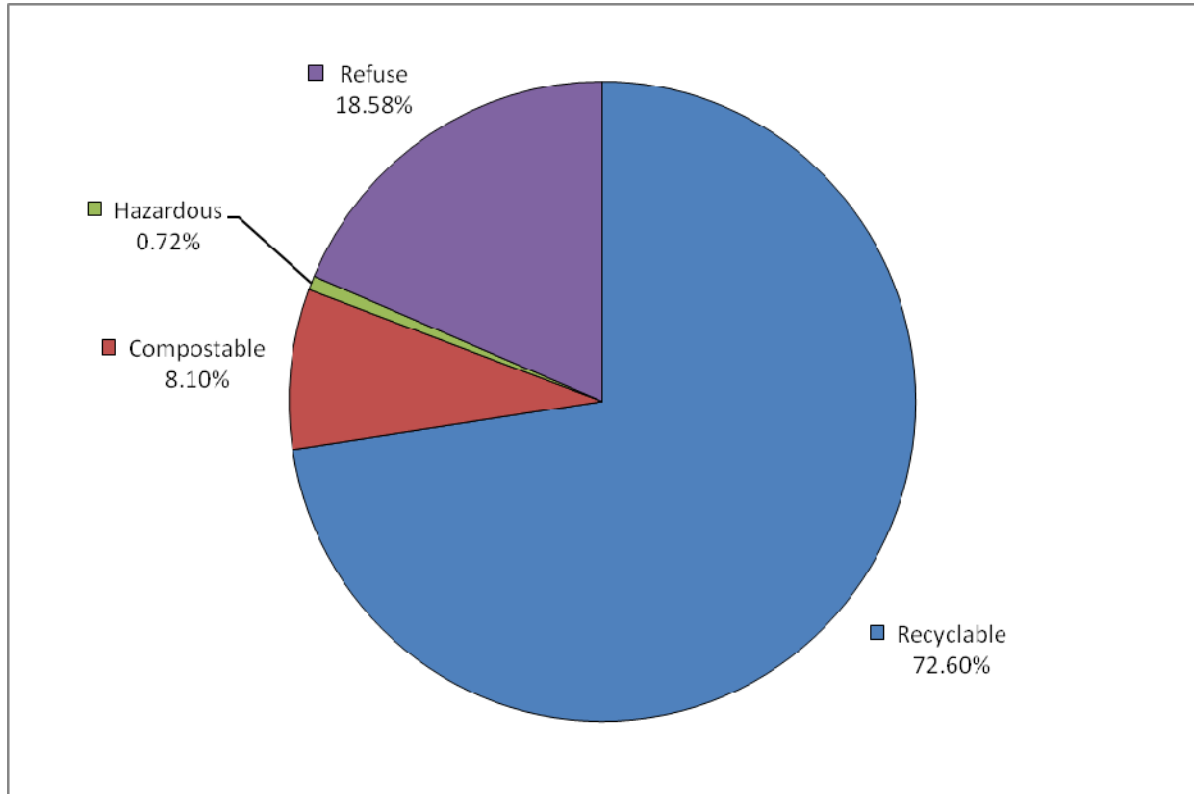
Figure A4-7 Composition of Administration Building refuse at the Mount Lawley campus



**Figure A4-8 Material groupings of Administration Building refuse at the Mount Lawley campus**



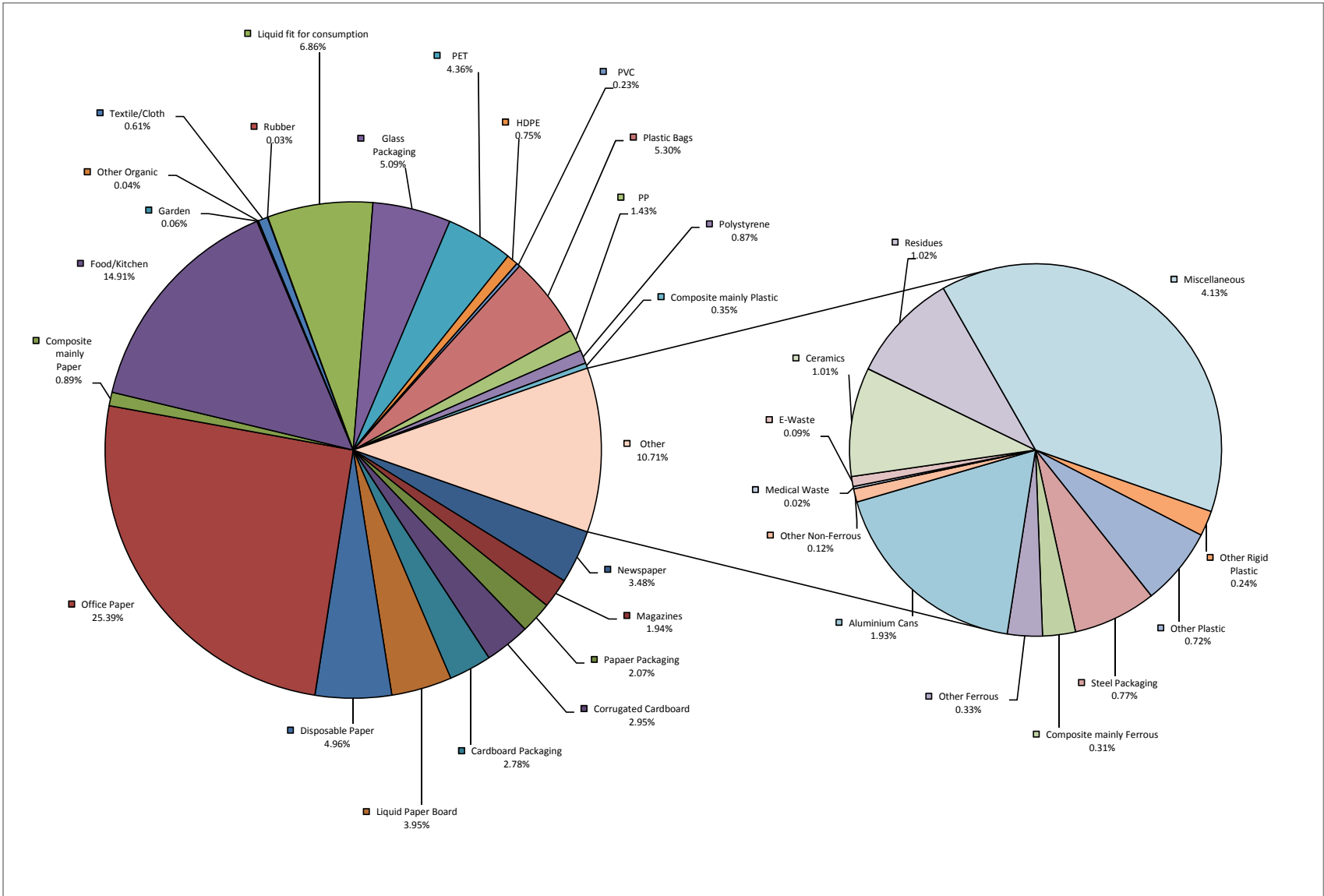
**Figure A4-9 Key Waste Streams of Administration Building refuse at the Mount Lawley campus**



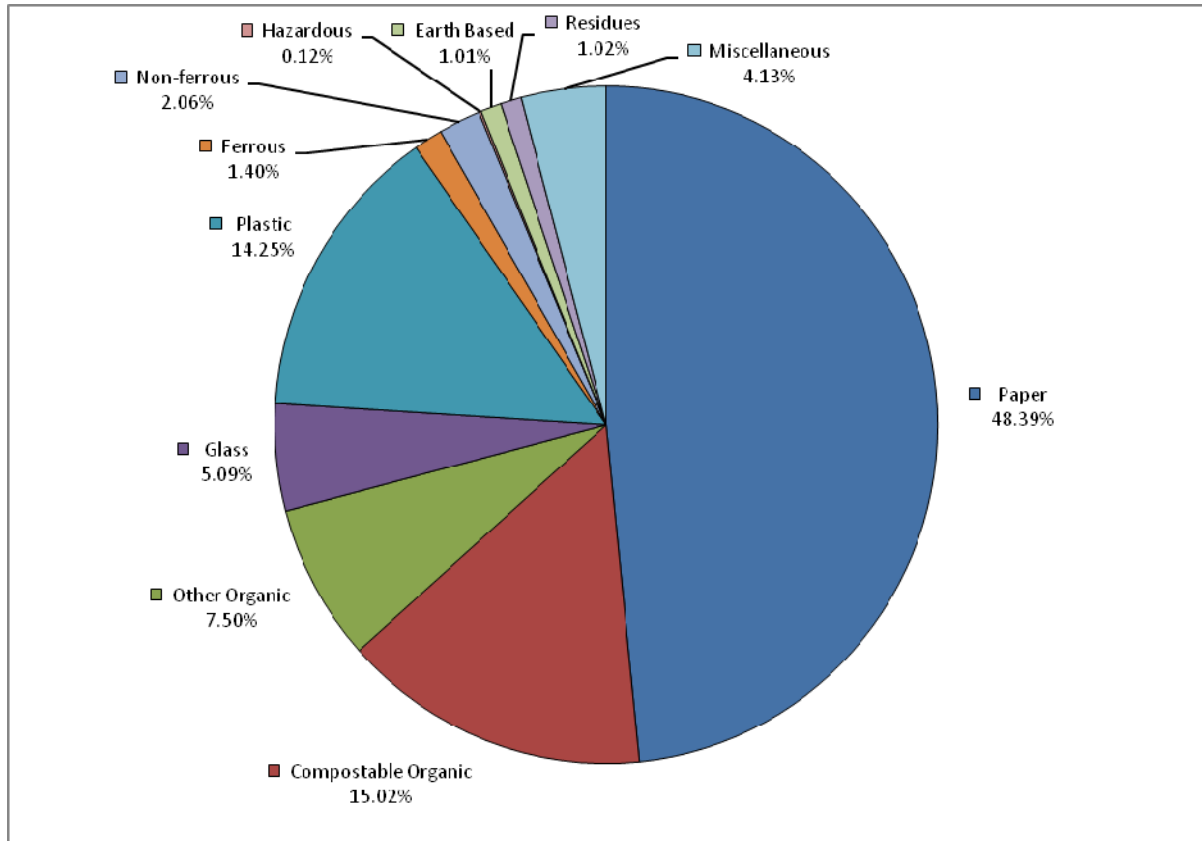
**Table A4-4 Composition of Faculty Building refuse at the Mount Lawley campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	3.44	3.48%
Magazines	A02	1.92	1.94%
Packaging	A03	2.04	2.07%
Corrugated Cardboard	A04	2.92	2.95%
Cardboard Packaging	A05	2.74	2.78%
Liquid Paper Board	A06	3.90	3.95%
Disposables	A07	4.90	4.96%
Office Paper	A08	25.10	25.39%
Composite mainly Paper	A09	0.88	0.89%
<b>SUBTOTAL - PAPER</b>		<b>47.84</b>	<b>48.39%</b>
Food/Kitchen	B01	14.74	14.91%
Garden Waste	B02	0.06	0.06%
Other Organics	B03	0.04	0.04%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>14.84</b>	<b>15.02%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.60	0.61%
Leather	C03	0.00	0.00%
Rubber	C04	0.03	0.03%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	6.78	6.86%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>7.42</b>	<b>7.50%</b>
Glass Packaging	D01	5.03	5.09%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>5.03</b>	<b>5.09%</b>
PET	E01	4.31	4.36%
HDPE	E02	0.74	0.75%
PVC	E03	0.23	0.23%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	5.24	5.30%
PP	E05	1.41	1.43%
Polystyrene	E06	0.86	0.87%
Composite mainly Plastic	E07	0.34	0.35%
Other Rigid Plastic	E08	0.23	0.24%
Other Plastic	E09	0.72	0.72%
<b>SUBTOTAL - PLASTIC</b>		<b>14.08</b>	<b>14.25%</b>
Steel Packaging	F01	0.76	0.77%
Composite mainly Ferrous	F02	0.30	0.31%
Other Ferrous	F03	0.32	0.33%
<b>SUBTOTAL - FERROUS</b>		<b>1.39</b>	<b>1.40%</b>
Aluminium Cans	G011	1.91	1.93%
Other Non-Ferrous	G02	0.12	0.12%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>2.03</b>	<b>2.06%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.02	0.02%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.09	0.09%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.11</b>	<b>0.12%</b>
Ceramics	I01	1.00	1.01%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>1.00</b>	<b>1.01%</b>
Fine residues <20mm	Res	1.01	1.02%
Miscellaneous	Misc	4.09	4.13%
<b>TOTAL - ALL MATERIALS</b>		<b>98.85</b>	<b>100.00%</b>

