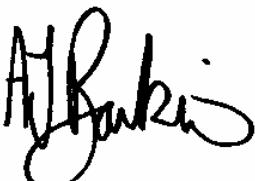


**DOE - ENVIRONMENT AND HERITAGE SERVICE
REVIEW OF MUNICIPAL WASTE COMPONENT ANALYSIS
FEBRUARY 2008
FINAL REPORT**

DOCUMENT CONTROL SHEET

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Office of Origin:	Belfast
Report Ref:	IBL0317/Report
Status:	Final
Revision No:	*
Date of Release:	February 2008
Approved and authorised for issue:  Name Andrew Baskin Position Director	

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EXECUTIVE SUMMARY

INTRODUCTION

The Environment and Heritage Service (EHS) identified the need to obtain information on the composition and characteristics of the municipal waste collected in Northern Ireland, in particular relating to the biodegradable fraction of the waste. The biodegradable fraction of the waste collected is of particular importance when considered in the context of the Landfill Directive targets of the reduction in the biodegradable waste to landfill implemented through the Northern Ireland Landfill Allowance Scheme (NILAS) Regulations. Regulation 12 of the NILAS Regulations states that *“the amount of biodegradable municipal waste in an amount of collected municipal waste is 71% by weight”*. This figure was determined from a previous Northern Ireland Household Waste Composition Study conducted in 2000.

EHS, commissioned RPS Consulting Engineers in September 2007, to carry out a Household Waste Compositional Analysis for Northern Ireland in order to review the Biodegradable Municipal Waste (BMW) fraction for Municipal Solid Waste (MSW) in Northern Ireland.

AIM

The aim of the project was two-fold; firstly, to determine the composition of municipal waste in Northern Ireland; and secondly, to review the percentage of municipal waste which is biodegradable.

METHODOLOGY

The project reviewed available data on kerbside collected household waste arisings and wastes accepted at municipal bring bank facilities and Civic Amenity Sites. The composition of mixed municipal waste collected for disposal was obtained by a physical sort of waste from both households and Civic Amenity Sites from district councils within all three Waste Management Groups (arc21, Southern Waste Management Partnership (SWaMP) and North West Region Waste Management Group (NWRWMG). All 26 district councils in Northern Ireland report their municipal waste arisings data, on a quarterly basis, through a national on-line database called WasteDataFlow (WDF). Through WDF each district council provides a detailed breakdown on the quantity of waste, by material type, separately collected for recycling or composting. The study looked at this operational data in relation to kerbside collected household waste, bring bank facilities and CA Sites.

Kerbside Collected Household Waste

A “grouped household-based” approach was employed for the collection and analysis of samples for the physical hand sorting of waste, in accordance with best practice and European Commission guidance for analysis of waste. Samples were taken from thirty-five households, a representative

number, for analysis. A total of 560 households across Northern Ireland were included in the Study. Background research was carried out on the waste management infrastructure and socio-economic make up of each district council in Northern Ireland in order to establish a representative sample for each waste management group. A socio-demographic area profiling system called ACORN (A Classification Of Residential Neighbourhoods) was also used. ACORN groups the population into five categories, namely: Wealthy Achievers; Urban Prosperity; Comfortably Off; Moderate Means and Hard Pressed.

The physical sorting was carried out into dedicated waste stream containers on site at licensed Waste Transfer Facilities in each waste management group. Following this, comprehensive statistical analysis was undertaken and the results were expressed as a 95% confidence level.

The kerbside collected residual waste composition results are from the statistical analysis of the raw data from the physical hand sorting of the waste during the Study. The composition has been determined from selected representative sample areas throughout Northern Ireland. The kerbside collected mixed dry recyclable waste composition results and kerbside collected compostable waste composition results for Northern Ireland are also obtained from the statistical analysis of the raw data through physical hand sorting of the waste in order to provide a more detailed level of compositional data than what is currently available through WDF. However, it should be noted that in order to calculate the overall total municipal waste composition the data from WDF returns has been used.

CA Site Waste

The composition of residual waste collected at six Civic Amenity (CA) Sites (two in each waste management group) throughout Northern Ireland has been obtained from the physical hand sorting of a sample of the mixed waste (collected for disposal). Waste Data Flow (WDF) operational data has been obtained for the period 2006/2007 for separately collected recyclable materials (broken down by material type) and the total amount of residual waste collected at CA Sites by each district council in Northern Ireland.

Six civic amenity sites were to be sampled on both weekdays and weekends. In order to determine which civic amenity sites, of the 110 sites in Northern Ireland were to be sampled as part of this survey, background research and a desktop study was carried out. Research was carried out, examining factors such as tonnage throughput, segregation efficiencies, location and usage with the aim of determining the most representative civic amenity sites, in each waste management group. WDF operational data for the period 2006/2007 was obtained for the purposes of selecting the CA Sites to be included in the Study. Furthermore discussions were held with technical officers from each District Council selected regarding the most representative and appropriate CA Site to sample. Supplementary data was provided by the District Councils to aid the selection process.

Bring Bank Waste

The waste generation and composition results contained in this section are from data supplied by EHS from WDF returns for all municipal Bring Bank facilities in Northern Ireland.

Total Municipal Waste

The overall composition of the total municipal waste in Northern Ireland has been obtained from a combination of all the above.

RESULTS

Waste Composition - Kerbside Collected Household Waste

Figure ES.1 Composition of all Kerbside Collected Household Waste in Northern Ireland

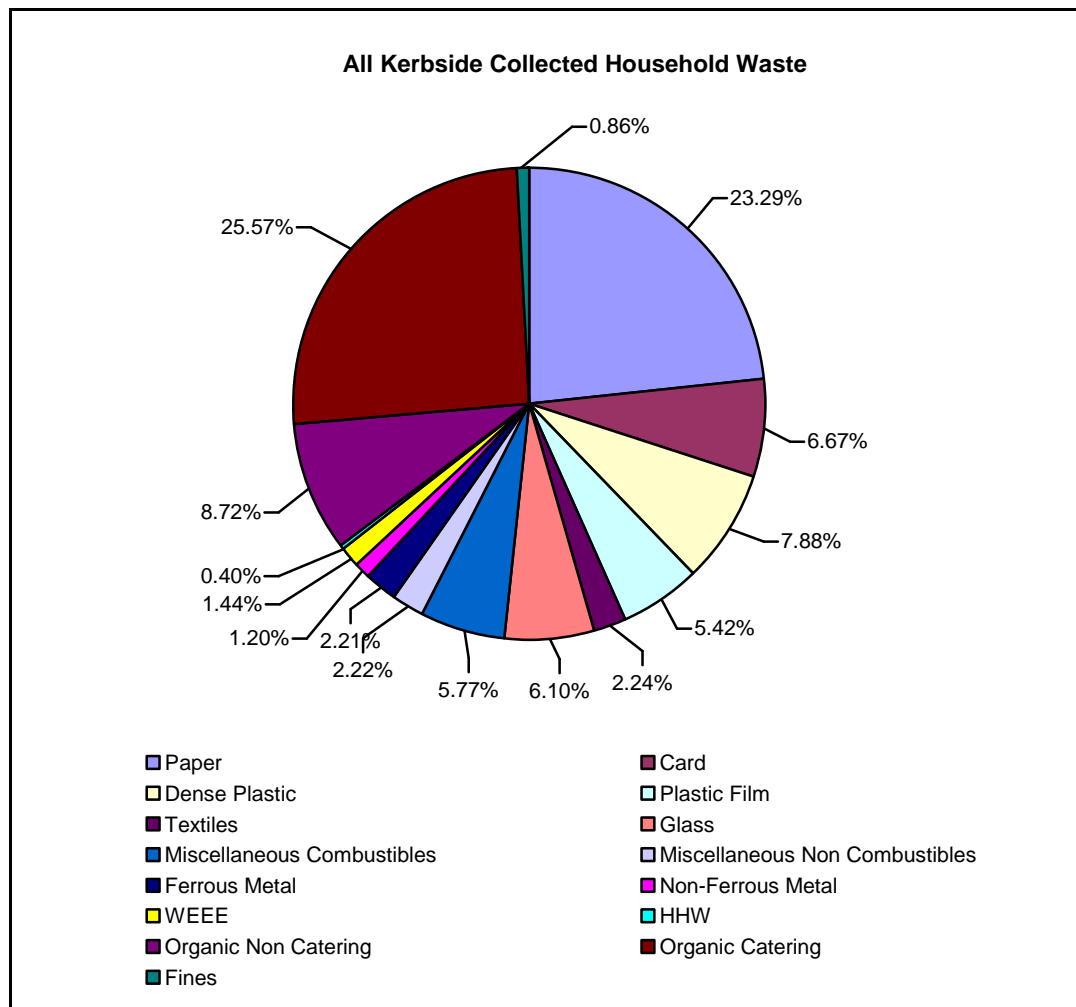


Figure ES.1 illustrates the summary composition of all kerbside collected household waste in Northern Ireland. All kerbside collected household waste includes:

- Kerbside collected household residual waste;
- Kerbside collected household mixed dry recyclable waste; and
- Kerbside collected household compostable waste.

Waste Composition - CA Site waste

Table ES.1 details the composition of wastes collected for disposal and recycled at CA Sites in Northern Ireland from April 2006 to March 2007.

Table ES.1 Composition of CA Sites (Separately Collected Recyclable/Compostable and Residual Waste collected for disposal)

Primary Category	CA Sites Waste Composition	
	Residual waste collected for disposal	Recycled waste <i>Rubble removed</i>
Paper	6.75%	2.42%
Card	5.23%	4.03%
Dense Plastic	7.18%	0.29%
Plastic Film	3.71%	0.03%
Textiles	5.67%	1.37%
Glass	3.15%	5.64%
Miscellaneous Combustibles	29.36%	18.99%
Miscellaneous Non-Combustibles	8.32%	1.89%
Ferrous Metal	0.93%	5.39%
Non-Ferrous Metal	1.43%	5.39%
WEEE	0.81%	6.01%
HHW	0.36%	1.20%
Organic Non-Catering	7.92%	47.29%
Organic Catering	17.74%	0.05%
Fines	1.46%	0.00%
Total	100.00%	100.00%

Waste Composition - Bring Bank waste

Table ES.2 details the annual quantity and composition of wastes collected at Bring Bank sites in Northern Ireland (April 2006 to March 2007).

Table ES.2 Composition of Bring Bank Sites

Categories	Bring Site Composition
Paper	14.33%
Card	2.95%
Dense Plastic	0.13%
Plastic Film	0.01%
Textiles	15.14%
Glass	66.59%
Miscellaneous Combustibles	0.00%
Miscellaneous Non-Combustibles	0.00%
Ferrous Metal	0.34%
Non-Ferrous Metal	0.50%
WEEE	0.00%
HHW	0.00%
Organic Non-Catering	0.00%
Organic Catering	0.00%
Fines	0.00%
Total	100.00%

Total Municipal Waste Composition

Table ES.3 below details the composition of the municipal waste in Northern Ireland.

Table ES.3 Municipal Waste Composition for Northern Ireland

Categories	Composition
Paper	15.93%
Card	5.10%
Dense Plastic	3.94%
Plastic Film	2.09%
Textiles	4.27%
Glass	14.59%
Miscellaneous Combustibles	9.19%
Miscellaneous Non-Combustibles	4.26%
Ferrous Metal	1.87%
Non-Ferrous Metal	1.55%
WEEE	1.36%
HHW	0.31%
Organic Non-Catering	25.77%
Organic Catering	9.34%
Fines	0.44%
Total	100.00%

Biodegradable Municipal Waste Fraction

The overall BMW percentage has been calculated by applying the biodegradability of each waste stream as outlined in the schedule to the NILAS Regulations. Table ES.4 summarises the biodegradable municipal waste (BMW) percentage for municipal solid waste (MSW) in Northern Ireland and shows that BMW fraction derived from the Study is **64.01%**. This is based on the waste analysed in the study via physical sorting and WDF operational data analysis, which equates to 909,359.64 tonnes (85.45%) of the total waste arisings in Northern Ireland. The biodegradability calculated from this waste is assumed to be representative of the total municipal waste.

CONCLUSIONS

This study has determined the composition of Municipal Solid Waste (MSW) in Northern Ireland and reviewed the percentage of Biodegradable Municipal Waste (BMW) of the MSW for Northern Ireland. The survey combined data collected for kerbside collections of residual, recyclable and compostable waste, bring bank sites and civic amenity sites to achieve these results.

In light of the results from this Study the current biodegradable municipal waste percentage of 71% would appear to be high. This study has shown that in Northern Ireland the percentage of municipal waste which is biodegradable is 64%.

1.0 INTRODUCTION

1.1 OVERVIEW

RPS Consulting Engineers were commissioned by Environment and Heritage Service (EHS), in September 2007, to carry out a Household Waste Compositional Analysis for Northern Ireland.

EHS, an agency within the Department of the Environment (NI), is responsible for the implementation of, and adherence to, waste management policy in Northern Ireland. In order to ensure that Northern Ireland is progressing towards meeting their waste management obligations, one of the key roles of EHS is the collection, collation and reporting of waste data, in fulfillment of the requirements of European Union Directives.

EHS identified the need to obtain information on the composition and characteristics of the municipal waste collected in Northern Ireland, in particular relating to the biodegradable fraction of the waste. The biodegradable fraction of the waste collected is of particular importance when considered in the context of the Landfill Directive targets of the reduction in the biodegradable waste to landfill implemented through the Northern Ireland Landfill Allowance Scheme (NILAS) Regulations.

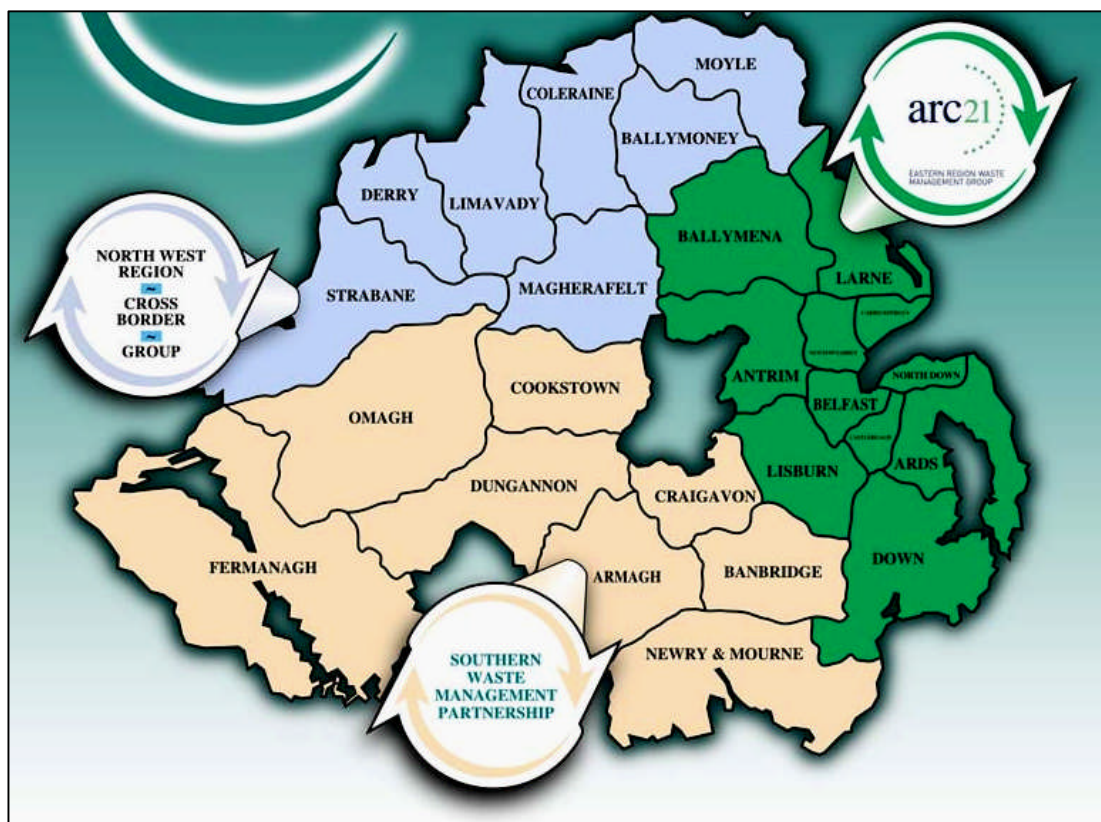
1.2 WASTE MANAGEMENT PLANNING IN NORTHERN IRELAND

For the purposes of waste management planning, the twenty-six District Councils within Northern Ireland are divided into three waste management groups. These are:

- **arc21** covering eleven District Councils in the eastern area of Northern Ireland
- **Southern Waste Management Partnership (SWaMP)** covering eight District Councils in the South West area of Northern Ireland.
- **North West Region Waste Management Group (NWRWMG)** covering seven District Councils in the North West area of Northern Ireland and also Donegal.