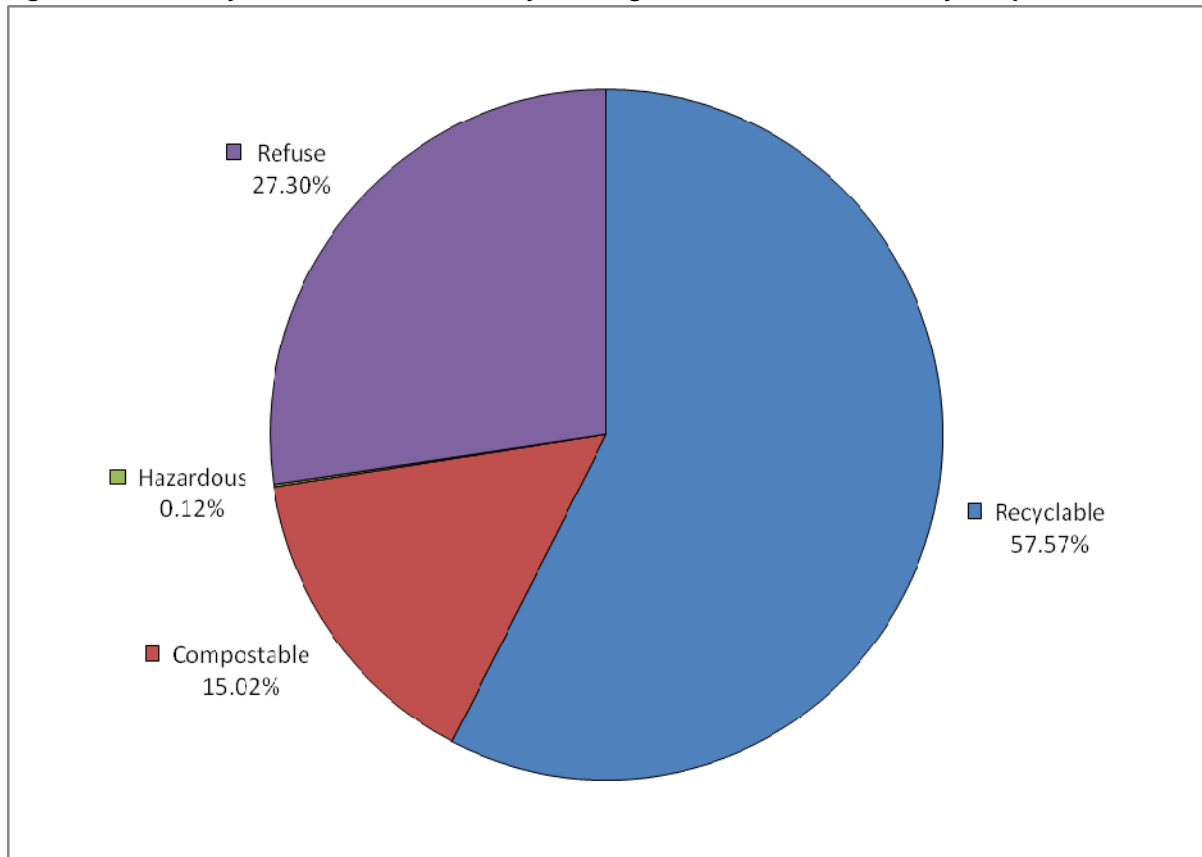
Figure A4-10 Composition of Faculty Building refuse at the Mount Lawley campus



**Figure A4-11 Material groupings of Faculty Building refuse at the Mount Lawley campus**



**Figure A4-12 Key Waste Streams of Faculty Building refuse at the Mount Lawley campus**



**Table A4-5 Composition of Public Building refuse at the Mount Lawley campus**

<b>MATERIALS</b>	<b>CODE</b>	<b>Weight (kg)</b>	<b>%</b>
Newspaper	A01	0.03	0.10%
Magazines	A02	0.28	0.89%
Packaging	A03	0.81	2.56%
Corrugated Cardboard	A04	0.54	1.70%
Cardboard Packaging	A05	0.71	2.24%
Liquid Paper Board	A06	1.83	5.75%
Disposables	A07	2.44	7.66%
Office Paper	A08	1.91	6.00%
Composite mainly Paper	A09	0.22	0.70%
<b>SUBTOTAL - PAPER</b>		<b>8.78</b>	<b>27.58%</b>
Food/Kitchen	B01	3.96	12.43%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>3.96</b>	<b>12.43%</b>
Wood Packaging	C011	0.03	0.10%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	9.25	29.05%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>9.28</b>	<b>29.15%</b>
Glass Packaging	D01	0.87	2.74%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.87</b>	<b>2.74%</b>
PET	E01	3.06	9.61%
HDPE	E02	0.14	0.45%
PVC	E03	0.05	0.16%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	2.31	7.25%
PP	E05	0.43	1.35%
Polystyrene	E06	0.20	0.63%
Composite mainly Plastic	E07	0.13	0.41%
Other Rigid Plastic	E08	0.10	0.32%
Other Plastic	E09	0.18	0.57%
<b>SUBTOTAL - PLASTIC</b>		<b>6.61</b>	<b>20.76%</b>
Steel Packaging	F01	0.00	0.00%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.00</b>	<b>0.00%</b>
Aluminium Cans	G011	1.23	3.86%
Other Non-Ferrous	G02	0.03	0.10%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>1.26</b>	<b>3.96%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.28	0.89%
Miscellaneous	Misc	0.79	2.49%
<b>TOTAL - ALL MATERIALS</b>		<b>31.85</b>	<b>100.00%</b>

Figure A4-13 Composition of Public Building refuse at the Mount Lawley campus

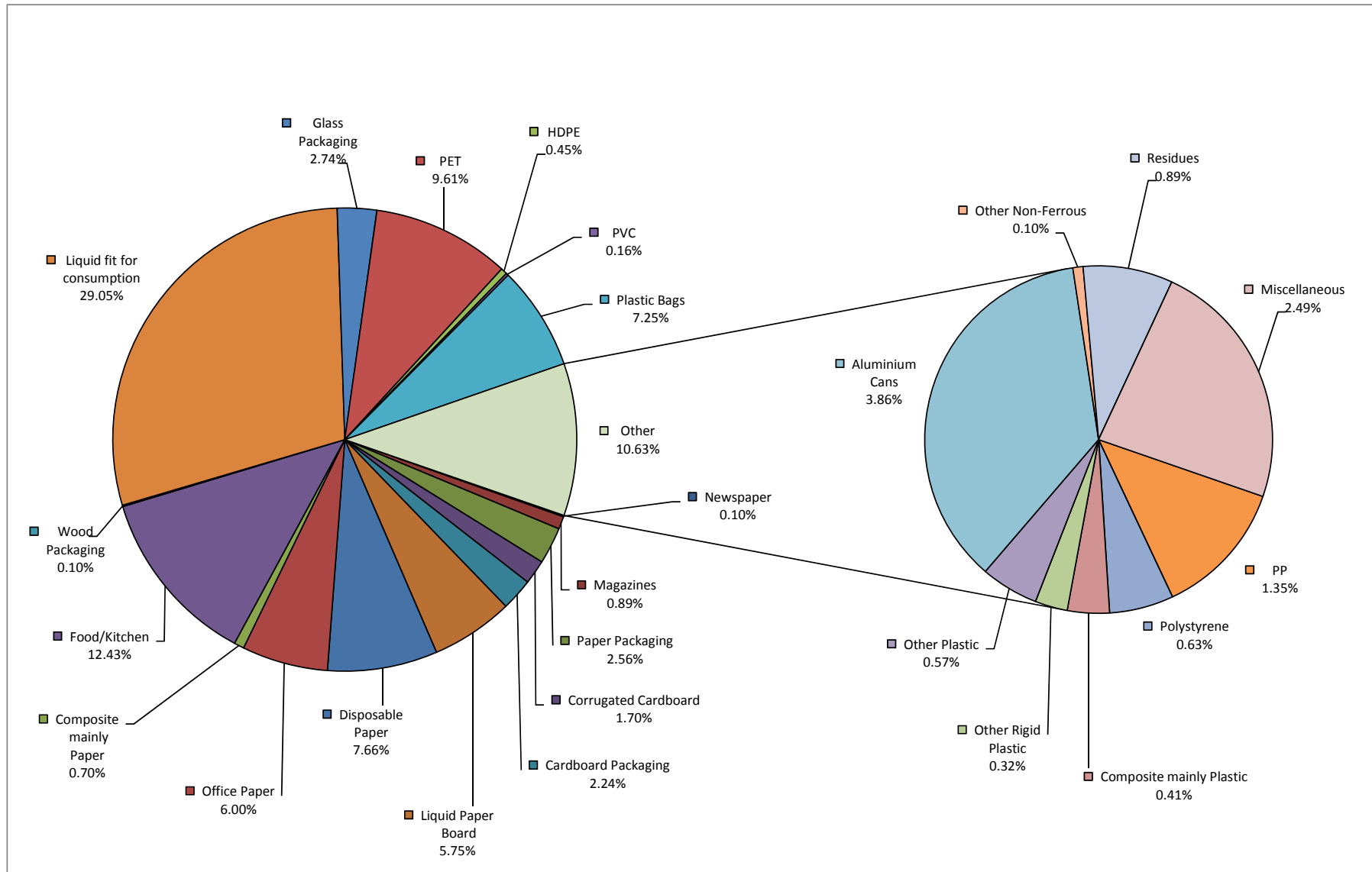


Figure A4-14 Material groupings of Public Building refuse at the Mount Lawley campus

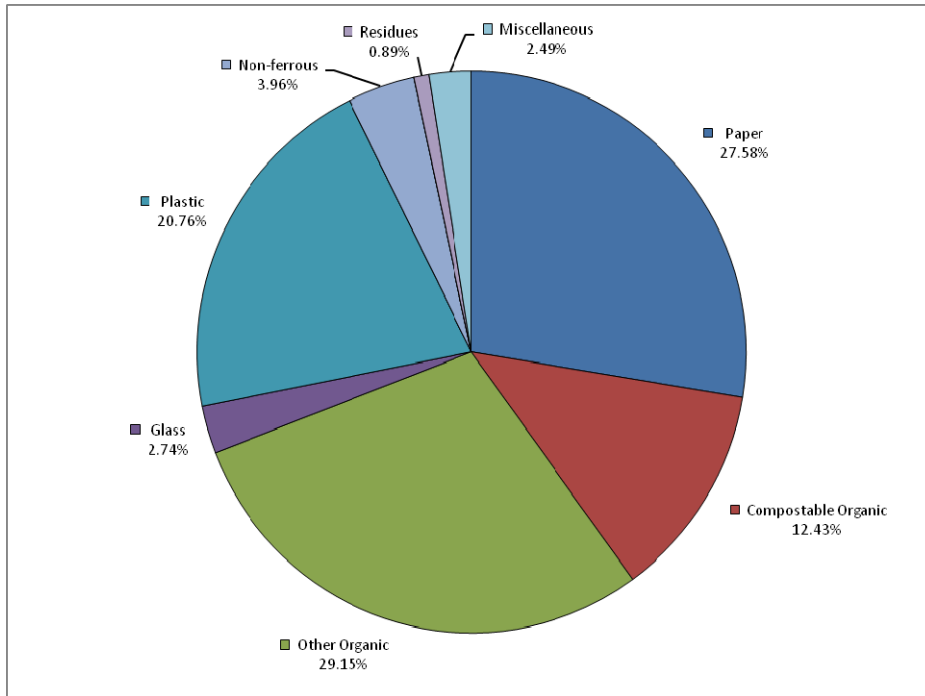
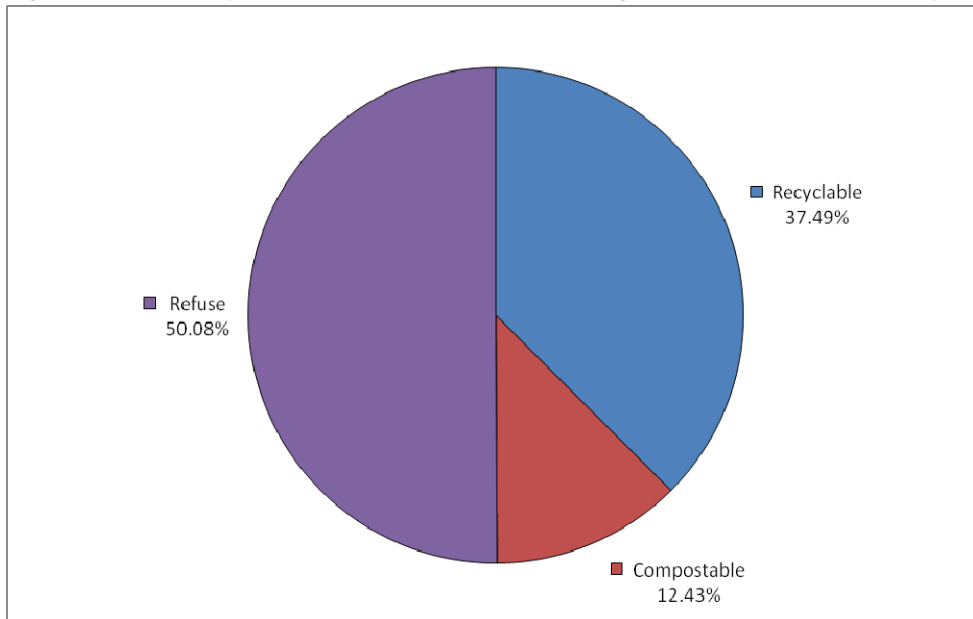


Figure A4-15 Key Waste Streams of Public Building refuse at the Mount Lawley campus





## Appendix E

# Detailed Waste Audit Data South West Campus

Table A5-1 Composition of 'Around Campus' refuse at the South West campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.00	0.00%
Packaging	A03	0.20	3.56%
Corrugated Cardboard	A04	0.23	4.09%
Cardboard Packaging	A05	0.16	2.86%
Liquid Paper Board	A06	0.36	6.38%
Disposables	A07	0.14	2.50%
Office Paper	A08	0.22	3.92%
Composite mainly Paper	A09	0.00	0.00%
<b>SUBTOTAL - PAPER</b>		<b>1.32</b>	<b>23.31%</b>
Food/Kitchen	B01	1.20	21.20%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>1.20</b>	<b>21.20%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.45	7.97%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.16	2.86%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.61</b>	<b>10.83%</b>
Glass Packaging	D01	0.25	4.44%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.25</b>	<b>4.44%</b>
PET	E01	0.49	8.71%
HDPE	E02	0.04	0.74%
PVC	E03	0.04	0.74%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.09	1.62%
PP	E05	0.06	1.09%
Polystyrene	E06	0.07	1.27%
Composite mainly Plastic	E07	0.04	0.74%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.09	1.62%
<b>SUBTOTAL - PLASTIC</b>		<b>0.94</b>	<b>16.54%</b>
Steel Packaging	F01	0.08	1.45%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.08</b>	<b>1.45%</b>
Aluminium Cans	G011	0.22	3.92%
Other Non-Ferrous	G02	0.03	0.56%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.25</b>	<b>4.48%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.07	1.27%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.07</b>	<b>1.27%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.01	0.22%
Miscellaneous	Misc	0.92	16.26%
<b>TOTAL - ALL MATERIALS</b>		<b>5.67</b>	<b>100.00%</b>

Figure A5-1 Composition of 'Around Campus' refuse at the South West campus

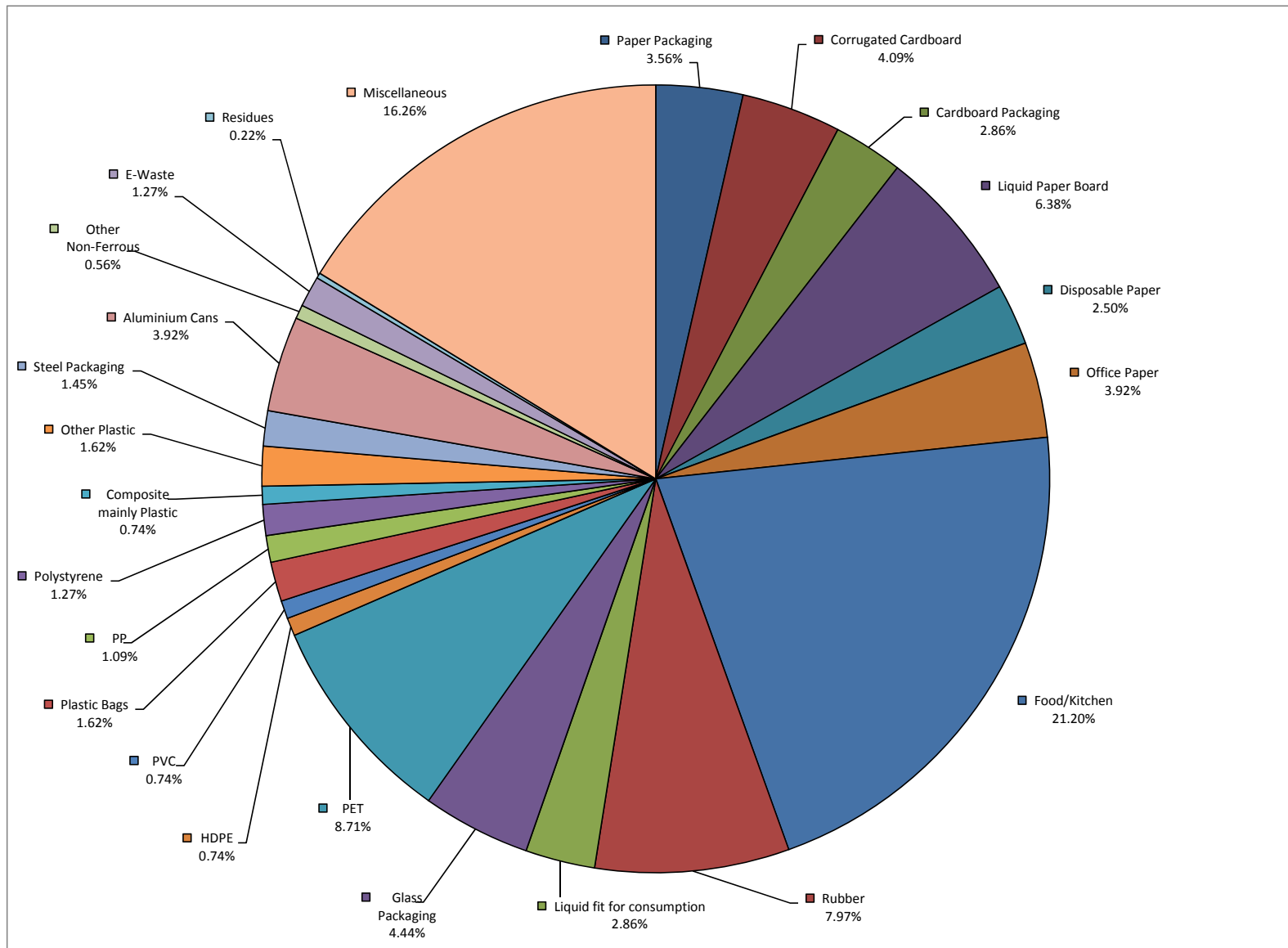


Figure A5-2 Material groupings of 'Around Campus' refuse at the South West campus

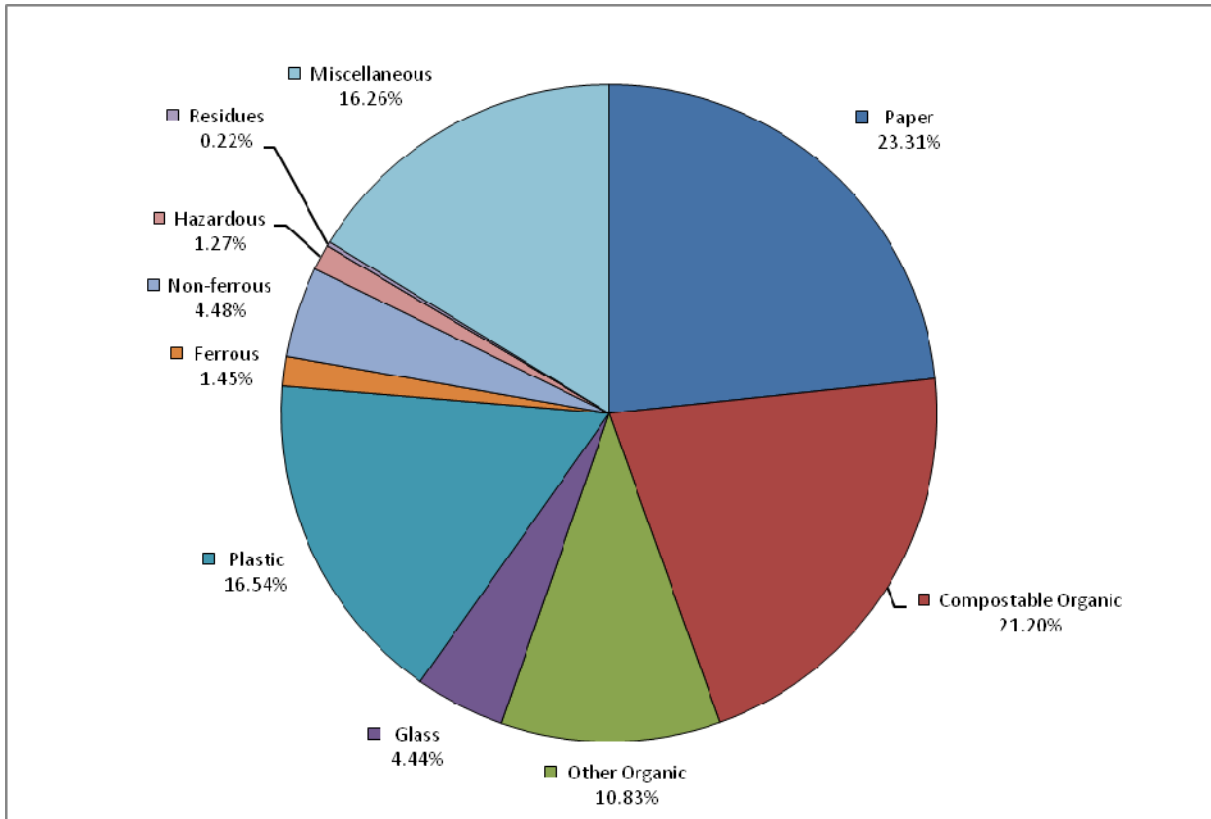
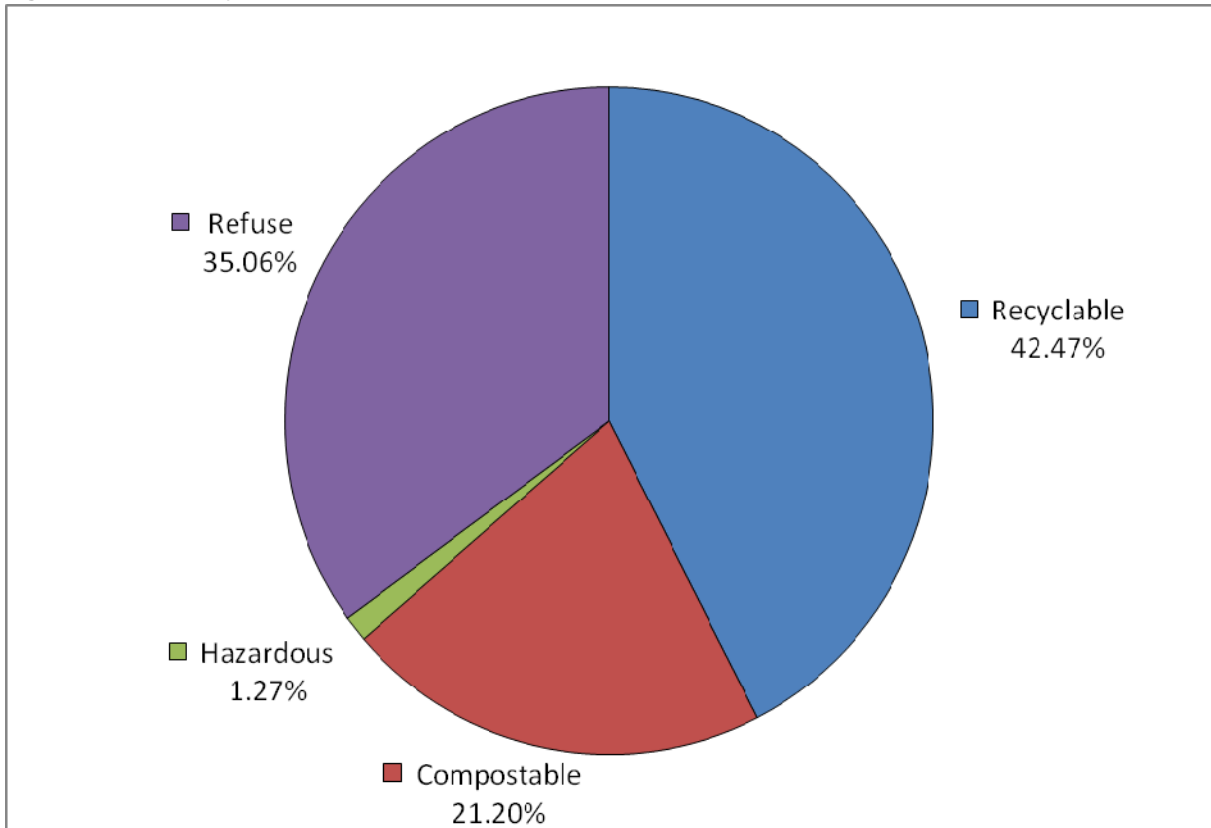