The District Councils within each of these Waste Management Groups are illustrated in Figure 1.1.

Figure 1.1 Waste Management Groups in Northern Ireland



Source: arc21 Waste Management Plan

1.3 REPORT CONTEXT

Waste characterisation or waste compositional/component analysis is a systematic approach to obtaining and analysing data from waste streams whereby the composition of waste according to the products and materials contained therein is obtained by manually sorting the waste. The analysis also provides an estimate of waste quantities generated.

This is the second household waste compositional analysis study for Northern Ireland to be carried out, the first taking place in 2000. In Northern Ireland the proportion of MSW which is biodegradable is assumed to be 71%. This assumption is taken from the Northern Ireland Household Waste Characterisation Study 2000. The NILAS Regulations require EHS to keep this assumption under review.

Since the 2000 study was carried out, a regional waste compositional analysis of household waste in the arc21 waste management group region has been undertaken in April 2007. In order to allow for an element of seasonality, the data collected for the arc21 study is included as part of this study.

1.4 WASTE DATA REPORTING

From the beginning of 2003, the three waste management planning groups have reported quarterly municipal waste data (by group and District Council) to the EHS. Since January 2005, following a 6 month pilot scheme, all 26 district councils have been reporting their municipal waste arisings data, on a quarterly basis, through a national on-line database called WasteDataFlow www.wastedataflow.co.uk

The WasteDataFlow on-line system is owned and operated by The Department of Food and Rural Affairs (Defra) in partnership with the UK's devolved administrations.

WasteDataFlow has been developed around a core set of questions (core dataset) that collect essential information on municipal waste collection and management and facilitates the monitoring of compliance with the Landfill Allowances Scheme (NI) Regulations (NILAS).. ,

1.5 LANDFILL ALLOWANCES SCHEME (NORTHERN IRELAND) REGULATIONS

The Landfill Allowances Scheme (Northern Ireland) (NILAS) Regulations came into operation in Northern Ireland on 1st April 2005 and supplement the Waste and Emissions Trading Act, 2003. The NILAS Regulations have been designed to ensure that Northern Ireland meets its Landfill Directive targets by allocating limits on the amount of Biodegradable Municipal Waste (BMW) which can be landfilled by each District Council.

Article 5(2) of the EC Landfill Directive (1999/31/EC) requires member states to reduce the amount of BMW sent to landfill. The targets for the reduction of BMW landfilled are:

- To reduce by 2010 the quantity of BMW landfilled to 75% of that produced in 1995.
- To reduce by 2013 the quantity of BMW landfilled to 50% of that produced in 1995.
- To reduce by 2020 the quantity of BMW landfilled to 35% of that produced in 1995.

The NILAS Regulations place a statutory responsibility on each District Council in each scheme year to landfill only the quantity of BMW they have an allowance for. To exceed this may result in financial penalties, in the order of £150 for every tonne landfilled over their allocated allowance. The scheme facilitates the transfer and borrowing (with restriction) of allowances between District Councils.

Regulation 12 of the NILAS Regulations states that *“the amount of biodegradable municipal waste in an amount of collected municipal waste is 71% by weight”*. This figure was determined from the previous Northern Ireland Household Waste Composition Study conducted in 2000.

In 2006/2007, 655,545 tonnes of BMW can be sent to landfill in Northern Ireland, reducing to 641,235 tonnes in 2007/2008 and 626,925 tonnes in 2008/2009. This amount further reduces to 470,000 tonnes in 2009/2010, which is the first Landfill Directive target year.

This survey will review the Biodegradable Municipal Waste (BMW) fraction for Municipal Solid Waste (MSW) in Northern Ireland.

1.6 SCOPE

This study is a compositional analysis of municipal waste collected across Northern Ireland. The composition of kerbside collected residual waste from representative sample areas throughout Northern Ireland has been investigated in this Study along with the compositional analysis of residual waste collected at six Civic Amenity (CA) Sites throughout Northern Ireland. The composition has been obtained by the physical hand sorting of the waste. Waste Data Flow (WDF) operational data has been obtained for the period 2006/2007 for kerbside collected recyclables and compostables, and recyclable materials collected at the CA Sites, Bring Bank facilities and total residual municipal waste collected in Northern Ireland. Furthermore, the Study obtained the composition of the kerbside collected recyclable and compostable waste through physical hand sorting of the waste in order to support the WDF operational data. Therefore, approximately 85% of municipal waste arising in Northern Ireland in the 2006/2007 period has been covered by this study both through representative sampling and operational data analysis.

1.7 AIM OF THE STUDY

The main aim of the project was two-fold:

1. To determine the composition of municipal waste in Northern Ireland; and
2. To review the percentage of municipal waste which is biodegradable i.e Biodegradable Municipal Waste (BMW).

The Study would also generate the following objectives:

- To provide the total amount of BMW collected for Northern Ireland.
- To percentage BMW in municipal waste for Northern Ireland.
- To provide the municipal waste composition for Northern Ireland.
- To provide the composition of municipal waste collected at the kerbside for Northern Ireland.
- To provide the composition of municipal waste collected at CA Sites for Northern Ireland.

1.8 REPORT CONTENT

This report content and structure is as follows:

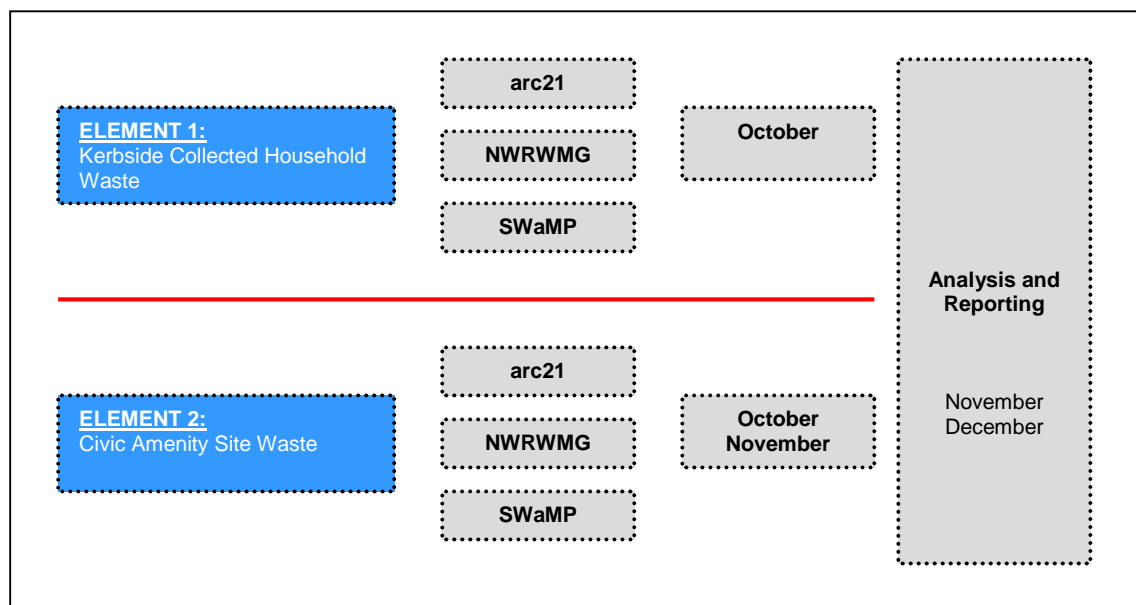
- Section 2 summarises the methodology adopted for the analysis, including information on the collection and sorting of the waste and statistical analysis of the data.
- Section 3 presents the main results of the analysis including the overall average generation and composition of all waste collected at the kerbside, residual waste and recyclable waste.
- Section 4 provides analyses of the waste data including comparisons to other studies and the biodegradable municipal waste composition. It also considers a number of scenarios and looks at the composition and waste generation associated with these scenarios.
- Section 5 details our conclusions to EHS.

2.0 METHODOLOGY

2.1 OVERVIEW

This section of the report details the methodology employed to undertake the waste compositional analysis and therefore meet the objectives of the project. The project required waste to be collected and physically sorted from both households and also from Civic Amenity Sites from pre-selected District Councils within all three Waste Management Groups (arc21, Southern Waste Management Partnership (SWaMP) and North West Region Waste Management Group (NWRWVG). Figure 2.1 below sets out an overview of the project methodology.

Figure 2.1 Methodology Overview



As illustrated above this project was carried out in two elements:

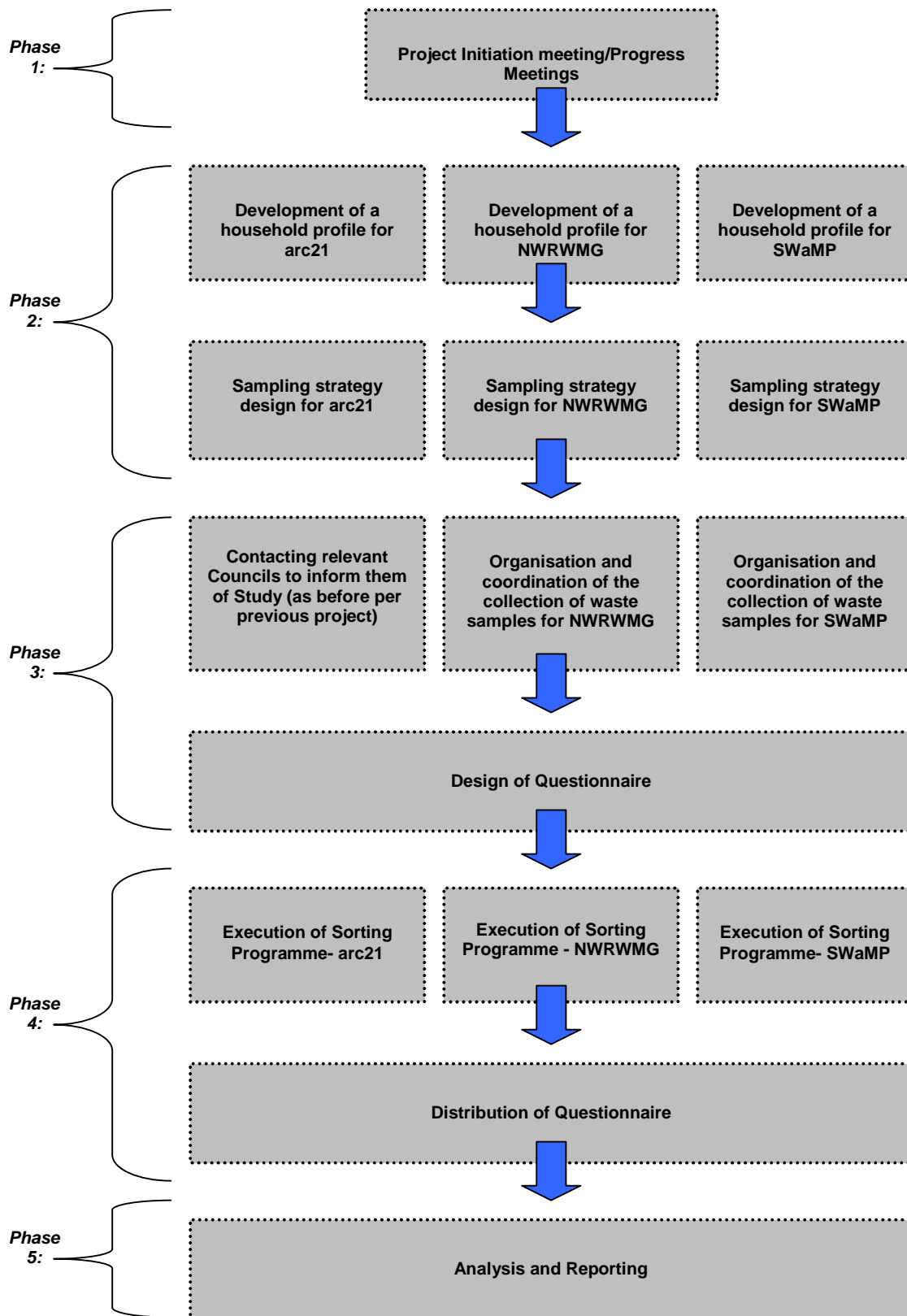
- **Element 1: Kerbside Collected Household Waste**
- **Element 2: Civic Amenity Site Waste**

The following section provides the methodology for each of the above elements.

2.2 ELEMENT 1: KERBSIDE COLLECTED HOUSEHOLD WASTE

A flow chart outlining the methodology used for this element of the project is set out in Figure 2.2.

Figure 2.2 Element 1: Kerbside Collected Household Waste Overview



2.2.1 Phase 2: Development of a Household Profile

The household profile for the arc21 region had already been established by RPS Consulting Engineers during the arc21 Waste Compositional Analysis Study in May 2007. The representative sample of households selected for the May study for arc21 were re-sampled so data which could be used an element of seasonality could be build into the survey.

For SWaMP and NWRWMG, household profiles were developed using the same methodology that had previously been used for arc21; that is, ensuring that the household sample chosen was representative of the regions, and therefore Northern Ireland as a whole. This is described in more detail below.

Sampling Design

A “grouped household-based” approach was employed for the collection and analysis of samples in accordance with best practice and European Commission guidance for analysis of waste. Samples were taken from thirty-five households, a representative number, for analysis.

As per the project brief, the representative sample of households selected for the May study for arc21 were re-sampled so data which could be used an element of seasonality could be built into the survey. Therefore, ten samples of thirty-five households were repeated within the arc21 Region (350 households). The Tender Specification also required that three additional samples were carried out from two District Council areas, one from the SWaMP Region and one from NWRWMG with each of these samples containing waste from thirty-five households. The areas chosen to be sampled within these groups were also to be representative of the socio-economic profile of the area and therefore the sampling design was based on ACORN data.