Figure A5-3 Key Waste Streams of 'Around Campus' refuse at the South West campus



**Table A5-2 Composition of 'Front of Outlets' refuse at the South West campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.00	0.00%
Packaging	A03	0.17	6.37%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.05	1.93%
Liquid Paper Board	A06	0.17	6.37%
Disposables	A07	0.03	1.19%
Office Paper	A08	0.12	4.52%
Composite mainly Paper	A09	0.05	1.93%
<b>SUBTOTAL - PAPER</b>		<b>0.60</b>	<b>22.29%</b>
Food/Kitchen	B01	0.32	11.92%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>0.32</b>	<b>11.92%</b>
Wood Packaging	C011	0.03	1.19%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.31	11.55%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.34</b>	<b>12.74%</b>
Glass Packaging	D01	0.24	8.96%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.24</b>	<b>8.96%</b>
PET	E01	0.50	18.67%
HDPE	E02	0.00	0.00%
PVC	E03	0.00	0.00%
LDPE	E041	0.03	1.19%
Plastic Bags	E042	0.37	13.78%
PP	E05	0.01	0.44%
Polystyrene	E06	0.09	3.41%
Composite mainly Plastic	E07	0.00	0.00%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.00	0.07%
<b>SUBTOTAL - PLASTIC</b>		<b>1.01</b>	<b>37.55%</b>
Steel Packaging	F01	0.00	0.00%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.00</b>	<b>0.00%</b>
Aluminium Cans	G011	0.03	1.19%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.03</b>	<b>1.19%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.01	0.45%
Miscellaneous	Misc	0.13	4.89%
<b>TOTAL - ALL MATERIALS</b>		<b>2.70</b>	<b>100.00%</b>

Figure A5-4 Composition of 'Front of Outlets' refuse at the South West campus

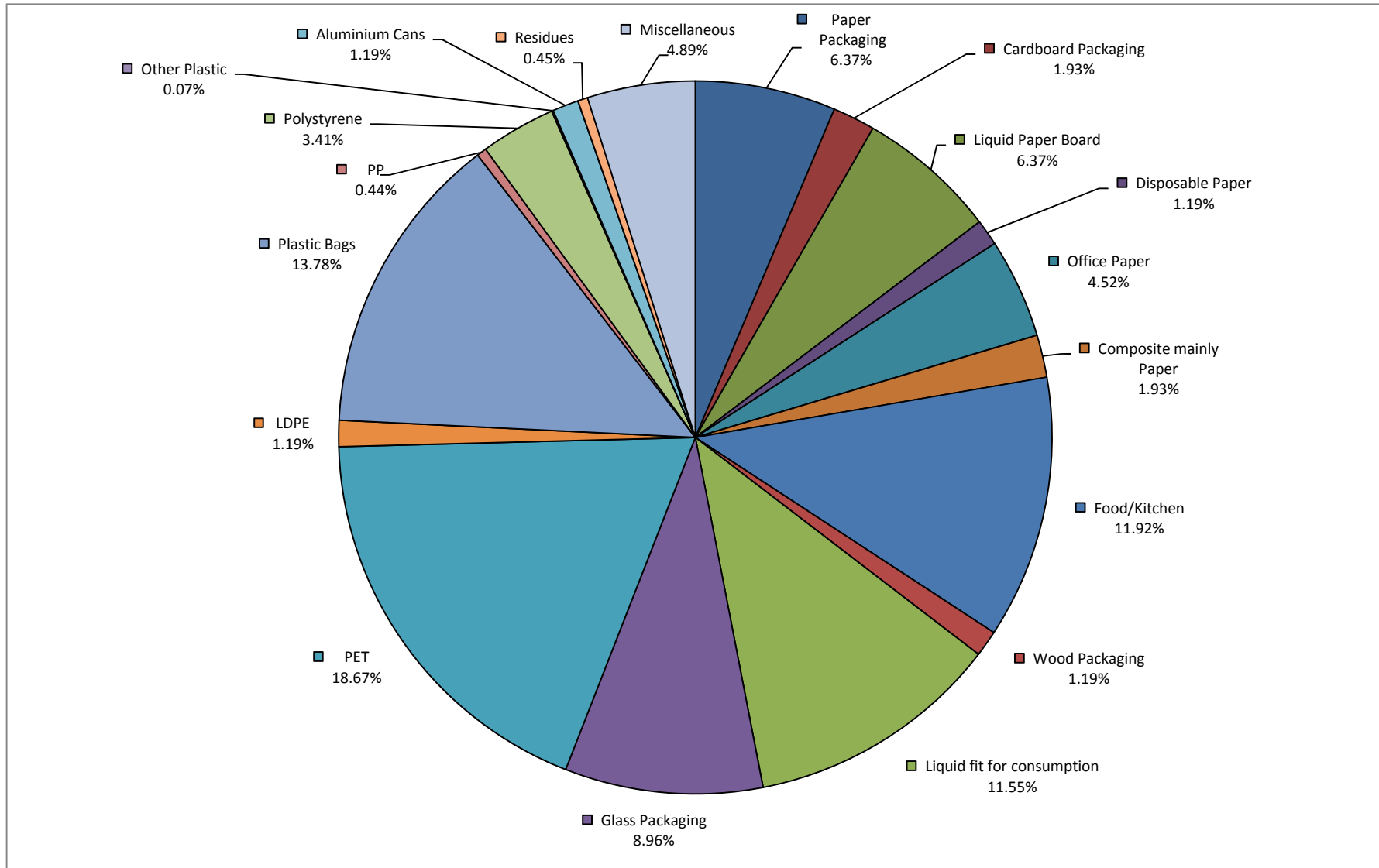


Figure A5-5 Material groupings of 'Front of Outlets' refuse at the South West campus

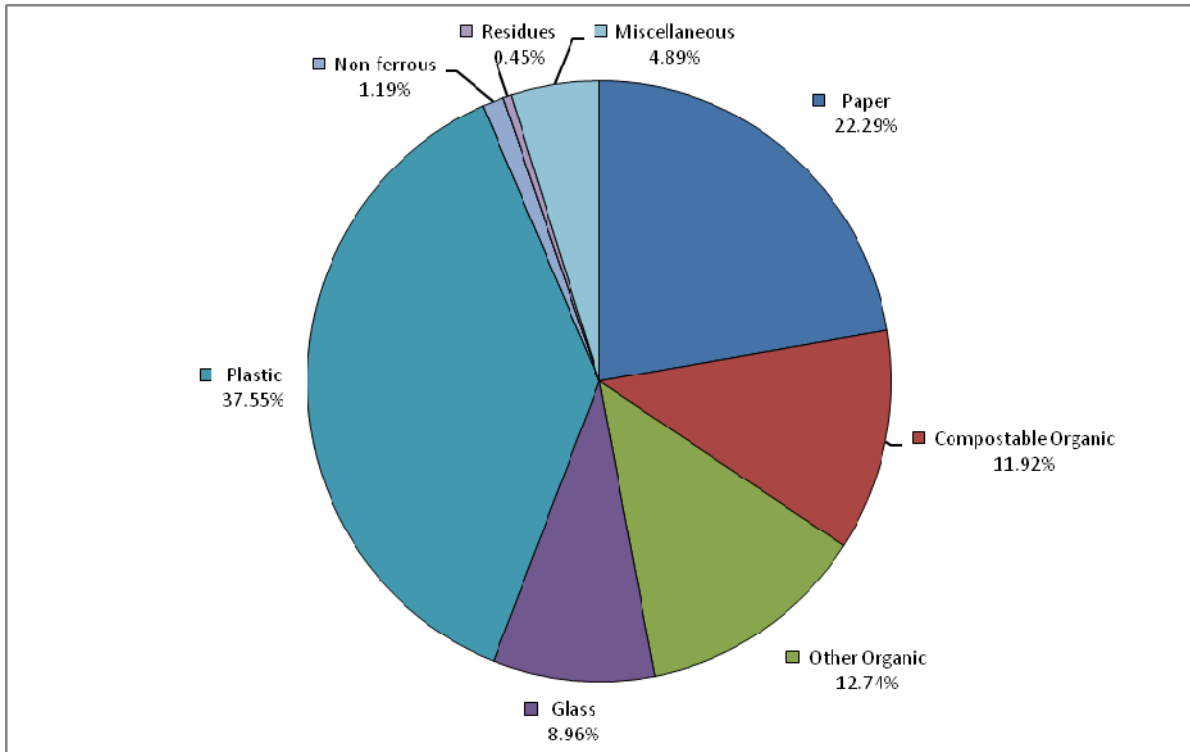
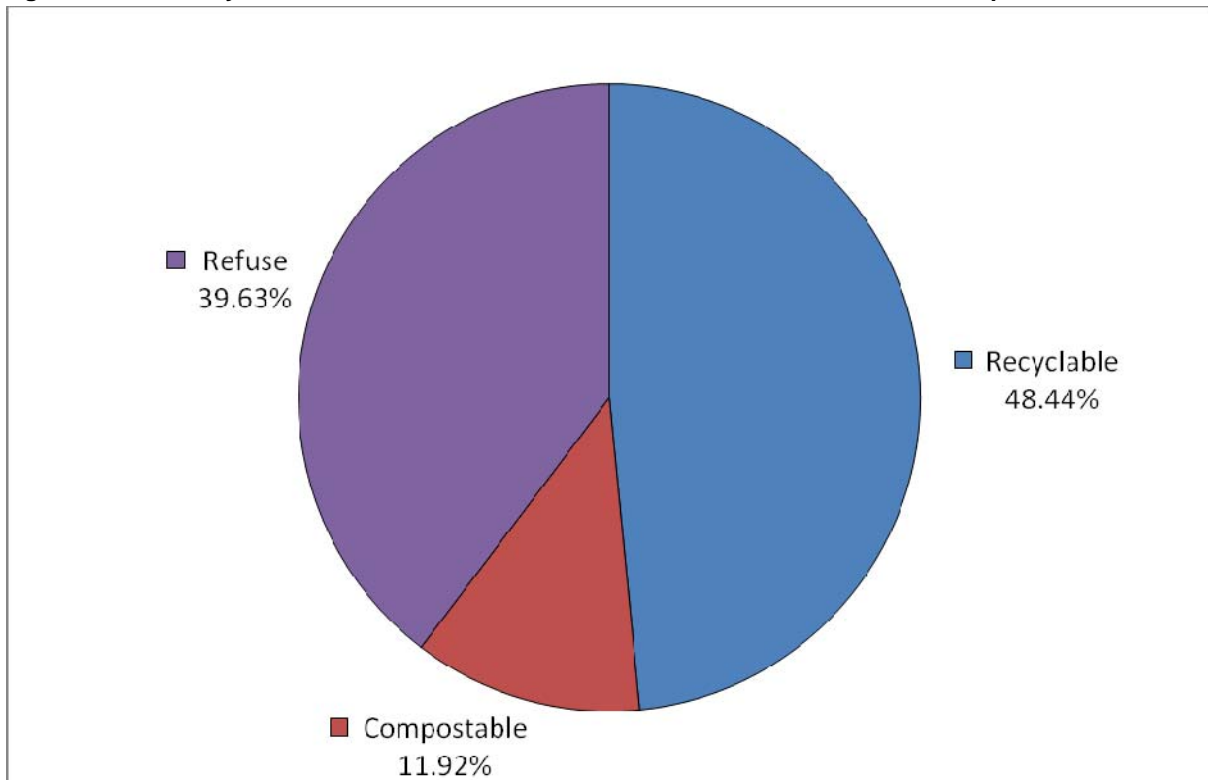