ACORN (A Classification of Residential Neighbourhoods)

The classification of socio-economic variation chosen was “ACORN” (A Classification of Residential Neighbourhoods). ACORN combines geography with demographics and lifestyle information, places where people live with their underlying characteristics and behaviour, in order to create a tool for understanding the different types of people in different areas. By analysing significant social factors and consumer behaviour, it provides an understanding of the different types of consumers throughout the region. It is an area profiling system which represents declining affluence and it groups the entire UK population into five categories as follows:

1. ACORN 1 - Wealthy Achievers
2. ACORN 2 - Urban Prosperity
3. ACORN 3 - Comfortably Off

4. ACORN 4 - Moderate Means
5. ACORN 5 - Hard Pressed

Sample Areas Selected

Based on ACORN categories and the number of samples that were required to be carried out, Table 2.1 sets out the number of samples required to be taken in each ACORN category by Waste Management Group, to achieve a representative sample for Northern Ireland.

Table 2.1 Sampling Matrix by ACORN category

Sample Numbers by ACORN classification and Waste Management Region						
	Wealthy Achievers	Urban Prosperity	Comfortably Off	Moderate Means	Hard Pressed	Total Sample Number
arc21	3	1	2	1	3	10
NWRWMG	1	0	1	0	1	3
SWaMP	2	0	0	1	0	3
Total	6	1	3	2	4	16

As detailed previously, the sample size at each location was thirty-five households and these were collected in sixteen samples consisting of:

- 350 households that were representative of the arc21 area
- 105 households within NWRWMG and SWaMP.

In summary, the District Council sampled were as follows:

- Belfast City Council
 - Lisburn City Council
 - Ards Borough Council
 - Castlereagh Borough Council
 - Derry City Council - **NWRWMG**
 - Newry & Mourne District Council - **SWaMP**
- } **arc21**

ACORN areas were selected in arc21, NWRWMG and SWaMP to ensure a representative sample of households in Northern Ireland. Considerations in achieving this representative sample were that the samples:

- Encompassed all five ACORN classifications;
- Located in urban and rural areas;
- Encompassed a number District Council areas;

- Consisted in a mix of housing types, semi-detached, detached, with/without gardens; and
- Had a number of bin systems including weekly residual waste collection, fortnightly residual waste collection, green/brown bin for compostables, and blue bin / black box for mixed dry recyclables.

2.2.2 Phase 3: Design of Questionnaire

In order to gain more information on householders waste management behaviour and to inform householders of the compositional analysis, a questionnaire was distributed to the relevant households participating in the study. However, it was considered that it was not necessary to issue the questionnaire to participating households in the arc21 region as a similar questionnaire had been distributed to the same households participating in the arc21 Waste Compositional Analysis Study in May 2007. These households instead were issued with an information leaflet providing an explanation of the study. A copy of the questionnaire and information leaflet issued are included within Appendix A of this report. The aim of the questionnaire was to gain an insight into the behaviour with regard to managing their wastes and to help build a more complete picture of the attitudes to waste management within Northern Ireland.

The results of the questionnaire, included within Appendix B of this report, also indicated levels of user satisfaction, reasons for lack of participation and perceived problems with waste management in general within Northern Ireland. The results of the arc21 Waste Compositional Analysis questionnaire issued in May 2007 were combined with the results for the NWRWMG and SWaMP regions during this study to give an overall representation of Northern Ireland.

2.2.3 Phase 4 - Survey Execution

The physical sorting was carried out at a licensed Waste Transfer Facility in each of the three Waste Management Groups and the collections were carried out by waste carriers, registered under The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations (Northern Ireland) 1999.

Each collected waste sample (collection from a group of thirty-five households) was weighed and recorded prior to sorting at a designated area within the sorting facility. Once the waste was tipped out on a polythene tarpaulin or sorting table for segregation, separate containers were allocated for each predefined primary and secondary waste category and placed in the correct sorting container. Waste was then picked off the tarpaulin by waste sorters and placed into the dedicated waste stream containers. Once full, each container was weighed and the data entered on to standard proformas and then transferred to an Excel database. Validation

checks were carried out at this stage. The categories into which the waste was sorted for household bins are included in Appendix C of this report.

Figure 2.3 Waste tipped out for sorting



Figure 2.4 Waste segregated into categories



Figure 2.5 Full container on weighing scales



Separated uncontaminated recyclable wastes were held aside for recycling. Residual waste was placed in designated bins for disposal. Upon completion of the waste sort, disposable overalls, disposable gloves and polythene sheets were correctly disposed and the area thoroughly cleaned.

Within the arc21 region some district councils provide a box collection scheme for recyclable materials, operated by Bryson Recycling. For this sampling, the waste from the box collection was segregated at the kerbside. A vehicle was provided by Bryson House with a number of containers into which recyclables could be sorted at kerbside. This segregated waste was then returned to the transfer station for weighing and results noted on the standard proforma. The waste was retained by Bryson House for recycling.

Figure 2.6 Waste segregated at kerbside with Bryson House



2.2.4 Phase 5 - Data and Statistical Analysis

Data Analysis

The “raw data” obtained from the compositional analysis was checked and validated again and then classified by ACORN category prior to statistical analysis.

Given the introduction of the WasteDataflow reporting system, whereby district councils report all their municipal waste arisings on a quarterly waste basis, WDF operational data for the period 2006/2007 has been obtained for kerbside collected recyclables and compostables, and recyclable materials collected at the CA Sites, Bring Bank facilities and total residual

municipal waste collected in Northern Ireland. The compositions obtained from the physical waste sorting have then been applied to the WDF data.

In order to allow for an element of seasonality, the data collected for the arc21 study has been reviewed as part of this study. The dataset used to assess seasonality in relation to waste composition is the data obtained from the kerbside collections.

Statistical Analysis

Boxes 2.1 and 2.2 give a brief introduction to statistical principles used for this Study.

Box 2.1 Statistical Principles

Statistical Principles

When conducting a waste survey, we are trying to predict a characteristic (for example, the mean amount produced per household per week in Northern Ireland) about the whole population (in this case, all the households in Northern Ireland) from our sample (the households studied during this survey). This is known as inferential statistics. We are therefore interested in two things;

- *The inference; and*
- *A measure of its accuracy*

The inference is simply a prediction about a specific parameter that is of interest to us (for example, the mean amount produced per household per week in Northern Ireland) while the accuracy of the measurement is usually expressed in terms of confidence intervals.

The results for the samples collected were scaled up in relation to ACORN for Northern Ireland as a whole. The statistical scale up of the results was carried out as per the breakdown for each ACORN category, as is shown below:

- Wealthy Achievers – 42%
- Urban Prosperity – 2%
- Comfortably Off – 17%
- Moderate Means – 10%
- Hard Pressed – 29%

A comprehensive statistical analysis was undertaken to produce the survey results including the following:

- | | |
|-------------------------|------------------------------------|
| ▪ Mean | ▪ Confidence coefficient |
| ▪ Median | ▪ Relative confidence interval (%) |
| ▪ Standard deviation | ▪ Confidence interval (kg) |
| ▪ Variation coefficient | ▪ Composition |

Box 2.2 Confidence Intervals and Levels**Confidence Intervals**

The confidence interval is an expression of statistical accuracy. It provides the upper and lower limits of the “actual” population mean based on the sampled mean and variance of the observed sampled data. For example, sample mean for the waste category newspaper may be 5 % for a certain generator, with a confidence interval of +/- 1%. This implies that the true population mean for paper is between 4% and 6%.

Confidence Levels

The probability that a confidence interval will enclose the estimated parameter is called the confidence level and is usually expressed as a percentage. The confidence level measures the proportion of samples that produce a confidence interval containing the population parameter. A good confidence interval is one that is as narrow as possible and has a confidence level near 100%. (However, unless we sample every household in Northern Ireland, we can never construct a 100% confidence interval). For example if the level of confidence is 95%, we are 95% certain that the true population mean is within the stated confidence interval. Combining the terms confidence interval and level of confidence, we use the phrase “95% confidence interval”. Applying this term to the previous example, we would be 95% certain that the true population mean would fall within the 4% to 6% range.

The narrower the interval, the more exactly the estimated parameter is located, while the larger the confidence level, the more confidence we have that a particular interval encloses the estimated parameter. The confidence level gives a measure of the confidence one can place in the confidence limits constructed from the data contained in a sample. In that sense the width of an interval and its associated confidence level measure the accuracy of the confidence interval. Larger samples provide more information to use in forming the interval estimate. Therefore, for a given confidence level, the larger the sample the narrower will be the resulting confidence interval.

Finally, the level of confidence and the confidence interval have an inverse relationship. For example, for an 80% level of confidence, the confidence interval will be narrower than if the level of confidence were 95%.

Within this study the composition of the following parameters were analysed:

- All kerbside collected household waste
- Kerbside collected household residual waste
- Kerbside collected household recyclable waste
- Kerbside collected household compostable waste
- CA site residual waste

For each of the above parameters, the composition of the waste was calculated and confidence intervals were computed for each primary and secondary category. The results of

these calculations were then combined with the percentage biodegradability of each secondary waste category and Waste Data Flow returns in order to calculate the percentage of biodegradable waste within Northern Ireland. *“These results were expressed on a 95% confidence level as recommended by best practice guidelines for EU Waste Characterisation Studies.”*

Results were then assembled from WasteDataFlow for BMW, and the following analysis carried out for these results:

- Mean (%)
- Lower Bound (%)
- Upper Bound (%)
- Mean (kg)
- Lower Bound (kg)
- Upper Bound (kg)

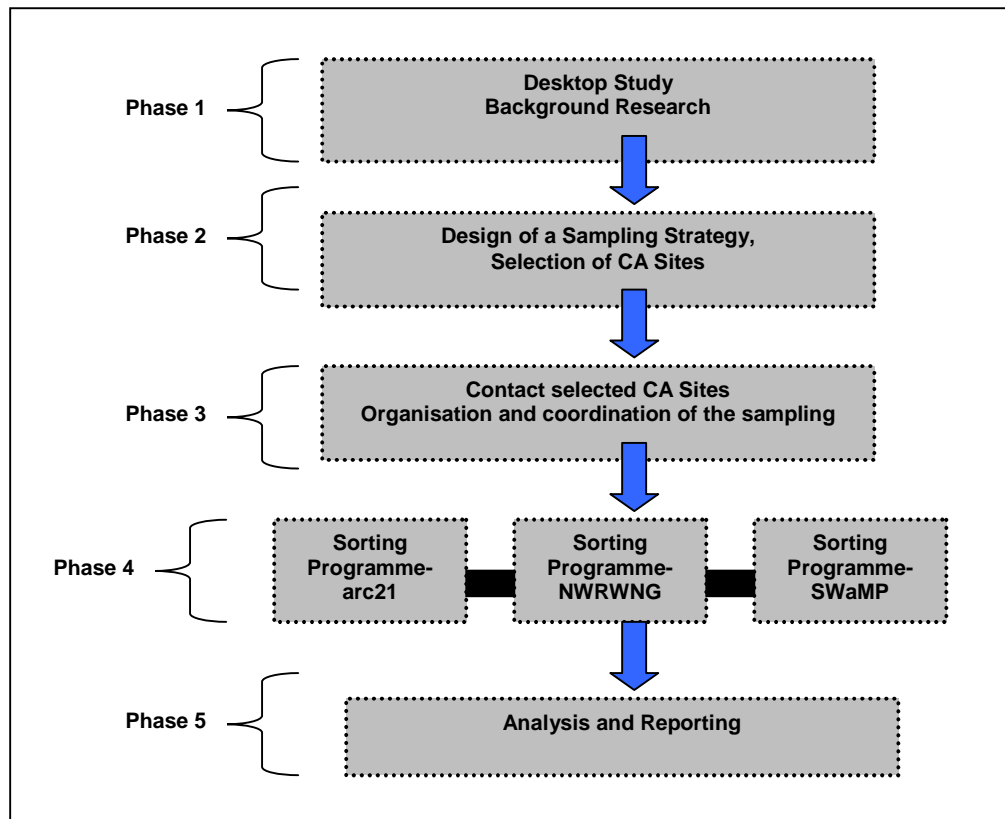
However, due to the combination of data used the confidence intervals for BMW were not calculated.

Comprehensive result sheets showing the statistical analysis are contained in Appendix D. Extrapolation was carried out on the obtained sample results in relation to the five ACORN categories in Northern Ireland.

2.3 ELEMENT 2: CIVIC AMENITY SITE WASTE

A flow chart outlining the methodology used for this element of the project is set out in Figure 2.7.

Figure 2.7 Element 2: Civic Amenity Site Waste Methodology Overview



2.3.1 Phase 1: Desktop Study and Research

The tender brief specified that six civic amenity sites two for each waste management group were to be sampled on both weekdays and weekends. In order to determine which civic amenity sites, of the 110 sites in Northern Ireland were to be sampled as part of this survey, background research and a desktop study was carried out.

Research was carried out, examining factors, such as tonnage throughput, segregation efficiencies, location and usage with the aim of determining the most representative civic amenity sites, in each waste management group, to be sampled. Therefore, the following information was included in the analysis:

- **Geographical Information**
 - Location of the CA site by urban or rural location
- **Provision and Demographics**
 - Number of sites
 - Population
 - Number of CA sites per 100,000 of population
 - Land area (sq miles)

- Land area per CA site (sq miles)
- **WasteDataFlow Information for 2006/07**
 - Tonnage collected for recycling/reuse
 - Tonnage collected for disposal (household and non-household)
 - Segregation efficiencies
- **Other Information**
 - Bulky waste collection

2.3.2 Phase 2: Selection of CA Sites

This section sets out the CA sites that were selected for sampling as part of this compositional analysis. WDF operational data for the period 2006/2007 was obtained for the purposes of selecting the CA Sites to be included in the Study. Furthermore discussions were held with technical officers from each District Council selected regarding the most representative and appropriate CA Site to sample. Supplementary data was provided by the District Councils to aid the selection process.

arc21

The arc21 CA sites that were selected to be sampled are set out in Table 2.2 below. The table sets out the segregation efficiencies (based on information submitted through WDF for 2006/07) and the percentage of each District Council's CA site waste of the arc21 CA site waste acceptance total.

Table 2.2 arc21 CA Sites for analysis

	Site 1	Site 2
District Council	Lisburn City Council	Newtownabbey Borough Council
% of arc21 CA Site Tonnage <i>(accepted at CA Sites in the district council area)</i>	15%	29%
Segregation Efficiency (%) <i>(collective rate for the district council area)</i>	24.6	36.3
CA Site Selected	The Cutts	Bruslee

Newtownabbey Borough Council area was selected as its one CA site accounts for 10% of the CA site waste in the arc21 region with the sample being taken from their CA site, at Bruslee. The site falls under the Wealthy Achiever socio-economic ACORN category.

Lisburn City Council area accounts for 15% of the CA site waste in the arc21 region and has two CA sites. Of these two sites, the Drumlough site is considered to be too rural to be representative of the overall arc21 sample, therefore, the CA site at The Cutts was sampled as it was considered more representative of the arc21 region. It falls under the Comfortably Off socio-economic ACORN category.

NWRWMG

Derry City Council and Coleraine Borough Council were selected as between them they make up over 60% of the CA site tonnage throughput in the NWRWMG. Both also have average segregation efficiencies, as is shown in Table 2.3 below.