Figure A5-6 Key Waste Streams of 'Front of Outlets' refuse at the South West campus



**Table A5-3 Composition of Administration Building refuse at the South West campus**

<b>MATERIALS</b>	<b>CODE</b>	<b>Weight (kg)</b>	<b>%</b>
Newspaper	A01	0.00	0.00%
Magazines	A02	0.14	2.34%
Packaging	A03	0.16	2.67%
Corrugated Cardboard	A04	0.17	2.80%
Cardboard Packaging	A05	0.05	0.88%
Liquid Paper Board	A06	0.20	3.32%
Disposables	A07	0.76	12.44%
Office Paper	A08	1.16	18.95%
Composite mainly Paper	A09	0.05	0.85%
<b>SUBTOTAL - PAPER</b>		<b>2.72</b>	<b>44.25%</b>
Food/Kitchen	B01	1.83	29.86%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>1.83</b>	<b>29.86%</b>
Wood Packaging	C011	0.04	0.68%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.03	0.52%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.00	0.00%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.07</b>	<b>1.20%</b>
Glass Packaging	D01	0.00	0.00%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.00</b>	<b>0.00%</b>
PET	E01	0.30	4.95%
HDPE	E02	0.00	0.00%
PVC	E03	0.07	1.17%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.54	8.86%
PP	E05	0.12	2.02%
Polystyrene	E06	0.10	1.69%
Composite mainly Plastic	E07	0.00	0.00%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.04	0.72%
<b>SUBTOTAL - PLASTIC</b>		<b>1.19</b>	<b>19.41%</b>
Steel Packaging	F01	0.11	1.86%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.02	0.36%
<b>SUBTOTAL - FERROUS</b>		<b>0.14</b>	<b>2.21%</b>
Aluminium Cans	G011	0.00	0.00%
Other Non-Ferrous	G02	0.04	0.68%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.04</b>	<b>0.68%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.02	0.40%
Miscellaneous	Misc	0.12	1.99%
<b>TOTAL - ALL MATERIALS</b>		<b>6.14</b>	<b>100.00%</b>

Figure A5-7 Composition of Administration Building refuse at the South West campus

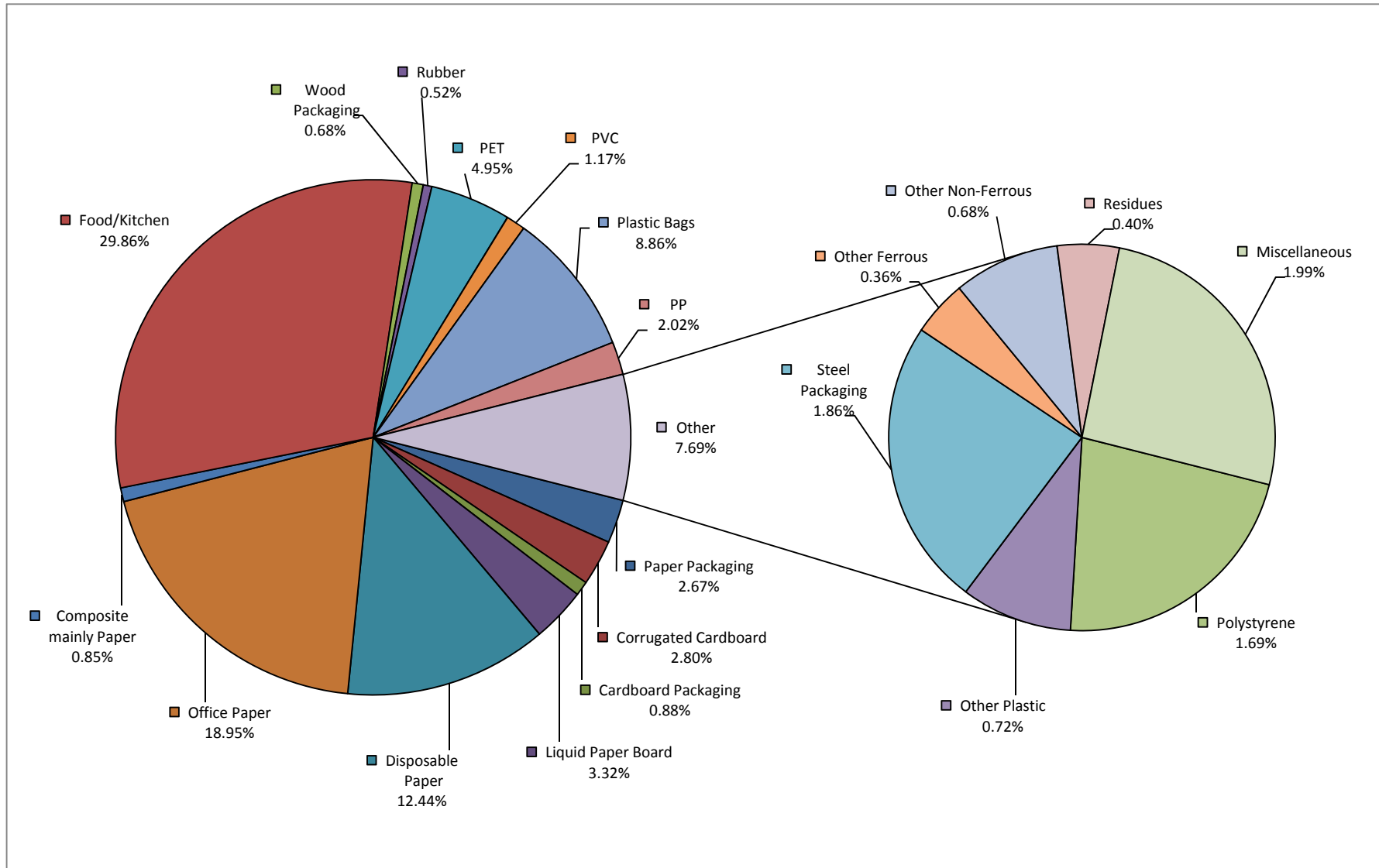


Figure A5-8 Material groupings of Administration Building refuse at the South West campus

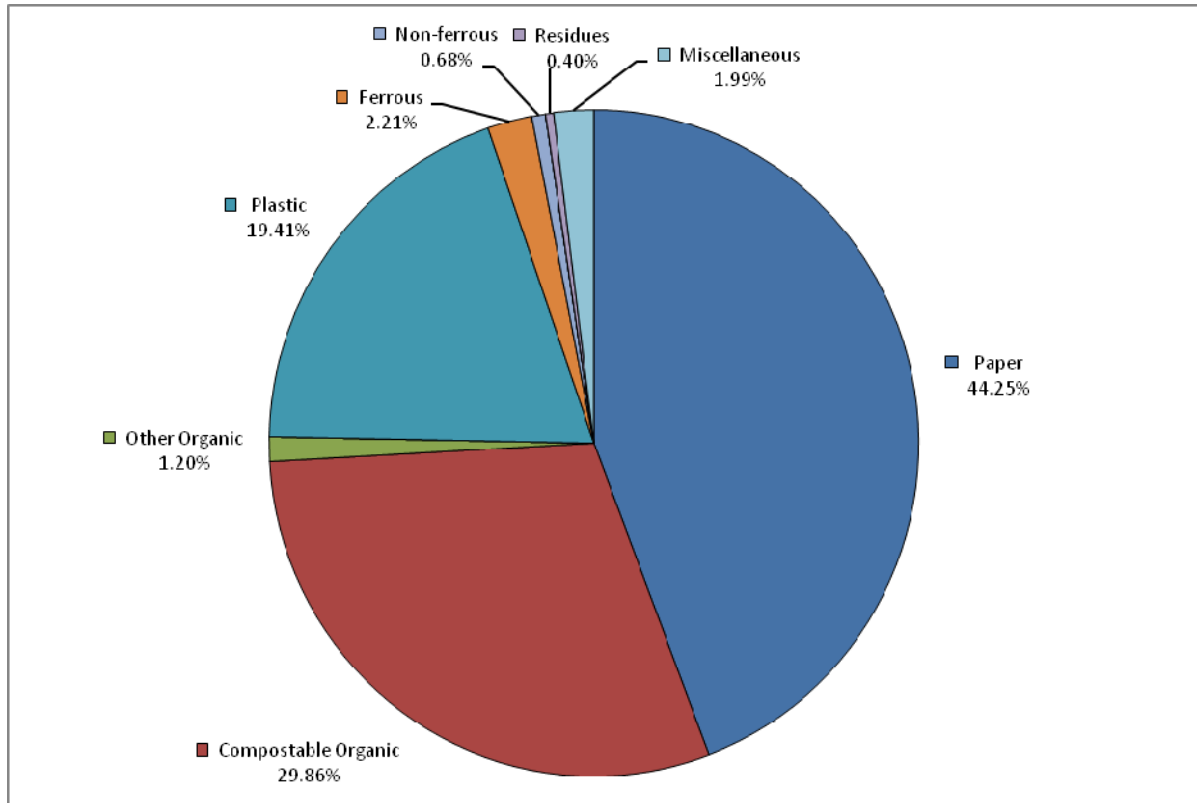
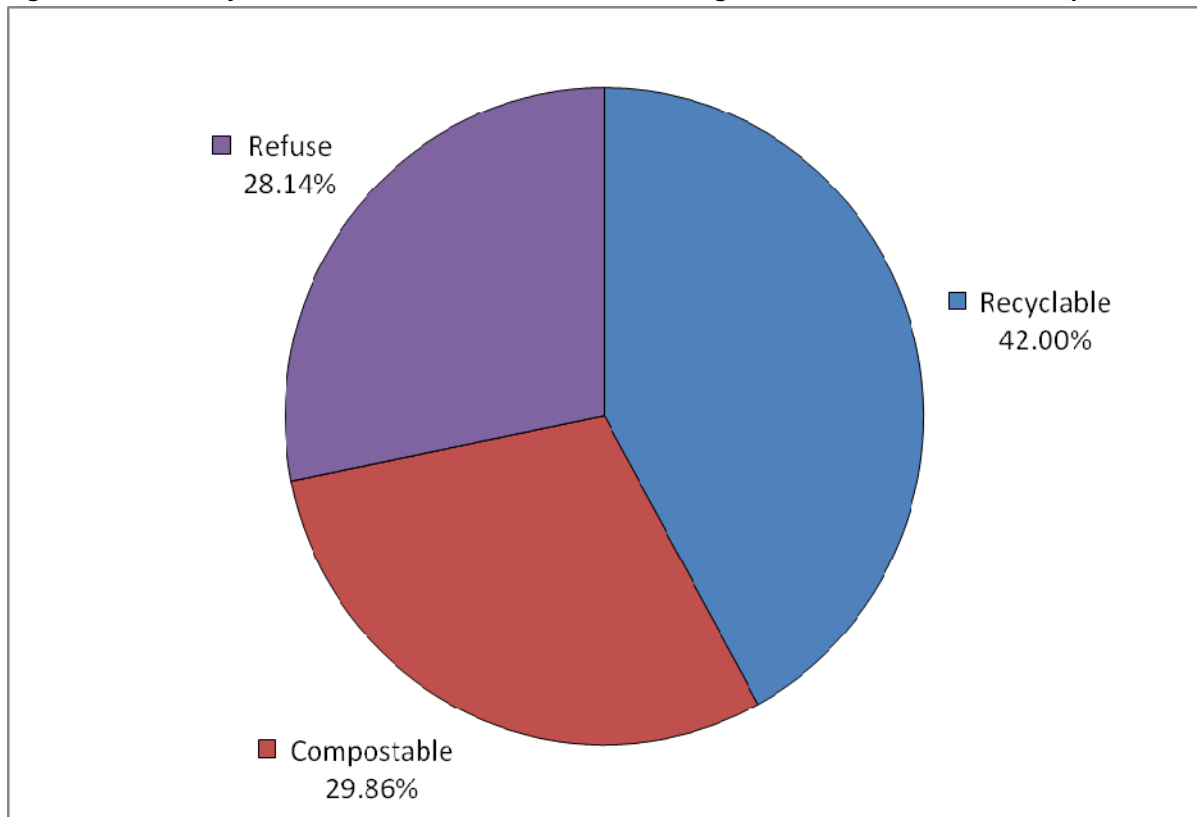