Table 2.3 NWRWMG CA Sites for analysis

	Site 1	Site 2
District Council	Derry City Council	Coleraine Borough Council
% of NWRWMG CA Site Tonnage <i>(accepted at CA Sites in the district council area)</i>	32%	29%
Segregation Efficiency (%) <i>(collective rate for the district council area)</i>	43.5	36.3
CA Site Selected	Brandywell	Kilrea

The Brandywell Site in Derry City Council was selected for the following reasons: it has a high tonnage throughput, it has a large catchment population, it is an urban site, it has high user levels and falls under the Hard Pressed socio-economic ACORN category. The Kilrea Site in Coleraine Borough Council was selected as it gives a representative sample of a rural CA site located in NWRWMG.

SWaMP

The SWaMP CA sites that were selected to be sampled are set out in Table 2.4.

Craigavon Borough Council was selected as the two CA sites in Craigavon Borough Council, Fairgreen and Newline, account for 19% of the waste accepted into CA sites in the SWaMP region. Craigavon BC also has a fairly average segregation efficiency compared with other CA sites in Northern Ireland average. The waste sampling took place at the Fairgreen Site which is situated in an area that falls under the Hard Pressed socio-economic ACORN category.

Table 2.4 SWaMP CA Sites for analysis

	Site 1	Site 2
District Council	Newry & Mourne District Council	Craigavon Borough Council
% of SWaMP CA Site Tonnage <i>(accepted at CA Sites in the district council area)</i>	17%	19%
Segregation Efficiency (%) <i>(collective rate for the district council area)</i>	36.3	43.5
CA Site Selected	Warrenpoint	Fairgreen

Newry and Mourne District Council was selected as the second site within the SWaMP Region as CA sites within this Council area accept a large proportion (17%) of the waste accepted at CA sites in the SWaMP region. The sites also have good segregation efficiencies. The Warrenpoint site in Newry & Mourne was selected as it has a high tonnage throughput, it represents a large proportion of the population of the area, the site has a segregation efficiency of approximately 30% were as the Newry CA site has a segregation efficiency of 10% and the site covers both rural and urban populations. The CA Site is located in an area that falls under the Wealthy Achiever socio-economic ACORN category.

2.3.3 Phase 3 & 4: Execution of CA Site Sampling

The waste materials that were sampled during this part of the compositional analysis were those that entered the general skips that are subsequently disposed of to landfill, that is, the residual waste. The CA Site compositional audits did not take into account materials that were being composted or recycled as information relating to this was obtained from WDF returns and through additional information obtained from each District Council.

A representative sub-sample of the waste disposed at each site was obtained (on three separate monitoring days for each CA Site) by setting aside a pre-determined skip for the survey that was filled by the public on the specified day of collection. The representative sub-sample was achieved by coning and quartering the waste accepted at the CA Site on the sample day. The public unaware of this study, ensuring their behaviour was not influenced in any way.

The waste in this skip was then sorted, following the same methodology as set out for the household bins, the following day. Collections, and subsequent sorting, were carried out on two weekdays and one weekend at each of the CA sites to ensure a representative sample was obtained. Due to the differing nature of the waste collected at CA sites compared to the household bins it was beneficial to modify the secondary categories into which the waste is sorted for CA sites, this is shown in Appendix C of this report.

2.3.4 Phase 5: Analysis and Reporting

A similar approach has been used to calculate waste composition at CA sites as for household bins. Broad confidence intervals have been calculated since only six of the approximately 110 CA sites in NI were sampled during this study. It was necessary to calculate the waste production at CA sites in the three regions individually before combining them with each other and with the kerbside waste production figures. Finally, as the secondary categories differ between kerbside collection and CA facilities, the analysis described above was performed at primary level before being scaled up for Northern Ireland.

3.0 COMPOMPOSITIONAL ANALYSIS RESULTS

3.1 INTRODUCTION

This section details the results of the waste compositional analysis, results from this study are presented in this section of the report in the following format. Detailed results are contained in Annex D.

3.1.1 Kerbside Collected Household Waste

Waste compositional results detailed in this Section are provided for:

- Kerbside collected household residual waste;
- Kerbside collected household mixed dry recyclable waste; and
- Kerbside collected household compostable waste.

The kerbside collected residual waste composition results for Northern Ireland in this Section are from the statistical analysis of the raw data from the physical hand sorting of the waste during the Study. The composition has been determined from selected representative sample areas throughout Northern Ireland. The kerbside collected mixed dry recyclable waste composition results and kerbside collected compostable waste composition results for Northern Ireland in this Section are also obtained from the from the statistical analysis of the raw data through physical hand sorting of the waste in order to provide a more detailed level of compositional data than what is currently available through WDF. However, it should be noted that in order to calculate the overall total municipal waste composition the composition from WDF returns has been used. Further information is contained in Box 3.1.

3.1.2 Bring Bank Sites

The waste generation and composition results contained in this section are from data supplied by EHS from WDF returns for all municipal Bring Bank facilities in Northern Ireland.

3.1.3 Civic Amenity Site Waste

The composition of residual waste collected at six Civic Amenity (CA) Sites (two in each waste management group) throughout Northern Ireland has been obtained from the physical hand sorting of a sample of the mixed waste (collected for disposal). Waste Data Flow (WDF) operational data has been obtained for the period 2006/2007 for separately collected recyclable materials (broken down by material type) and the total amount of residual waste collected at CA Sites by each district council in Northern Ireland.

3.1.4 Total Municipal Waste

The overall composition of the total municipal waste in Northern Ireland has been obtained from a combination of all the above. Further details are contained in Box 3.1.

3.2 WASTE COMPOSITION OF KERBSIDE COLLECTED HOUSEHOLD WASTE

This section of the report details the results achieved from the kerbside waste collections (residual, recyclables and compostables) for Northern Ireland.

3.2.1 Kerbside Collected Household Residual Waste

As can be seen from Table 3.1 the following categories make up the majority of the residual waste stream in Northern Ireland:

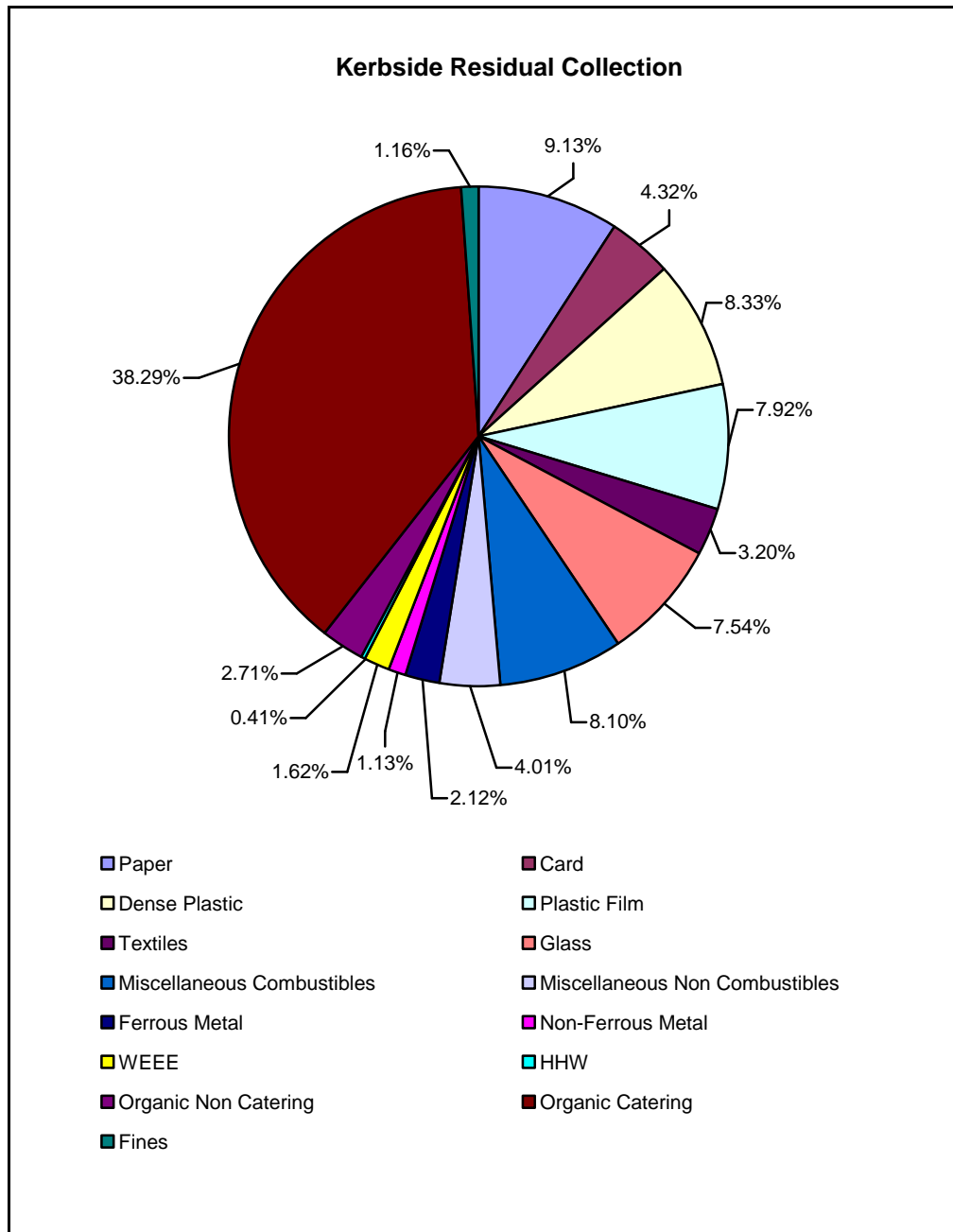
- Organic catering (38.3%)
- Plastic (16.2%)
 - Dense Plastic (8.3%)
 - Plastic Film (7.9%),
- Paper (9.1%)
- Miscellaneous Combustibles (8.1%).

Table 3.1 Summary of the Average Composition of the Kerbside Collected Residual Waste per Household

Summary Categories	Residual Waste
Paper	9.1%
Card	4.3%
Dense Plastic	8.3%
Plastic film	7.9%
Textiles	3.2%
Glass	7.5%
Miscellaneous combustibles	8.1%
Miscellaneous non-combustibles	4.0%
Ferrous metal	2.1%
Non-ferrous metal	1.1%
WEEE	1.6%
HHW	0.4%
Organic non-catering	2.7%
Organic catering	38.3%
Fines (Less than 10 mm)	1.2%

Figure 3.1 illustrates the above table. As can be seen from Figure 3.1 Organic Catering (food waste), makes up the majority of the residual waste fraction disposed of in Northern Ireland. The Study has shown that it is the largest single fraction of the household residual waste stream.

Figure 3.1 Summary Composition of Residual Waste in Northern Ireland



SEASONALITY

In order to allow for an element of seasonality, the data collected for the arc21 study (carried out in May 2007) on kerbside collected household waste in the arc21 region has been included as part of this study. The same ten household ACORN areas sampled during the arc21 Study were re-sampled as part of this Study to allow seasonality to be considered between the May and October sampling periods.

Table 3.2 shows the difference in the composition of the kerbside residual waste from the spring sampling in May 2007 (as part of the arc21 waste compositional analysis study) and autumn sampling in October 2007 for this Study.

Table 3.2 arc21 Waste Management Group - Summary of Average Composition of the Kerbside Collected Residual Waste per Household

Primary Categories	Composition arc21 Spring Sampling			Composition arc21 Autumn Sampling		
	Mean	Lower Bound	Upper Bound	Mean	Lower Bound	Upper Bound
	Paper	11.95%	9.91%	13.98%	9.35%	6.99%
Card	5.42%	4.25%	6.58%	5.06%	2.82%	7.29%
Dense Plastic	8.72%	5.97%	11.46%	8.34%	6.29%	10.39%
Plastic film	6.29%	4.16%	8.42%	6.69%	5.16%	8.23%
Textiles	3.88%	2.14%	5.62%	2.95%	1.49%	4.41%
Glass	7.87%	4.89%	10.85%	7.54%	2.11%	12.97%
Miscellaneous combustibles	7.32%	5.47%	9.16%	7.43%	4.26%	10.60%
Miscellaneous non-combustibles	2.12%	0.18%	4.06%	6.23%	0.30%	12.16%
Ferrous metal	2.12%	1.84%	2.41%	1.98%	1.13%	2.82%
Non-ferrous metal	1.22%	0.65%	1.78%	1.24%	0.84%	1.63%
WEEE	0.98%	0.00%	3.90%	2.22%	0.09%	4.36%
HHW	0.15%	0.00%	0.30%	0.32%	0.00%	1.07%
Organic non-catering	5.09%	1.21%	8.96%	1.90%	0.00%	4.05%
Organic catering	22.52%	15.84%	29.20%	38.24%	30.25%	46.22%
Fines (Less than 10 mm)	14.38%	9.92%	18.84%	0.52%	0.00%	1.60%
	100.00%			100.00%		

Any trends in the disposal of kerbside collected residual waste will be related to the time of year. One obvious example is the production of garden waste (Organic non-catering waste) which should peak in the summer compared to the winter. As can be seen from the Table 3.2 there are variations in the waste composition from both surveys, particularly in relation to

Organic Catering waste and Fines. In relation to the seasonal variations of these waste categories a number of assumptions can be made:

Organic Catering Waste

- Home compostable kitchen waste comprising of materials such as fruit and vegetable peelings, tea bags, and liquids decrease from 16.53% in spring to 9.87% in the autumn sample. This is to be expected as spring/summer is the time when consumption of fresh fruit and vegetables is at its highest.
- Non-compostable kitchen waste comprising of materials such as meat, processed food, bread, egg shells, chocolate, biscuits, and cheese increased from 5.99% in spring to 28.36% in autumn. More food waste is thrown away in the autumn sample, this corresponds to other waste compositional analysis carried out in the UK¹

Fines

- The Fines category usually comprises of a mixture of organic sources such as soil particles and dusty particles arising from construction and demolition waste like cement dust, < 10mm diameter particles. As the waste samples were generally drier in May compared to wetter samples in October, fewer fines are to be expected in the wetter waste samples.
- Construction and demolition (C&D) waste and miscellaneous non combustibles comprised a smaller proportion of the waste in the October samples (0.6% of the residual waste stream) compared with the May sample (2.1% of the residual waste stream). Therefore fewer fines associated with C&D waste and miscellaneous non-combustibles is to be expected.
- The autumn sampling appears to give a more accurate composition as the lower and upper bound composition confidence levels are much narrower than those generated by the arc21 study, spring sampling.

Table 3.3 shows the seasonality difference between the spring and autumn arc21 samples and details the average residual waste composition for the arc21 region.

¹ Analysis of the Composition of Waste Arising in Essex, 2004

Table 3.3 Summary of Average Composition of the Kerbside Collected Residual Waste per Household

Primary Categories	Northern Ireland Autumn Sampling October 2007	arc21 Spring Sampling May 2007	arc21 Autumn Sampling May 2007	Average Composition of arc21 region	Seasonality difference in composition
Paper	9.13%	11.95%	9.35%	10.65%	2.60%
Card	4.32%	5.42%	5.06%	5.24%	0.36%
Dense Plastic	8.33%	8.72%	8.34%	8.53%	0.38%
Plastic Film	7.92%	6.29%	6.69%	6.49%	0.40%
Textiles	3.20%	3.88%	2.95%	3.42%	0.92%
Glass	7.54%	7.87%	7.54%	7.70%	0.33%
Miscellaneous Combustibles	8.10%	7.32%	7.43%	7.37%	0.11%
Miscellaneous Non-Combustibles	4.01%	2.12%	6.23%	4.17%	4.11%
Ferrous Metal	2.12%	2.12%	1.98%	2.05%	0.15%
Non-Ferrous Metal	1.13%	1.22%	1.24%	1.23%	0.02%
WEEE	1.62%	0.98%	2.22%	1.60%	1.25%
HHW	0.41%	0.15%	0.32%	0.23%	0.18%
Organic Non-Catering	2.71%	5.09%	1.90%	3.49%	3.19%
Organic Catering	38.28%	22.52%	38.24%	30.38%	15.72%
Fines	1.16%	14.38%	0.52%	7.45%	13.86%
	100.00%	100.00%	100.00%	100.00%	

3.2.2 Kerbside Collected Household Recyclable Waste (Mixed Dry Recyclables collected in the bin and box schemes)

The results for the kerbside collected household recyclable waste details the following:

- The content of the recyclable bin that is actually collected at the kerbside.
- The contamination levels.

District Councils and Bryson House Recycling² have confirmed that the following materials are collected via the various kerbside bin and box recycling schemes:

- Newspapers
- Magazines
- Other Recyclable Paper
- Paper Packaging
- Board Packaging
- Card Packaging

² The box collection for recyclable materials operated in the arc21 Region is contracted by Bryson Recycling. Glass is accepted in the kerbside box.

- Other Card
- Plastic Bottles
- Textiles
- Shoes
- Glass Bottles & Jars – Green
- Glass Bottles & Jars – Clear
- Glass Bottles & Jars - Brown
- Ferrous Metal Food Cans
- Ferrous Metal Beverage Cans
- Other Ferrous Metal
- Non-ferrous Metal Food Cans
- Non-ferrous Metal Beverage Cans
- Other Non Ferrous Metal

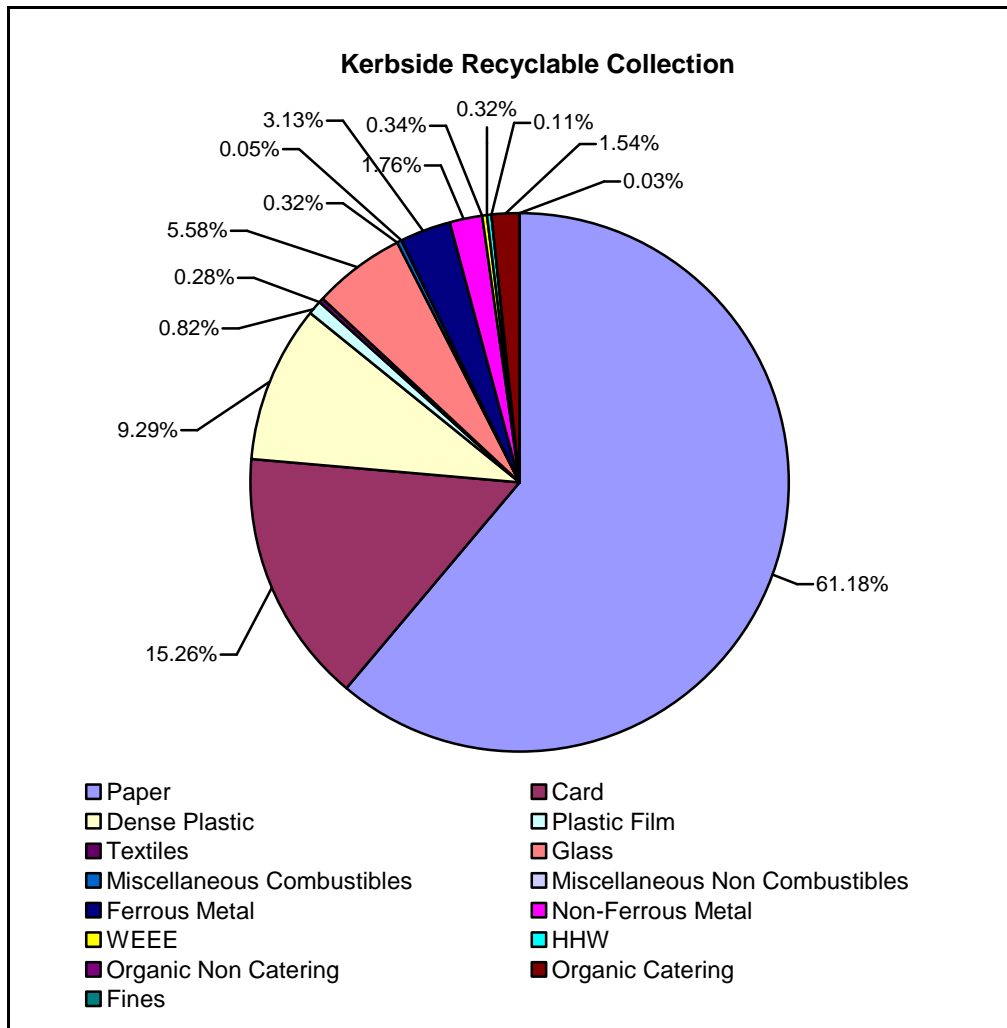
Table 3.4 details the summary composition of the contents of the recyclable bin that is actually collected at the kerbside. This information is from statistical analysis of the raw data through physical hand sorting of the kerbside collected household recyclable waste.

Table 3.4 Summary Composition of Kerbside Collected Recyclable Waste Collection per Household

Summary Categories	Actual Collected
Paper	61.2%
Card	15.3%
Dense Plastic	9.3%
Plastic film	0.8%
Textiles	0.3%
Glass	5.6%
Miscellaneous combustibles	0.3%
Miscellaneous non-combustibles	0.1%
Ferrous metal	3.1%
Non-ferrous metal	1.8%
WEEE	0.3%
HHW	0.3%
Organic non-catering	0.1%
Organic catering	1.5%
Fines (Less than 10 mm)	0.0%

As illustrated in Figure 3.2, the majority of dry recyclable waste is made up of Paper (61.2%) consisting of Newspapers (39.1%), Magazines (11.0%) and recyclable paper (10.5%). Card, Glass and Dense Plastic make up another large percentage (15.3%, 5.6% & 9.3% respectively).

Figure 3.2 Detailed Composition of the Mixed Dry Recyclables



Note: From statistical analysis of the raw data through physical hand sorting of the kerbside collected household recyclable waste

Contaminants account for approximately 7% composition of the waste kerbside collected mixed dry recyclables bin. As detailed in Table 3.5 the main contaminants are Dense Plastic Packaging (32.8%), Liquid Cartons (14.8%), Non-Home Compostable Kitchen Waste (12.2%), Other Plastic Film (7.7%) and Other Dense Plastic (6.6%).

Table 3.5 Summary Composition of the Contamination Materials from the Kerbside Collected Recyclable Waste Collection per Household

Summary Categories	Contamination
Paper ³	6.5%
Card	14.8%
Dense Plastic	32.8%
Plastic film	13.2%
Miscellaneous combustibles	3.8%
Miscellaneous non-combustibles	0.4%
Ferrous metal	0.0%
WEEE	6.1%
HHW	3.4%
Organic non-catering	3.2%
Organic catering	15.7%
Fines	0.2%

3.2.3 Kerbside Collected Household Compostable Waste (Garden Waste)

The results for the kerbside collected household compostable waste details the content of the compostable bin that is actually collected at the kerbside.

District Councils in Northern Ireland have confirmed that the following materials are collected via the organic collection:

- Garden waste
- Soil - It should be noted that it is not encouraged for householders to dispose of solely soil in the garden waste kerbside collection; however it is acknowledged that the collection of garden waste will evidently result with small amounts of soil being present in the bin.
- Some District Councils in Northern Ireland are accepting compostable kitchen waste such as fruit and vegetable peelings in the bin, but of the areas that were sampled for the Study this was not the case.

Table 3.6 details the summary compositions of the organic waste (compostable) bin. Table 3.6 highlights the overwhelming majority of Organic Non Catering in the bin is Garden Waste (92.6%) with the remaining (7.4%) being Soil.

³ Contaminated paper consists of non-recyclable paper such as tissue paper, wall paper, sanitary tissue paper, fish & chip wrappers, photographs

Table 3.6 Summary Composition of Actual Contents Average Composition of the Kerbside Collected Garden Waste per Household

Summary Categories	Actual Collected
Paper	0.6%
Card	0.1%
Plastic film	0.2%
Glass	0.1%
Miscellaneous combustibles	0.3%
Miscellaneous non-combustibles	0.2%
Organic non-catering	95.9%
Organic catering	2.8%

3.2.4 All Kerbside Collected Household Waste

All kerbside collected household waste includes:

- Kerbside collected household residual waste;
- Kerbside collected household mixed dry recyclable waste; and
- Kerbside collected household compostable waste.

The composition is obtained from the statistical analysis of the raw data from the physical hand sorting of the waste during the Study.

Table 3.7 Summary Composition of all Kerbside Collected Waste per Household

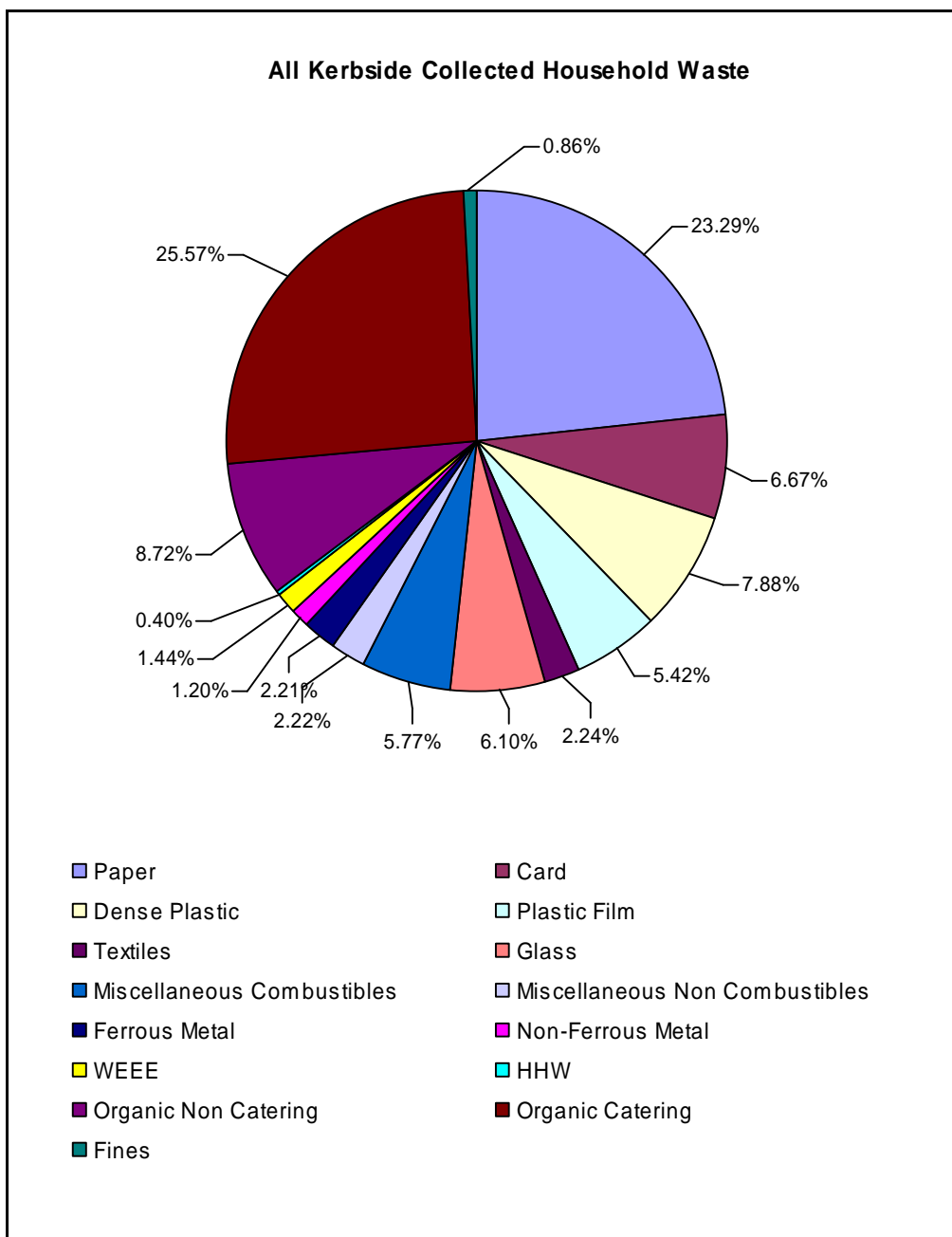
Summary Categories	All Waste
Paper	23.29%
Card	6.67%
Dense Plastic	7.88%
Plastic film	5.42%
Textiles	2.24%
Glass	6.10%
Miscellaneous combustibles	5.77%
Miscellaneous non-combustibles	2.22%
Ferrous metal	2.21%
Non-ferrous metal	1.20%
WEEE	1.44%
HHW	0.40%
Organic non-catering	8.72%
Organic catering	25.57%
Fines (Less than 10 mm)	0.86%

It can be seen from Table 3.7 that the following waste categories make up over 60% of all waste generated in Northern Ireland:

- Organic Catering (26%),
- Paper (23%),
- Organic Non Catering (9%), and
- Dense Plastic (8%).

Figure 3.3 illustrates the above table

Figure 3.3 Summary Composition of all Kerbside Collected Household Waste in Northern Ireland



3.3 BRING BANK SITES

This section of the report details the results achieved from a desktop analysis of Bring Bank sites in Northern Ireland. The data for this analysis was supplied by EHS from WasteDataFlow returns for all municipal Bring Bank sites in Northern Ireland.

3.3.1 Waste Generation and Composition

Table 3.8 below details the annual quantity and composition of wastes collected at Bring Bank sites in Northern Ireland (April 2006 to March 2007).

Table 3.8 Waste Generated at Bring Bank Sites in Northern Ireland

	Waste Generated (Tonnes)	Waste Composition
Aluminium Cans	12.10	0.17%
Books	2.86	0.04%
Brown Glass	328.25	4.53%
Card	1.01	0.01%
Clear Glass	784.85	10.84%
Green Glass	818.68	11.31%
Mixed Cans	48.56	0.67%
Mixed Glass	2889.92	39.91%
Mixed Paper & Card	425.36	5.87%
Paper	822.01	11.35%
Plastics	10.58	0.15%
Steel Cans	0.32	0.00%
Textiles & Footwear	1096.41	15.14%
Total	7240.91	100.00%

3.4 CIVIC AMENITY SITE WASTE

This section of the report details the results achieved from both physical hand sorting of the residual waste accepted at CA Sites and through a desktop analysis of WDF data on recyclable materials separately collected at CA Sites.

3.4.1 Recyclable Waste – Generation and Composition

Table 3.9 below details the quantity and composition of wastes recycled at CA Sites in Northern Ireland from April 2006 to March 2007.