Figure A5-9 Key Waste Streams of Administration Building refuse at the South West campus



**Table A5-4 Composition of Faculty Building refuse at the South West campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.32	5.50%
Packaging	A03	0.03	0.55%
Corrugated Cardboard	A04	0.15	2.60%
Cardboard Packaging	A05	0.12	2.12%
Liquid Paper Board	A06	0.12	2.08%
Disposables	A07	0.81	13.76%
Office Paper	A08	0.37	6.39%
Composite mainly Paper	A09	0.05	0.92%
<b>SUBTOTAL - PAPER</b>		<b>1.99</b>	<b>33.91%</b>
Food/Kitchen	B01	0.98	16.80%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>0.98</b>	<b>16.80%</b>
Wood Packaging	C011	0.02	0.38%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.32	5.50%
Leather	C03	0.00	0.00%
Rubber	C04	0.02	0.38%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.00	0.00%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.37</b>	<b>6.25%</b>
Glass Packaging	D01	0.00	0.00%
Other Glass	D02	0.05	0.89%
<b>SUBTOTAL - GLASS</b>		<b>0.05</b>	<b>0.89%</b>
PET	E01	0.04	0.72%
HDPE	E02	0.04	0.72%
PVC	E03	0.07	1.26%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.51	8.64%
PP	E05	0.03	0.55%
Polystyrene	E06	0.01	0.20%
Composite mainly Plastic	E07	0.00	0.00%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.22	3.82%
<b>SUBTOTAL - PLASTIC</b>		<b>0.93</b>	<b>15.91%</b>
Steel Packaging	F01	0.00	0.00%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.00</b>	<b>0.00%</b>
Aluminium Cans	G011	0.00	0.03%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.00</b>	<b>0.03%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	1.42	24.31%
<b>SUBTOTAL - HAZARDOUS</b>		<b>1.42</b>	<b>24.31%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.04	0.63%
Miscellaneous	Misc	0.07	1.26%
<b>TOTAL - ALL MATERIALS</b>		<b>5.86</b>	<b>100.00%</b>

Figure A5-10 Composition of Faculty Building refuse at the South West campus

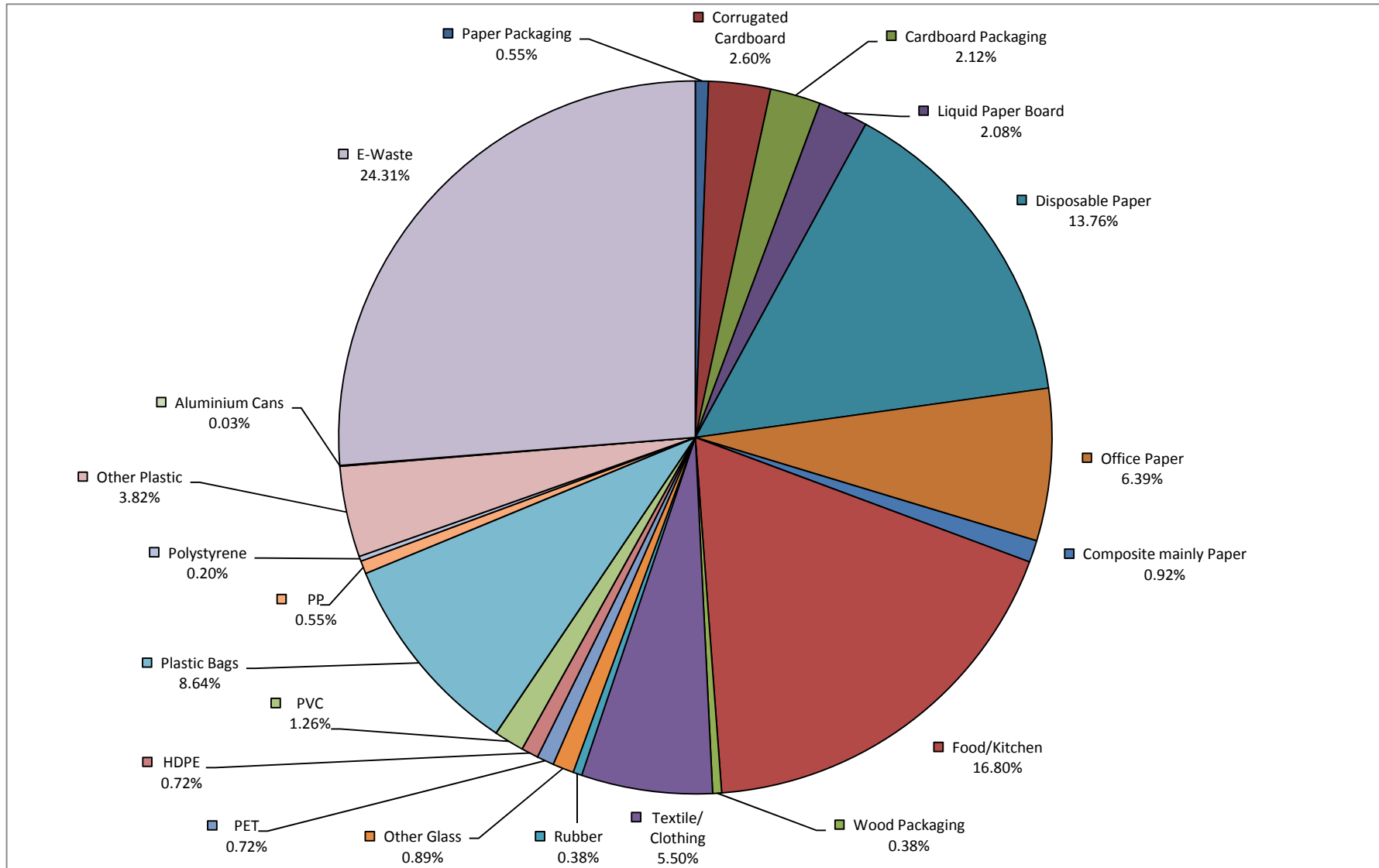


Figure A5-11 Material groupings of Faculty Building refuse at the South West campus

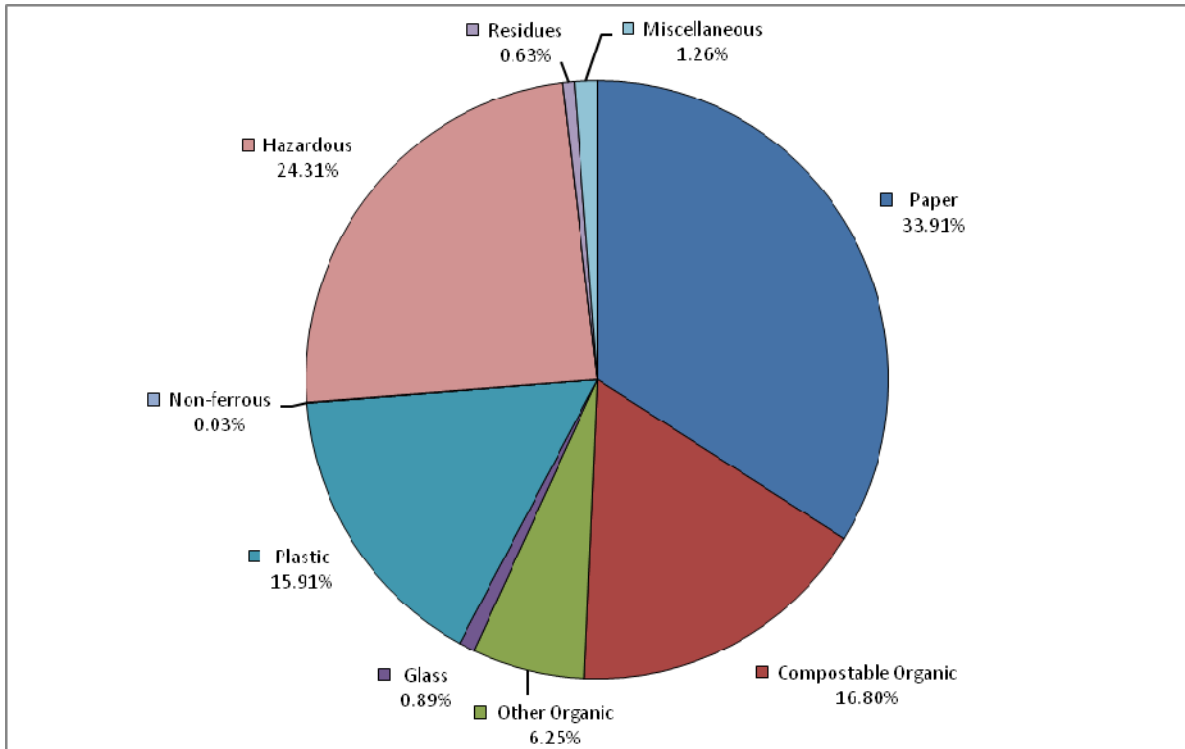
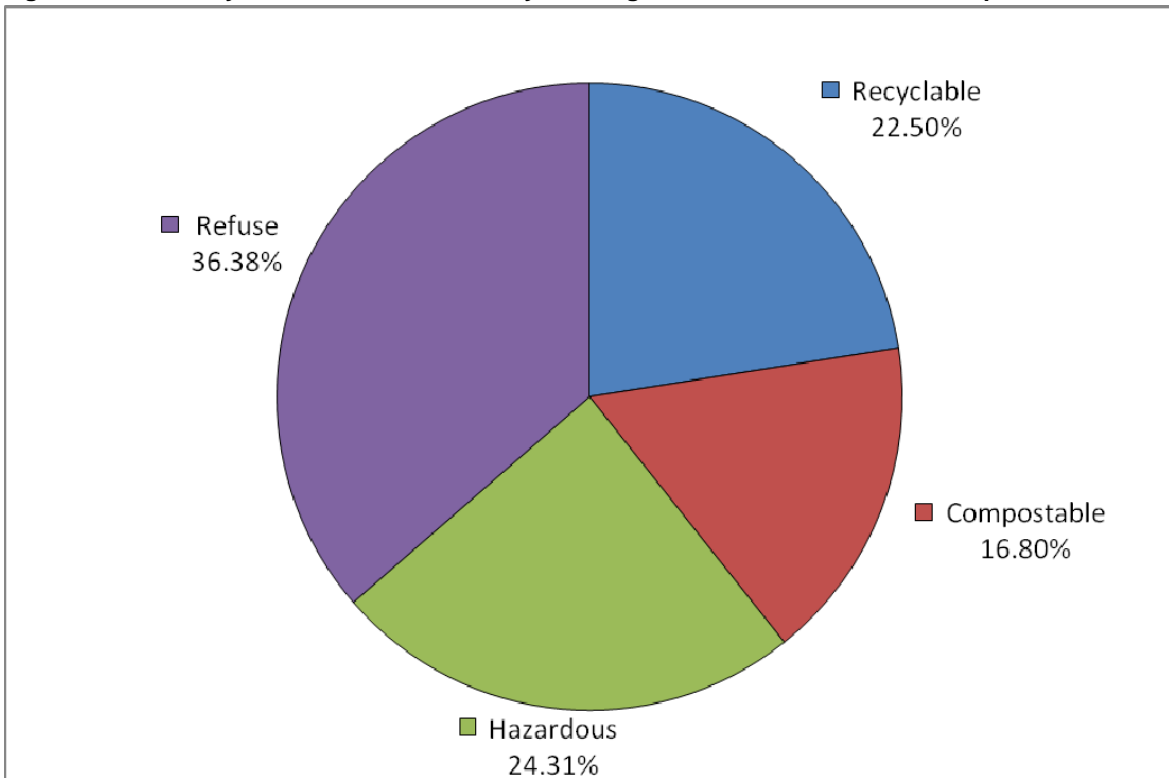