Table 3.9 Northern Ireland CA Sites– Separately Collected Recyclable/ Compostable Waste Arisings and Composition**

	Waste Generated (Tonnes per annum)	Waste Composition
Aluminum cans	0.86	0.00%
Automotive batteries	688.18	0.57%
Books	1.99	0.00%
Brown glass	249.84	0.21%
Card	4,612.00	3.82%
Clear glass	647.57	0.54%
Flourescent tubes	48.50	0.04%
Fridges & freezers	2,394.34	1.98%
Green glass	829.44	0.69%
Green waste only	56,300.58	46.62%
Mineral oil	362.87	0.30%
Mixed cans	137.89	0.11%
Mixed glass	5,085.44	4.21%
Mixed paper and card	509.62	0.42%
Other compostable waste	802.61	0.66%
Other electrical goods	4,207.68	3.48%
Other materials	2,285.40	1.89%
Other scrap metal	12,888.51	10.67%
Other white goods	660.90	0.55%
Paint	341.41	0.28%
Paper	2,659.88	2.20%
Plastics	387.39	0.32%
Post consumer non automotive batteries	9.13	0.01%
Steel cans	0.25	0.00%
Textiles & footwear	1,652.41	1.37%
Vegetable Oil	57.90	0.05%
Wood	22,930.12	18.99%
Total	120,752.69	100.00%

** Note: Rubble collected separately at CA sites has not been included for the purposes of calculating the %BMW for Northern Ireland.

Table 3.10 classifies the waste generation and composition data by the primary sorting categories.

Table 3.10 Recyclable Waste Arisings at CA Sites in Northern Ireland by Primary Category

Primary Category	Tonnage		Waste Composition	
	CA Site recycled waste	CA Site recycled waste <i>Rubble removed</i>	CA Site recycled waste	CA Site recycled waste <i>Rubble removed</i>
Paper	2916.68	2,916.68	2.25%	2.42%
Card	4866.81	4,866.81	3.75%	4.03%
Dense Plastic	348.65	348.65	0.27%	0.29%
Plastic Film	38.74	38.74	0.03%	0.03%
Textiles	1652.41	1,652.41	1.27%	1.37%
Glass	6812.29	6,812.29	5.25%	5.64%
Miscellaneous Combustibles	22930.12	22,930.12	17.68%	18.99%
Miscellaneous Non-Combustibles	11256.30	2,285.40	8.68%	1.89%
Ferrous Metal	6513.45	6,513.45	5.02%	5.39%
Non-Ferrous Metal	6514.06	6,514.06	5.02%	5.39%
WEEE	7262.92	7,262.92	5.60%	6.01%
HHW	1450.09	1,450.09	1.12%	1.20%
Organic Non-Catering	57103.19	57,103.19	44.02%	47.29%
Organic Catering	57.90	57.90	0.04%	0.05%
Total	129,723.61	120,752.71	100.00%	100.00%

3.4.2 Residual Waste Collected for Disposal – Generation and Composition

Table 3.11 below details the quantity and composition of wastes collected for disposal at CA Sites in Northern Ireland from April 2006 to March 2007. Table 3.11 classifies the residual waste generation and composition data by the primary sorting categories.

Table 3.11 CA Sites in Northern Ireland – Residual Waste Generation and Composition Residual waste arisings at CA Sites in Northern Ireland by Primary Category

Primary Category	Tonnage	Waste Composition
Paper	12,094.38	6.75%
Card	9,371.50	5.23%
Dense Plastic	12,866.11	7.18%
Plastic Film	6,645.83	3.71%
Textiles	10,160.17	5.67%
Glass	5,646.24	3.15%
Miscellaneous Combustibles	52,628.92	29.36%
Miscellaneous Non-Combustibles	14,919.30	8.32%
Ferrous Metal	1,673.58	0.93%
Non-Ferrous Metal	2,558.41	1.43%
WEEE	1,459.39	0.81%
HHW	643.73	0.36%
Organic Non-Catering	14,192.37	7.92%
Organic Catering	31,797.70	17.74%
Fines	2,610.94	1.46%
Total	179,268.56	100.00%

3.5 TOTAL MUNICIPAL WASTE COMPOSITION FOR NORTHERN IRELAND

This section of the report details the total municipal waste composition for municipal waste in Northern Ireland. The results achieved are from a combination of compositional data from the physical hand sorting of the kerbside collected residual waste and compositional data from WDF. Box 3.1 below briefly outlines the methodology adopted to derive the the total waste composition for Northern Ireland.

Box 1 Methodology for achieving the compositing for the Total Municipal waste arisings for Northern Ireland

Kerbside Collected Household Residual Waste

The study calculated the composition of kerbside collected residual waste from the sampling of 350 households. This composition was then applied to the total amount of household kerbside residual waste collected, as reported by District Councils in WDF.

Kerbside Collected Household Recyclable Waste

Section 3.2.2 details the composition achieved from the physical hand sorting of the kerbside collected household recyclable waste.

In order to calculate the total municipal waste composition and to take account of seasonality over a period of a year the composition was derived from waste data reported by District Councils in WDF for the period 2006/2007. Waste categories reported by District Councils in WDF were allocated to one of the Primary Sorting Categories (so as to allow correlation between each waste stream and the other results) and the composition was derived from the tonnages allocated to each Primary Category. (see Table 3.14)

Kerbside Collected Household Compostable Waste

Section 3.2.3 details the composition of the kerbside collected compostable waste achieved from the physical hand sorting of the kerbside collected waste.

As with kerbside collected recyclable waste, in order to calculate the kerbside collected compostable waste composition to be used in the total municipal waste arisings the composition was calculated from WDF. This took into account seasonality from the tonnages reported in WDF.

Bring Banks

The composition for Bring Banks was derived from WDF data. Waste categories reported by District Councils in WDF were allocated to one of the Primary Sorting Categories and the composition was derived from the tonnages allocated to each Primary Category. (see Table 3.14)

CA Sites

The composition for CA Sites was derived from a combination of composition obtained from WDF for waste recycled at CA Sites and the physical hand sorting of residual waste for waste landfilled at CA Sites.. Waste categories reported by District Councils in WDF were allocated to one of the Primary Sorting Categories and the compositions were then applied to tonnages as reported by District Councils in WDF (see Table 3.14).

Total Municipal Waste Composition

Theses compositions were then combined by a qualified statistician to calculate the overall composition of municipal waste in Northern Ireland (See table 3.12).

Table 3.12 details the composition of the total municipal waste composition for Northern Ireland by the primary sorting categories. Table 3.13 summarises the waste generation data of the total municipal waste composition for Northern Ireland by the primary sorting categories.

Table 3.12 Summary of the Total Municipal Waste Composition for Northern Ireland

	Mean (%)	Lower bound (%)	Upper bound (%)
Paper	15.93%	0.00%	38.61%
Card	5.10%	0.43%	9.77%
Dense Plastic	3.94%	0.00%	7.94%
Plastic Film	2.09%	0.00%	5.15%
Textiles	4.27%	0.00%	9.76%
Glass	14.59%	0.00%	39.11%
Miscellaneous Combustibles	9.19%	0.00%	20.79%
Miscellaneous Non-Combustibles	4.26%	0.61%	7.90%
Ferrous Metal	1.87%	0.07%	3.66%
Non-Ferrous Metal	1.55%	0.00%	3.25%
WEEE	1.36%	0.00%	3.44%
HHW	0.31%	0.00%	0.73%
Organic Non-Catering	25.77%	0.00%	64.15%
Organic Catering	9.34%	0.00%	24.53%
Fines	0.44%	0.00%	1.09%

Table 3.13 Summary of the Total Municipal Waste Arisings for Northern Ireland

	Mean (kg)	Lower bound (kg)	Upper bound (kg)
Paper	144,885.10	0.00	351,140.27
Card	46,388.02	3,926.64	88,849.40
Dense Plastic	35,788.69	0.00	72,220.61
Plastic Film	18,993.08	0.00	46,841.57
Textiles	38,788.68	0.00	88,713.17
Glass	132,668.43	0.00	355,677.81
Miscellaneous Combustibles	83,554.23	0.00	189,056.08
Miscellaneous Non-Combustibles	38,703.92	5,543.56	71,864.29
Ferrous Metal	16,962.82	648.98	33,276.65
Non-Ferrous Metal	14,065.64	0.00	29,583.60
WEEE	12,378.80	0.00	31,284.13
HHW	2,864.30	0.00	6,669.12
Organic Non-Catering	234,383.15	0.00	583,322.92
Organic Catering	84,962.85	0.00	223,034.65
Fines	3,971.93	0.00	9,921.48
Totals	909,359.64	10,119.18	2,181,455.75

Table 3.14 Total Municipal Waste for Northern Ireland

	Kerbside Collected Waste			CA Site Collected Waste		Bring Bank Collected Waste	Total
	Compostables	Recyclables	Residual	CA Sites Recyclable	CA Sites Residual	Bring Banks	
	<i>Tonnes per annum</i>	<i>Tonnes per annum</i>	<i>Tonnes per annum</i>	<i>Tonnes per annum</i>	<i>Tonnes per annum</i>	<i>Tonnes per annum</i>	
Paper	0.00	56,058.44	41,620.12	2,916.68	12,094.38	1,037.54	113,727.16
Card	0.00	12,747.94	19,679.37	4,866.81	9,371.50	213.69	46,879.31
Dense Plastic	0.00	6,839.87	37,970.66	348.65	12,866.11	9.52	58,034.81
Plastic Film	0.00	759.99	36,109.40	38.74	6,645.83	1.06	43,555.01
Textiles	0.00	272.18	14,596.46	1,652.41	10,160.17	1,096.41	27,777.63
Glass	0.00	4,440.59	34,373.35	6,812.29	5,646.24	4,821.70	56,094.17
Miscellaneous Combustibles	0.00	0.00	36,891.77	22,930.12	52,628.92	0.00	112,450.81
Miscellaneous Non-Combustibles	0.00	4,021.56	18,264.54	11,256.30	14,919.30	0.00	48,461.70
Ferrous Metal	0.00	2,468.40	9,649.93	6,513.45	1,673.58	24.60	20,329.96
Non-Ferrous Metal	0.00	1,061.69	5,166.23	6,514.06	2,558.41	36.38	15,336.77
WEEE	0.00	115.50	7,403.44	7,262.92	1,459.39	0.00	16,241.25
HHW	0.00	0.00	1,881.84	1,450.09	643.73	0.00	3,975.66
Organic Non-Catering	48,648.83	0.00	12,354.83	57,103.19	14,192.37	0.00	132,299.22
Organic Catering	0.00	0.00	174,424.21	57.90	31,797.70	0.00	206,279.81
Fines	0.00	0.00	5,305.45	0.00	2,610.94	0.00	7,916.39
Subtotal	48,648.83	88,786.15	455,691.60	129,723.61	179,268.56		
Total		593,126.58		308,992.15		7240.91	909,359.64

4.0 BIODEGRADABLE MUNICIPAL WASTE PERCENTAGE ANALYSIS

4.1 INTRODUCTION

This section provides an analysis of the biodegradable fraction of waste by using a combination of WasteDataFlow operational data, and where compositions were not available, statistical analysis from the physical hand sorting. The biodegradable fraction of the each of the different sections of results, as discussed in Section 3.0, are as follows:

1. Kerbside Collected Household Waste
2. Bring Bank Sites
3. Civic Amenity Site Waste
4. Total Municipal Waste

4.2 BIODEGRADABLE MUNICIPAL WASTE

The biodegradable fraction of the waste collected is of particular importance when considered in the context of the Landfill Directive targets for the reduction in the biodegradable waste to landfill implemented through the Northern Ireland Landfill Allowance Scheme (NILAS). NILAS makes detailed provisions for the allocation and monitoring of landfill allowances allocated to District Councils. The schedule to the NILAS Regulations details the amount of BMW in certain types of waste and these have been applied for the purposes of this study. The Regulations defines components consisting of biogenic carbon to be a 100% biodegradable component, fraction with no carbon or solely fossil carbon to be 0% and those with a mixture to be 50%. For example, the Schedule defines paper, card, putrescible waste and vegetable oil as being 100% biodegradable. Footwear, furniture and textiles are regarded as being 50% biodegradable in the regulations. Table 4.1 details the amount of BMW content expressed as a percentage by weight.

Table 4.1 Percentage BMW Content of Various Waste Categories¹

Type of Waste	Amount of BMW (% by weight)
Paper, Card, Putrescible* Waste and Vegetable Oil	100%
Footwear, Furniture and Textiles	50%
Batteries, Electrical and electronic equipment, End-of-life vehicles, Fluorescent tubes, Glass, Inert construction and demolition waste, Metal, Mineral oil, Plastic and Soil	0%

Note:

* Putrescible waste means any animal or vegetable waste (including wood which is capable of undergoing anaerobic or aerobic decomposition, but do not include any of these other types of wastes: Batteries, Electrical and Electronic Equipment, End-of-Life Vehicles, Florescent Tubes, Glass, Inert Construction and Demolition Waste, Metal, Mineral Oil, Plastic and Soil.

¹ Please note that for all calculations the BMW fraction has been calculated as outlined in the schedule to the NILAS Regulations.

This section of the report illustrates how the calculation of the biodegradable fraction of the kerbside waste was carried out. Each of the different fractions of kerbside collected waste are set out below.

4.2.2 *Kerbside Collected Household Residual Waste*

Table 4.2 below sets out the calculation of the biodegradable fraction of kerbside collected residual waste.