Figure A5-12 Key Waste Streams of Faculty Building refuse at the South West campus



**Table A5-5 Composition of Public Building refuse at the South West campus**

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.04	0.58%
Magazines	A02	0.00	0.00%
Packaging	A03	0.05	0.72%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.36	5.00%
Liquid Paper Board	A06	0.12	1.68%
Disposables	A07	0.44	6.10%
Office Paper	A08	0.21	2.93%
Composite mainly Paper	A09	0.04	0.58%
<b>SUBTOTAL - PAPER</b>		<b>1.27</b>	<b>17.59%</b>
Food/Kitchen	B01	0.66	9.14%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>0.66</b>	<b>9.14%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.00	0.00%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.00	0.00%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.00</b>	<b>0.00%</b>
Glass Packaging	D01	2.01	27.78%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>2.01</b>	<b>27.78%</b>
PET	E01	0.05	0.72%
HDPE	E02	0.00	0.00%
PVC	E03	0.00	0.00%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	0.19	2.65%
PP	E05	0.01	0.17%
Polystyrene	E06	0.05	0.72%
Composite mainly Plastic	E07	2.22	30.68%
Other Rigid Plastic	E08	0.04	0.58%
Other Plastic	E09	0.04	0.58%
<b>SUBTOTAL - PLASTIC</b>		<b>2.61</b>	<b>36.09%</b>
Steel Packaging	F01	0.07	0.99%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.07</b>	<b>0.99%</b>
Aluminium Cans	G011	0.09	1.27%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.09</b>	<b>1.27%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.43	5.97%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.43</b>	<b>5.97%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.01	0.17%
Miscellaneous	Misc	0.07	0.99%
<b>TOTAL - ALL MATERIALS</b>		<b>7.24</b>	<b>100.00%</b>

Figure A5-13 Composition of Public Building refuse at the South West campus

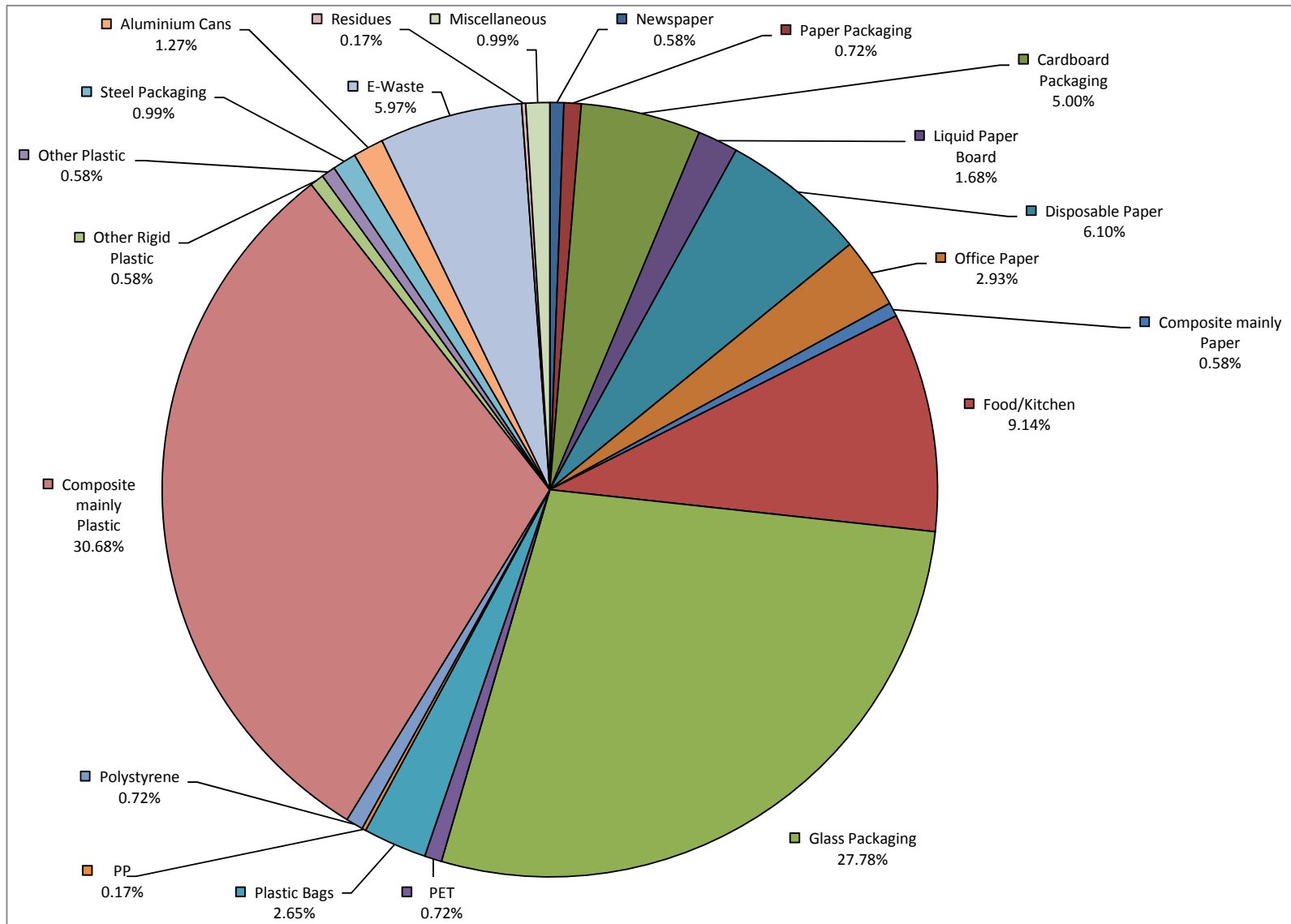


Figure A5-14 Material groupings of Public Building refuse at the South West campus

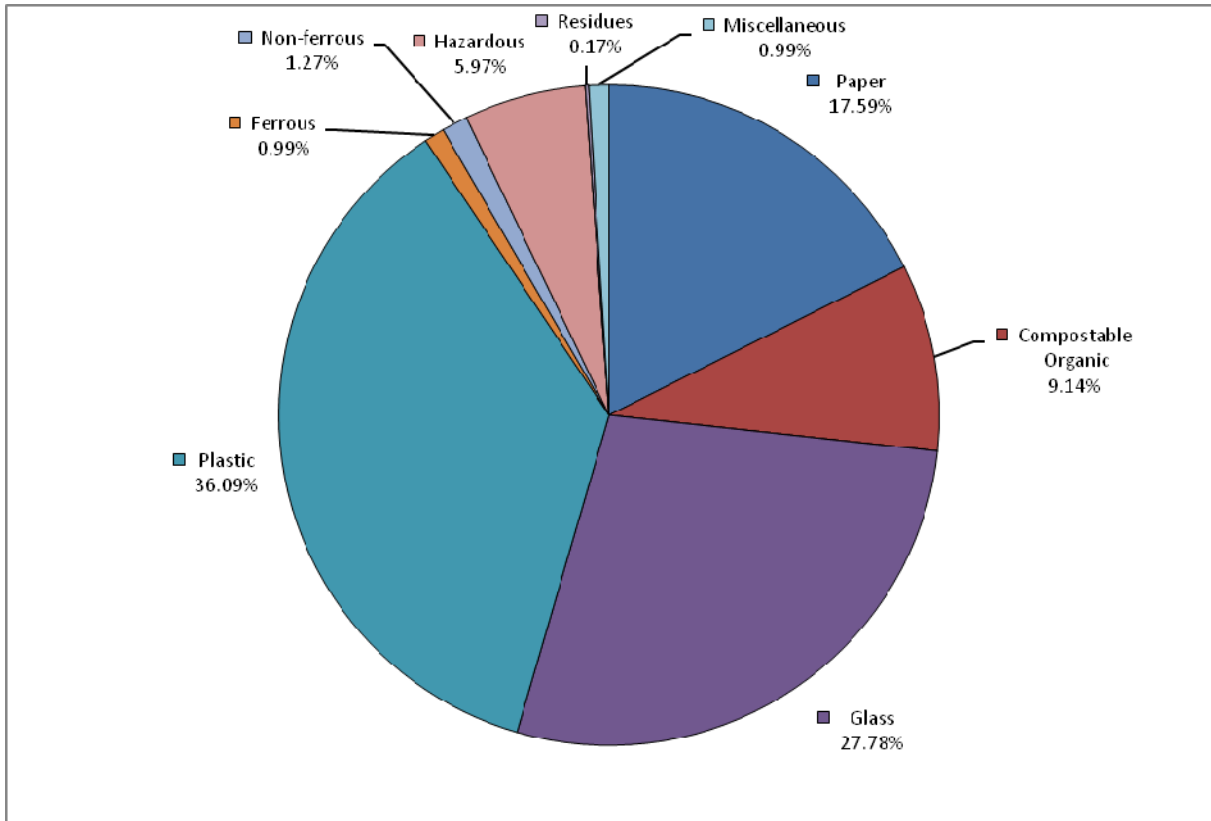


Figure A5-15 Key Waste Streams of Public Building refuse at the South West campus