Table 4.2 BMW percentage calculation for kerbside collected household residual waste

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Newspapers	2.0%	Paper (100%)	2.0%	8,915.71	8,915.71
Magazines	1.2%		1.2%	5,632.51	5,632.51
Other Recyclable Paper	2.4%		2.4%	10,838.87	10,838.87
Paper Packaging	0.3%		0.3%	1,270.04	1,270.04
Non-recyclable Paper	3.3%		3.3%	14,962.99	14,962.99
Liquid Cartons	0.4%	Card (100%)	0.4%	1,666.34	1,666.34
Board Packaging	1.3%		1.3%	5,858.38	5,858.38
Card Packaging	2.7%		2.7%	12,117.84	12,117.84
Other Card	0.01%		0.01%	36.81	36.81
Plastic Bottles	3.7%	Dense Plastic (0%)	0.0%	17,010.96	0.00
Dense Plastic Packaging	3.5%		0.0%	15,748.18	0.00
Other Dense Plastic	1.1%		0.0%	5,211.52	0.00
Other Plastic Film	4.9%	Plastic Film (0%)	0.0%	22,139.60	0.00
Packaging Film	3.1%		0.0%	13,969.80	0.00
Textiles	2.4%	Textiles (50%)	1.2%	11,103.16	5,551.58
Shoes	0.8%		0.4%	3,493.30	1,746.65
Glass Bottles & Jars – Green	2.9%	Glass (0%)	0.0%	13,041.06	0.00
Glass Bottles & Jars – Clear	3.1%		0.0%	14,143.04	0.00
Glass Bottles & Jars – Brown	1.4%		0.0%	6,389.20	0.00
Other Glass	0.2%		0.0%	800.05	0.00
Treated Wood	0.4%	Miscellaneous Combustibles (Some categories are 100%, some are 0% and disposable nappies 50%*)	0.4%	1,611.46	1,611.46
Untreated Wood	0.4%		0.4%	1,861.13	1,861.13
Furniture	0.0%		0.0%	0.00	0.00
Disposable Nappies	6.2%		3.1%	28,035.63	14,017.82
Other Misc. Combustibles	0.5%		0.0%	2,068.90	0.00
Carpet and Underlay	0.7%	0.0%	3,314.65	0.00	
Construction and Demolition	1.6%	Miscellaneous Non-Combustibles (0%)	0.0%	7,274.75	0.00
Other Misc. Non-combustibles	2.4%		0.0%	10,989.79	0.00
Ferrous Food Cans	0.8%	Ferrous Metal (0%)	0.0%	3,737.30	0.00
Ferrous Beverage Cans	0.5%		0.0%	2,455.42	0.00
Other ferrous Metal	0.8%		0.0%	3,457.21	0.00
Non Ferrous Food Cans	0.2%	Non Ferrous Metal (0%)	0.0%	1,111.92	0.00
Non Ferrous Beverage Cans	0.1%		0.0%	490.65	0.00
Other non ferrous metal	0.8%		0.0%	3,563.66	0.00

Table 4.2 BMW percentage calculation for kerbside collected household residual waste (continued)

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
White goods	1.1%	WEEE (0%)	0.0%	4,821.13	0.00
Large electronic goods	0.0%		0.0%	0.00	0.00
TV's and monitors	0.0%		0.0%	0.00	0.00
Other WEEE	0.6%		0.0%	2,582.31	0.00
Household Batteries	0.02%	HHW (0%)	0.0%	97.92	0.00
Car Batteries	0.05%		0.0%	220.91	0.00
Engine Oil	0.0%		0.0%	0.00	0.00
Asbestos	0.0%		0.0%	0.00	0.00
Other potentially hazardous	0.2%		0.0%	716.18	0.00
Identifiable clinical waste	0.2%		0.0%	846.83	0.00
Garden Waste	1.4%	Organic Non Catering (Some categories are 100%, some are 0%)	1.4%	6,136.58	6,136.58
Soil	0.9%		0.0%	4,235.95	0.00
Other Organic	0.4%		0.4%	1,982.30	1,982.30
Home Compostable Kitchen Waste	13.9%	Organic Catering (100%)	13.9%	63,453.99	63,453.99
Non-home comp Kitchen Waste	24.4%		24.4%	110,970.22	110,970.22
Fines (Less than 10 mm)	1.2%	Fines (50%)**	0.6%	5,305.45	2,652.72
Total	100%		59.53%	455,691.61	271,284

Therefore, the BMW fraction of Kerbside Collected Residual Waste is derived as **60%**.

4.2.3 Kerbside Collected Household Recyclable Waste

Table 4.3 below sets out the calculation of the biodegradable fraction of kerbside collected recyclable waste. This biodegradable fraction is calculated using the actual data collected during the compositional analysis.

Table 4.3 BMW percentage calculation for kerbside collected household recyclable waste

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Newspapers	39.1%	Paper (100%)	39.1%	34,708.34	34,708.34
Magazines	11.0%		11.0%	9,778.75	9,778.75
Other Recyclable Paper	10.5%		10.5%	9,289.68	9,289.68
Paper Packaging	0.2%		0.2%	200.50	200.50
Non-recyclable Paper	0.4%		0.4%	348.53	348.53
Liquid Cartons	0.6%	Card (100%)	0.6%	542.13	542.13
Board Packaging	7.7%		7.7%	6,846.94	6,846.94
Card Packaging	6.8%		6.8%	6,000.14	6,000.14
Other Card	0.2%		0.2%	163.25	163.25
Plastic Bottles	8.0%	Dense Plastic (0%)	0.0%	7,061.40	0.00
Dense Plastic Packaging	1.1%		0.0%	936.14	0.00
Other Dense Plastic	0.3%		0.0%	251.39	0.00
Other Plastic Film	0.5%	Plastic Film (0%)	0.0%	473.55	0.00
Packaging Film	0.3%		0.0%	257.92	0.00
Textiles	0.3%	Textiles (50%)	0.15%	217.97	108.98
Shoes	0.03%		0.02%	28.26	14.13
Glass Bottles & Jars – Green	1.6%	Glass (0%)	0.0%	1,456.76	0.00
Glass Bottles & Jars – Clear	2.7%		0.0%	2,354.10	0.00
Glass Bottles & Jars – Brown	1.3%		0.0%	1,141.60	0.00
Other Glass	0.0%		0.0%	0.00	0.00
Treated Wood	0.04%	Miscellaneous Combustibles (Some categories are 100%, some are 0% and disposable nappies 50%*)	0.04%	33.92	33.92
Untreated Wood	0.03%		0.03%	23.96	23.96
Furniture	0.0%		0.0%	0.00	0.00
Disposable Nappies	0.2%		0.1%	156.12	78.06
Other Misc. Combustibles	0.08%		0.0%	68.41	0.00
Carpet and Underlay	0.0%		0.0%	0.00	0.00
Construction and Demolition	0.0%	Miscellaneous Non-Combustibles (0%)	0.0%	0.00	0.00
Other Misc. Non-combustibles	0.05%		0.0%	45.51	0.00
Ferrous Food Cans	1.7%	Ferrous Metal (0%)	0.0%	1,488.12	0.00
Ferrous Beverage Cans	1.2%		0.0%	1,047.42	0.00
Other ferrous Metal	0.3%		0.0%	247.42	0.00
Non Ferrous Food Cans	0.7%	Non Ferrous Metal (0%)	0.0%	593.96	0.00
Non Ferrous Beverage Cans	0.9%		0.0%	787.49	0.00

Table 4.3 BMW percentage calculation for kerbside collected household recyclable waste (continued)

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Other non ferrous metal	0.2%		0.0%	185.07	0.00
White goods	0.02%	WEEE (0%)	0.0%	21.56	0.00
Large electronic goods	0.1%		0.0%	115.40	0.00
TV's and monitors	0.0%		0.0%	0.00	0.00
Other WEEE	0.2%		0.0%	163.75	0.00
Household Batteries	0.02%		HHW (0%)	0.0%	21.22
Car Batteries	0.0%	0.0%		0.00	0.00
Engine Oil	0.0%	0.0%		0.00	0.00
Asbestos	0.0%	0.0%		0.00	0.00
Other potentially hazardous	0.1%	0.0%		82.24	0.00
Identifiable clinical waste	0.2%	0.0%		180.61	0.00
Garden Waste	0.1%	Organic Non Catering (Some categories are 100%, some are 0%)	0.1%	98.00	98.00
Soil	0.0%		0.0%	0.00	0.00
Other Organic	0.0%		0.0%	0.00	0.00
Home Compostable Kitchen Waste	0.2%	Organic Catering (100%)	0.2%	204.55	204.55
Non-home comp Kitchen Waste	1.3%		1.3%	1,140.41	1,140.41
Fines (Less than 10 mm)	0.03%	Fines (50%)**	0.01%	23.66	11.83
Total	100%		78.38%	88,786.14	69,592

Therefore, the BMW fraction of Kerbside Collected Household Recyclable Waste is derived as **78%**.

Table 4.4 below sets out the calculation of the biodegradable fraction of kerbside collected recyclable waste from operational data from WasteDataFlow returns by each District Council in Northern Ireland.

Therefore, the BMW fraction of Kerbside Collected Household Recyclable Waste using operational data from WasteDataFlow is derived as **78%**. This supports the biodegradable fraction calculated using the actual data collected during the compositional analysis.

Table 4.4 BMW percentage calculation for kerbside collected household recyclable waste (from WDF)

Waste Categories	WDF Tonnage	% Composition of MDR	% Biodegradable	% Biodegradable Content	Total Tonnage Biodegradable
Aluminium Cans	718.49	0.81	0%	0.0%	0.00
Aluminium Foil	14.30	0.02	0%	0.0%	0.00
Automotive Batteries	0.00	0.00	0%	0.0%	0.00
Books	11.93	0.01	0%	0.0%	0.00
Brown Glass	0.00	0.00	0%	0.0%	0.00
Card	6,744.32	7.60	100%	7.6%	6,744.32
Clear Glass	1,241.73	1.40	0%	0.0%	0.00
Co-Mingled Materials	649.27	0.73	0%	0.0%	0.00
Fluorescent Tubes	0.00	0.00	0%	0.0%	0.00
Fridges & Freezers	115.50	0.13	0%	0.0%	0.00
Green Glass	207.83	0.23	0%	0.0%	0.00
Mineral Oil	0.00	0.00	0%	0.0%	0.00
Mixed Cans	605.80	0.68	0%	0.0%	0.00
Mixed Glass	2,991.03	3.37	0%	0.0%	0.00
Mixed Paper & Card	12,007.24	13.52	100%	13.5%	12,007.24
Other Electrical Goods	0.00	0.00	0%	0.0%	0.00
Other Materials	3,372.29	3.80	0%	0.0%	0.00
Other Scrap Metal	52.00	0.06	0%	0.0%	0.00
Other White Goods	0.00	0.00	0%	0.0%	0.00
Paint	0.00	0.00	0%	0.0%	0.00
Paper	50,042.89	56.36	100%	56.4%	50,042.89
Plastics	7,599.85	8.56	0%	0.0%	0.00
Post Consumer Non-Automotive Battery	0.00	0.00	0%	0.0%	0.00
Rubble	0.00	0.00	0%	0.0%	0.00
Steel Cans	2,139.50	2.41	0%	0.0%	0.00
Textiles & Footwear	272.18	0.31	50%	0.2%	136.09
Vegetable Oil	0.00	0.00	100%	0.0%	0.00
Wood	0.00	0.00	100%	0.0%	0.00
Total	88,786.14	100		77.64	68,930.54

4.2.4 Kerbside Collected Garden Waste (Compostables)

Table 4.5 below sets out the calculation of the biodegradable fraction of kerbside collected garden waste (compostables). This biodegradable fraction is calculated using the actual data collected during the compositional analysis.

Table 4.5 BMW percentage calculation for kerbside collected household compostable waste

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Newspapers	0.3%	Paper (100%)	0.3%	130.67	130.67
Magazines	0.0%		0.0%	0.00	0.00
Other Recyclable Paper	0.3%		0.3%	131.98	131.98
Paper Packaging	0.01%		0.01%	2.53	2.53
Non-recyclable Paper	0.01%		0.01%	3.45	3.45
Liquid Cartons	0.0%	Card (100%)	0.0%	1.27	1.27
Board Packaging	0.05%		0.05%	22.78	22.78
Card Packaging	0.0%		0.0%	0.00	0.00
Other Card	0.0%		0.0%	0.00	0.00
Plastic Bottles	0.02%	Dense Plastic (0%)	0.0%	7.60	0.00
Dense Plastic Packaging	0.0%		0.0%	0.00	0.00
Other Dense Plastic	0.01%		0.0%	3.16	0.00
Other Plastic Film	0.01%	Plastic Film (0%)	0.0%	5.48	0.00
Packaging Film	0.2%		0.0%	76.42	0.00
Textiles	0.01%	Textiles (50%)	0.0%	2.72	1.36
Shoes	0.0%		0.0%	0.00	0.00
Glass Bottles & Jars – Green	0.0%	Glass (0%)	0.0%	0.00	0.00
Glass Bottles & Jars – Clear	0.07%		0.0%	35.79	0.00
Glass Bottles & Jars – Brown	0.0%		0.0%	0.00	0.00
Other Glass	0.0%		0.0%	0.00	0.00
Treated Wood	0.0%		Miscellaneous Combustibles (Some categories are 100%, some are 0% and disposable nappies 50%*)	0.0%	0.00
Untreated Wood	0.1%	0.1%		41.43	41.43
Furniture	0.0%	0.0%		0.00	0.00
Disposable Nappies	0.0%	0.0%		0.00	0.00
Other Misc. Combustibles	0.2%	0.0%		101.53	0.00
Carpet and Underlay	0.0%	0.0%		0.00	0.00

Table 4.5 BMW percentage calculation for kerbside collected household compostable waste (continued)

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Construction and Demolition	0.0%	Miscellaneous Non-Combustibles (0%)	0.0%	0.00	0.00
Other Misc. Non-combustibles	0.2%		0.0%	71.67	0.00
Ferrous Food Cans	0.0%	Ferrous Metal (0%)	0.0%	1.66	0.00
Ferrous Beverage Cans	0.0%		0.0%	1.81	0.00
Other ferrous Metal	0.0%		0.0%	0.00	0.00
Non Ferrous Food Cans	0.0%	Non Ferrous Metal (0%)	0.0%	0.00	0.00
Non Ferrous Beverage Cans	0.0%		0.0%	0.00	0.00
Other non ferrous metal	0.0%		0.0%	0.55	0.00
White goods	0.0%	WEEE (0%)	0.0%	0.00	0.00
Large electronic goods	0.0%		0.0%	0.00	0.00
TV's and monitors	0.0%		0.0%	0.00	0.00
Other WEEE	0.0%		0.0%	0.00	0.00
Household Batteries	0.0%	HHW (0%)	0.0%	0.00	0.00
Car Batteries	0.0%		0.0%	0.00	0.00
Engine Oil	0.0%		0.0%	0.00	0.00
Asbestos	0.0%		0.0%	0.00	0.00
Other potentially hazardous	0.0%		0.0%	0.00	0.00
Identifiable clinical waste	0.0%		0.0%	0.00	0.00
Garden Waste	90.9%	Organic Non Catering (Some categories are 100%, some are 0%)	90.9%	44,203.22	44,203.22
Soil	5.0%		0.0%	2,428.08	0.00
Other Organic	0.0%		0.0%	0.00	0.00
Home Compostable Kitchen Waste	1.8%	Organic Catering (100%)	1.8%	885.09	885.09
Non-home comp Kitchen Waste	1.0%		1.0%	489.93	489.93
Fines (Less than 10 mm)	0.0%	Fines (50%)**	0.0%	0.00	0.00
TOTAL	100%		94.38%	48,648.83	45,914

Therefore, the BMW fraction of Kerbside Collected Garden Waste (Compostables) is derived as **94%**.

Table 4.6 below sets out the calculation of the biodegradable fraction of kerbside collected garden waste (compostables) from operational data from WasteDataFlow returns by each District Council in Northern Ireland.

Table 4.6 BMW percentage calculation for kerbside collected household compostable (garden) waste(from WDF)

Waste Categories	WDF Tonnage	Composition of Compostables	% Biodegradable	% Biodegradable Content	Total Tonnage Biodegradable
Green Waste Only	36,535.21	75.1%	100%	75.1%	36,535.21
Other Compostable Waste	12,113.62	24.9%	100%	24.9%	12,113.62
Total	48,648.83	100.0%		100%	48,648.83

Therefore, the BMW fraction of Kerbside Collected Recyclable Waste using operational data from WasteDataFlow is derived as **100%**.

4.2.1 All Kerbside Collected Waste

Table 4.7 below sets out the calculation of the biodegradable fraction of all kerbside collected waste.