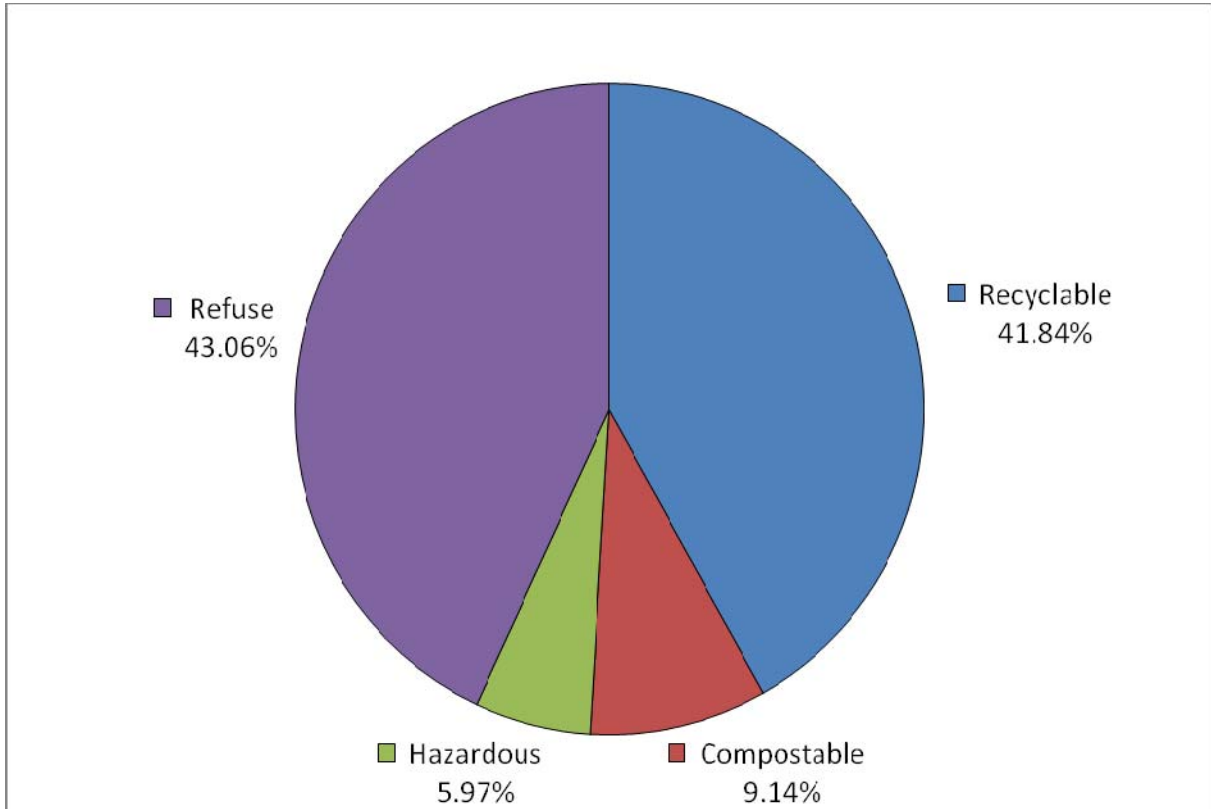


Table A5-6 Composition of Building 4 refuse at the South West campus

MATERIALS	CODE	Weight (kg)	%
Newspaper	A01	0.00	0.00%
Magazines	A02	0.00	0.00%
Packaging	A03	0.70	4.92%
Corrugated Cardboard	A04	0.00	0.00%
Cardboard Packaging	A05	0.02	0.15%
Liquid Paper Board	A06	0.08	0.57%
Disposables	A07	0.24	1.71%
Office Paper	A08	0.02	0.15%
Composite mainly Paper	A09	0.07	0.50%
<b>SUBTOTAL - PAPER</b>		<b>1.15</b>	<b>8.02%</b>
Food/Kitchen	B01	9.50	66.47%
Garden Waste	B02	0.00	0.00%
Other Organics	B03	0.00	0.00%
<b>SUBTOTAL - COMPOSTABLE ORGANICS</b>		<b>9.50</b>	<b>66.47%</b>
Wood Packaging	C011	0.00	0.00%
Other Wood	C012	0.00	0.00%
Textile/Cloth	C02	0.21	1.48%
Leather	C03	0.00	0.00%
Rubber	C04	0.00	0.00%
Engine Oil	C05a	0.00	0.00%
Cooking Oil	C05b	0.00	0.00%
Liquid fit for consumption	C06	0.21	1.48%
<b>SUBTOTAL - OTHER ORGANICS</b>		<b>0.42</b>	<b>2.97%</b>
Glass Packaging	D01	0.00	0.00%
Other Glass	D02	0.00	0.00%
<b>SUBTOTAL - GLASS</b>		<b>0.00</b>	<b>0.00%</b>
PET	E01	0.43	3.04%
HDPE	E02	0.00	0.00%
PVC	E03	0.11	0.78%
LDPE	E041	0.00	0.00%
Plastic Bags	E042	1.26	8.84%
PP	E05	0.65	4.56%
Polystyrene	E06	0.03	0.22%
Composite mainly Plastic	E07	0.03	0.22%
Other Rigid Plastic	E08	0.00	0.00%
Other Plastic	E09	0.28	1.97%
<b>SUBTOTAL - PLASTIC</b>		<b>2.81</b>	<b>19.64%</b>
Steel Packaging	F01	0.31	2.18%
Composite mainly Ferrous	F02	0.00	0.00%
Other Ferrous	F03	0.00	0.00%
<b>SUBTOTAL - FERROUS</b>		<b>0.31</b>	<b>2.18%</b>
Aluminium Cans	G011	0.09	0.64%
Other Non-Ferrous	G02	0.00	0.00%
Composite mainly Non-Ferrous	G03	0.00	0.00%
<b>SUBTOTAL - NON-FERROUS</b>		<b>0.09</b>	<b>0.64%</b>
Paint/chemicals	H01	0.00	0.00%
Light Bulbs	H02	0.00	0.00%
Dry Cell Batteries	H03	0.00	0.00%
Car Batteries	H04	0.00	0.00%
Medical Waste	H05	0.00	0.00%
Other Hazardous	H06	0.00	0.00%
E-Waste	H07	0.00	0.00%
<b>SUBTOTAL - HAZARDOUS</b>		<b>0.00</b>	<b>0.00%</b>
Ceramics	I01	0.00	0.00%
Rocks/Soils	I02	0.00	0.00%
Ash	I03	0.00	0.00%
<b>SUBTOTAL - EARTH BASED</b>		<b>0.00</b>	<b>0.00%</b>
Fine residues <20mm	Res	0.01	0.09%
Miscellaneous	Misc	0.00	0.00%
<b>TOTAL - ALL MATERIALS</b>		<b>14.30</b>	<b>100.00%</b>

Figure A5-16 Composition of Building 4 refuse at the South West campus

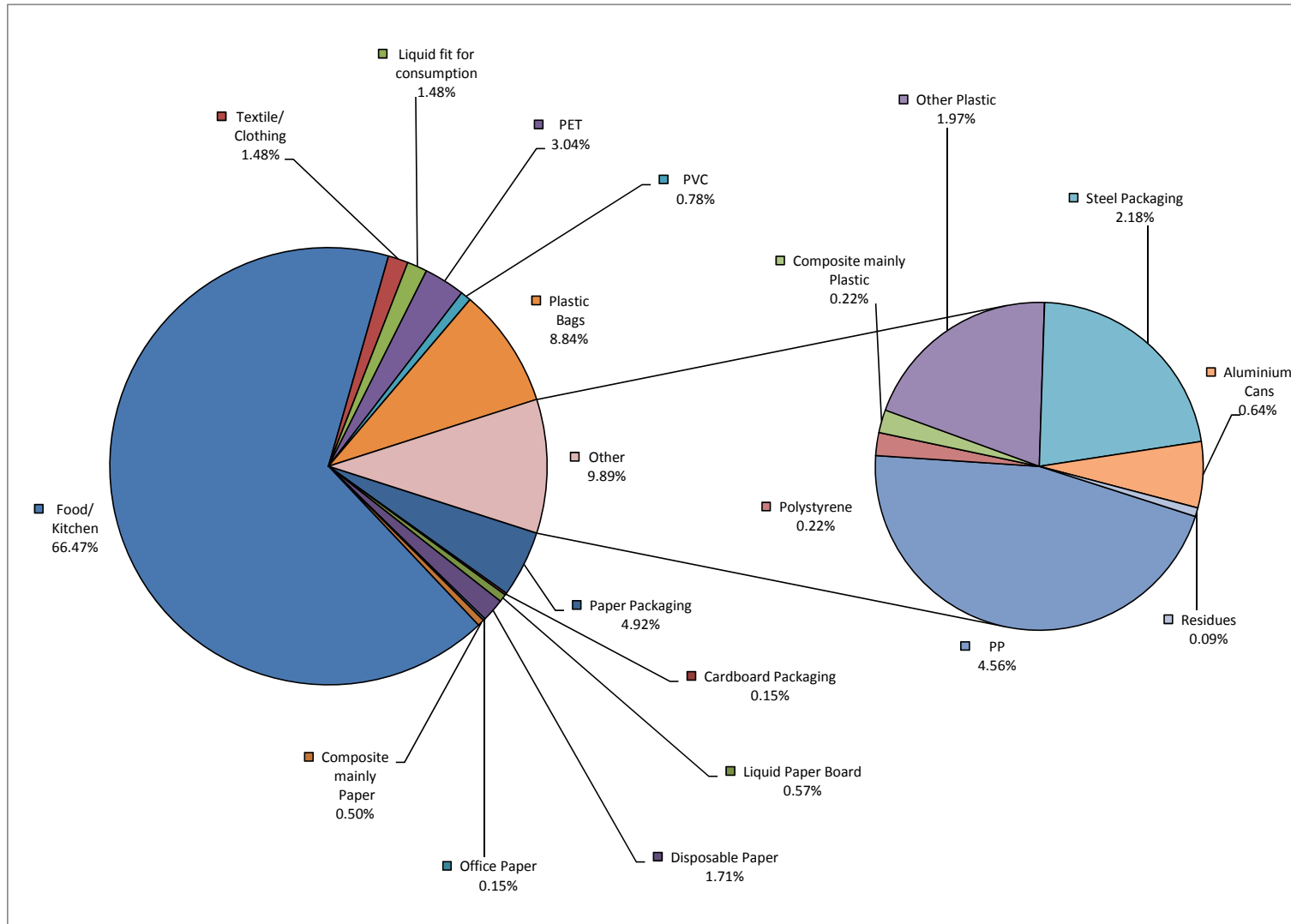


Figure A5-17 Material groupings of Building 4 refuse at the South West campus

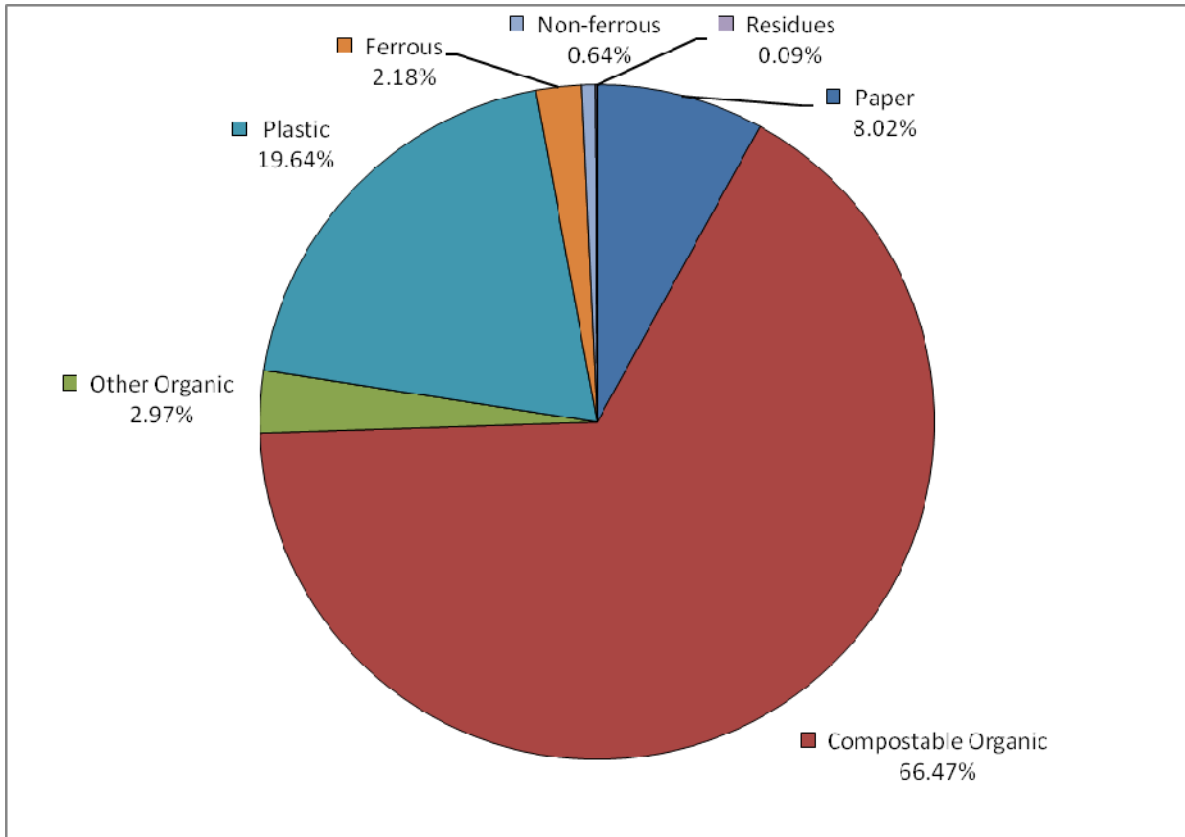


Figure A5-18 Key Waste Streams of Building 4 refuse at the South West campus