Table 4.7 BMW percentage calculation for all kerbside collected household waste

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Newspapers	12.2%	Paper (100%)	12.2%	72,474.05	72,474.05
Magazines	3.9%		3.9%	22,945.05	22,945.05
Other Recyclable Paper	4.8%		4.8%	28,243.24	28,243.24
Paper Packaging	0.2%		0.2%	1,427.75	1,427.75
Non-recyclable Paper	2.2%		2.2%	13,042.46	13,042.46
Liquid Cartons	0.4%	Card (100%)	0.4%	2,597.80	2,597.80
Board Packaging	2.6%		2.6%	15,142.61	15,142.61
Card Packaging	3.7%		3.7%	21,644.10	21,644.10
Other Card	0.03%		0.03%	201.35	201.35
Plastic Bottles	4.5%	Dense Plastic (0%)	0.0%	26,821.27	0.00
Dense Plastic Packaging	2.5%		0.0%	14,727.11	0.00
Other Dense Plastic	0.9%		0.0%	5,211.34	0.00
Other Plastic Film	3.4%	Plastic Film (0%)	0.0%	20,076.80	0.00
Packaging Film	2.0%		0.0%	12,055.90	0.00
Textiles	1.7%	Textiles (50%)	0.85%	10,253.88	5,126.94
Shoes	0.5%		0.25%	3,061.79	1,530.89
Glass Bottles & Jars – Green	2.1%	Glass (0%)	0.0%	12,327.67	0.00
Glass Bottles & Jars – Clear	2.5%		0.0%	14,849.89	0.00

Table 4.7 BMW percentage calculation for all kerbside collected household waste (continued)

Waste Categories	% by weight	% Biodegradability	% Biodegradable Content	WDF 06/07	Tonnage Biodegradable
Glass Bottles & Jars – Brown	1.4%		0.0%	8,364.75	0.00
Other Glass	0.1%		0.0%	638.28	0.00
Treated Wood	0.3%	Miscellaneous	0.3%	1,860.48	1,860.48
Untreated Wood	0.3%	Combustibles	0.3%	1,656.42	1,656.42
Furniture	0.0%	(Some categories are	0.0%	0.00	0.00
Disposable Nappies	4.4%	100%, some are 0%	2.2%	25,904.24	12,952.12
Other Misc. Combustibles	0.4%	and disposable	0.0%	2,635.07	0.00
Carpet and Underlay	0.4%	nappies 50%*)	0.0%	2,182.18	0.00
Construction and Demolition	0.8%	Miscellaneous	0.0%	4,626.16	0.00
Other Misc. Non-combustibles	1.4%	Non-Combustibles (0%)	0.0%	8,542.57	0.00
Ferrous Food Cans	1.0%	Ferrous Metal (0%)	0.0%	5,798.68	0.00
Ferrous Beverage Cans	0.7%		0.0%	4,222.87	0.00
Other ferrous Metal	0.5%		0.0%	3,067.08	0.00
Non Ferrous Food Cans	0.4%	Non Ferrous Metal (0%)	0.0%	2,195.62	0.00
Non Ferrous Beverage Cans	0.3%		0.0%	1,545.07	0.00
Other non ferrous metal	0.6%		0.0%	3,352.78	0.00
White goods	1.0%	WEEE (0%)	0.0%	5,832.91	0.00
Large electronic goods	0.04%		0.0%	217.82	0.00
TV's and monitors	0.0%		0.0%	0.00	0.00
Other WEEE	0.4%		0.0%	2,501.40	0.00
Household Batteries	0.03%	HHW (0%)	0.0%	162.47	0.00
Car Batteries	0.03%		0.0%	198.40	0.00
Engine Oil	0.0%		0.0%	0.00	0.00
Asbestos	0.0%		0.0%	0.00	0.00
Other potentially hazardous	0.1%		0.0%	690.40	0.00
Identifiable clinical waste	0.2%		0.0%	1,348.57	0.00
Garden Waste	7.6%	Organic Non Catering	7.6%	44,811.40	44,811.40
Soil	0.8%	(Some categories are	0.0%	4,873.23	0.00
Other Organic	0.4%	100%, some are 0%)	0.4%	2,055.94	2,055.94
Home Compostable Kitchen Waste	9.3%	Organic Catering (100%)	9.3%	55,227.83	55,227.83
Non-home comp Kitchen Waste	16.3%		16.3%	96,424.76	96,424.76
Fines (Less than 10 mm)	0.9%	Fines (50%)**	0.45%	5,085.14	2,542.57
Total	100%		67.76%	593,126.58	401,908

Note:

* Furthermore the Regulations do not state the percentage biodegradability of Disposable Nappies, due to the make up of these, 50% biodegradability has been agreed with EHS. ** The Regulations do not specifically state the percentage biodegradability of Fines. However the fines smaller than 10mm encountered in physical sorting of the waste were generally derived from a mixture of organic sources, miscellaneous combustibles and miscellaneous non-combustibles and therefore have been classified as having 50% biodegradability.

Therefore, the BMW fraction of all kerbside collected household waste is derived as **68%**.

4.2.5 Bring Bank Sites

This section of the report illustrates how the calculation of the biodegradable fraction of the Bring Bank Site waste was carried out. Table 4.8 below sets out the calculation of the biodegradable fraction of waste disposed at Bring bank Sites from operational data from WasteDataFlow returns by each District Council in Northern Ireland.

Table 4.8 BMW percentage calculation of waste collected from municipal Bring Bank Sites (from WDF)

Waste Categories	WDF Tonnage (Tonnes)	%Composition of MDR	% Biodegradable	% Biodegradable Content	Total Tonnage Biodegradable
Aluminium Cans	12.1	0.17%	0%	0.0%	0.00
Aluminium Foil	0	0.00%	0%	0.0%	0.00
Automotive Batteries	0	0.00%	0%	0.0%	0.00
Books	2.86	0.04%	0%	0.0%	0.00
Brown Glass	328.25	4.53%	0%	0.0%	0.00
Card	1.01	0.01%	100%	0.01%	1.01
Clear Glass	784.85	10.84%	0%	0.0%	0.00
Co-Mingled Materials	0	0.00%	0%	0.0%	0.00
Fluorescent Tubes	0	0.00%	0%	0.0%	0.00
Fridges & Freezers	0	0.00%	0%	0.0%	0.00
Green Glass	818.68	11.31%	0%	0.0%	0.00
Green Waste Only	0	0.00%	100%	0.0%	0.00
Mineral Oil	0	0.00%	0%	0.0%	0.00
Mixed Cans	48.65	0.67%	0%	0.0%	0.00
Mixed Glass	2,889.92	39.91%	0%	0.0%	0.00
Mixed Paper & Card	425.36	5.87%	100%	5.87%	425.36
Other Compostable Waste	0	0.00%	100%	0.0%	0.00
Other Electrical Goods	0	0.00%	0%	0.0%	0.00
Other Materials	0	0.00%	0%	0.0%	0.00
Other Scrap Metal	0	0.00%	0%	0.0%	0.00
Other White Goods	0.00	0.00%	0%	0.0%	0.00
Paint	0.00	0.00%	0%	0.0%	0.00
Paper	822.06	11.35%	100%	11.35%	822.01
Plastics	10.58	0.15%	0%	0.0%	0.00

Table 4.8 BMW percentage calculation of waste collected from municipal Bring Bank Sites from WDF (continued)

Waste Categories	WDF Tonnage (Tonnes)	%Composition of MDR	% Biodegradable	% Biodegradable Content	Total Tonnage Biodegradable
Post Consumer Non-Automotive Battery	0	0.00%	0%	0.0%	0.00
Rubble	0	0.00%	0%	0.0%	0.00
Steel Cans	0.32	0.00%	0%	0.0%	0.00
Textiles & Footwear	1,096.41	15.14%	50%	7.57%	548.21
Vegetable Oil	0	0.00%	100%	0.0%	0.00
Wood	0	0.00%	100%	0.0%	0.00
TOTAL	7,240.91	100%		24.81%	1,797

Therefore, the BMW fraction of Kerbside Collected Recyclable Waste using operational data from WasteDataFlow is derived as **25%**.

4.2.6 Civic Amenity Sites

This section of the report illustrates how the calculation of the biodegradable fraction of the CA Site waste was carried out.

Recyclable Waste

Table 4.9 below sets out the calculation for determining the percentage biodegradability of waste separately collected for recycling at CA Sites, from operational data from WasteDataFlow returns.

Table 4.9 BMW percentage calculation of waste separately collected for recycling at CA Sites (from WDF) ^{rubble excluded}

Waste Categories	Total Annual Tonnage from WDF	% Composition	% Biodegradable Content	% Biodegradable Content	Total Tonnage Biodegradable
Aluminum cans	0.86	0.00%	0%	0.00%	0.00
Aluminum foil	0.00	0.00%	0%	0.00%	0.00
Automotive batteries	688.18	0.57%	0%	0.00%	0.00
Books	1.99	0.00%	0%	0.00%	0.00
Brown glass	249.84	0.21%	0%	0.00%	0.00
Card	4,612.00	3.82%	100%	3.82%	4,612.00
Clear glass	647.57	0.54%	0%	0.00%	0.00
Co-mingled materials	0.00	0.00%	0%	0.00%	0.00
Flouresent tubes	48.50	0.04%	0%	0.00%	0.00
Fridges & freezers	2,394.34	1.98%	0%	0.00%	0.00
Green glass	829.44	0.69%	0%	0.00%	0.00
Green waste only	56,300.58	46.62%	100%	46.62%	56,300.58
Mineral oil	362.87	0.30%	0%	0.00%	0.00
Mixed cans	137.89	0.11%	0%	0.00%	0.00
Mixed glass	5,085.44	4.21%	0%	0.00%	0.00
Mixed paper and card	509.62	0.42%	100%	0.42%	509.62
Other compostable waste	802.61	0.66%	100%	0.66%	802.61
Other electrical goods	4,207.68	3.48%	0%	0.00%	0.00
Other materials	2,285.40	1.89%	0%	0.00%	0.00
Other scrap metal	12,888.51	10.67%	0%	0.00%	0.00
Other white goods	660.90	0.55%	0%	0.00%	0.00
Paint	341.41	0.28%	0%	0.00%	0.00
Paper	2,659.88	2.20%	100%	2.20%	2,659.88
Plastics	387.39	0.32%	0%	0.00%	0.00
Post consumer non automotive batteries	9.13	0.01%	0%	0.00%	0.00
Steel cans	0.25	0.00%	0%	0.00%	0.00
Textiles & footwear	1,652.41	1.37%	50%	0.68%	826.205
Vegetable Oil	57.90	0.05%	100%	0.05%	57.90
Wood	22,930.12	18.99%	100%	18.99%	22,930.12
TOTAL	120,752.69	100.00%		73.46%	88,698.91

Residual Waste Collected for disposal

Table 4.10 sets out the calculation of the biodegradable fraction of waste sent to landfill at CA Sites in Northern Ireland.

Table 4.10 Percentage Biodegradable Content of Various Waste Categories of Waste Collected from CA Sites (from WDF, Rubble excluded)

Waste Categories	% by weight	% Biodegradability	% Biodegradability Content	WDF 06/07	Tonnage Biodegradable
Paper	6.75%	100.00%	6.75%	12,094.38	12,094.38
Card	5.23%	100.00%	5.23%	9,371.50	9,371.50
Dense Plastic	7.18%	0.00%	0.00%	12,866.11	0.00
Plastic film	3.71%	0.00%	0.00%	6,645.83	0.00
Textiles and shoes	5.67%	50.00%	2.83%	10,160.17	5,080.09
Clear Glass Bottles and Jars	1.28%	0.00%	0.00%	2,298.06	0.00
Brown Glass Bottles and Jars	0.51%	0.00%	0.00%	911.81	0.00
Green Glass Bottles and Jars and Blue Glass	0.73%	0.00%	0.00%	1,304.57	0.00
Other Glass	0.63%	0.00%	0.00%	1,131.80	0.00
Disposable Nappies	1.32%	50.00%	0.66%	2,368.77	1,184.39
Furniture	1.26%	50.00%	0.63%	2,251.27	1,125.63
Wood	4.35%	100.00%	4.35%	7,792.13	7,792.13
MDF, board etc	0.97%	0.00%	0.00%	1,740.16	0.00
Chipboard	4.33%	0.00%	0.00%	7,758.85	0.00
Hardboard	0.75%	0.00%	0.00%	1,339.92	0.00
Laminated Flooring	0.71%	0.00%	0.00%	1,276.50	0.00
Carpets and Underlay	5.45%	0.00%	0.00%	9,771.18	0.00
Soft Furnishings	10.21%	0.00%	0.00%	18,308.75	0.00
Other Misc. Combustibles	0.01%	0.00%	0.00%	21.39	0.00
DIY & Other Misc. Non-Combustibles	6.20%	0.00%	0.00%	11,115.74	0.00
Other Misc. Non-Combustibles	0.62%	0.00%	0.00%	1,111.06	0.00
All Ferrous Metal	0.93%	0.00%	0.00%	1,673.58	0.00
All Non- Ferrous Metal	1.43%	0.00%	0.00%	2,558.41	0.00
Small WEEE	0.65%	0.00%	0.00%	1,170.19	0.00
Large WEEE	0.00%	0.00%	0.00%	0.00	0.00
TV's and monitors	0.16%	0.00%	0.00%	289.20	0.00
All HHW	0.36%	0.00%	0.00%	643.73	0.00
Garden Waste	4.53%	100.00%	4.53%	8,124.50	8,124.50
Soil	1.50%	0.00%	0.00%	2,692.50	0.00
Other Organic	3.38%	100.00%	3.38%	6,067.87	6,067.87
Food Waste	17.74%	100.00%	17.74%	31,797.70	31,797.70
Fines (Less than 10mm)	1.46%	50.00%	0.73%	2,610.94	1,305.47
	100.00%		46.83%	179,268.56	83,943.66

BMW for all CA Site Waste

Table 4.11 sets out the calculation of the total biodegradable fraction at CA Sites taking into account the variances in the BMW fraction of residual and recyclable waste.

Table 4.11 Total BMW Tonnage and Percentage BMW for CA Sites in Northern Ireland
(excluding separately collected rubble)

	Residual Waste	Recyclable Waste <i>With rubble removed</i>	Totals
% BMW	46.83%	73.46%	
Total Tonnage	179,268.56	120,752.69	308,992.15
Total Tonnage BMW	83,951.47	88,698.91	172,656.46
Overall BMW % for CA Sites			57.54%

4.3 TOTAL AMOUNT AND PERCENTAGE OF BIODEGRADABLE MUNICIPAL WASTE IN NORTHERN IRELAND

Tables 4.13 to 4.16 summarise the following:

- Total waste arisings;
- Percentage of the waste that is biodegradable,
- Tonnage of biodegradable waste; and
- Percentage of BMW as a proportion of the overall municipal waste in Northern Ireland.

For example, all waste collected at the kerbside makes up 55.73% of the total municipal waste in Northern Ireland.

Table 4.12 Summary Amounts and Percentage of BMW for kerbside collected waste in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage	% of MSW in NI
Kerbside residual	455,691.61	59.53%	271,283.95	42.82%
Kerbside recyclable	88,786.14	78.38%	69,592.08	8.34%
Kerbside compostable	48,648.83	94.38%	45,913.72	4.57%
All kerbside collected waste*	593,126.58	67.76%	401,907.78	55.73%

Note: From statistical scale up

Table 4.13 Summary Amounts and Percentage of BMW for waste accepted at Bring Bank facilities in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage	% of MSW in NI
Bring banks	7240.91	24.81%	1796.58	0.68%

Table 4.14 Summary Amounts and Percentage of BMW for waste accepted at CA Site facilities in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage	% of MSW in NI
CA Site residual	179,268.56	46.83%	83,943.66	16.85%
CA Site recyclable	129,723.59	68.38%	88,704.99	12.19%
All CA Site waste	308,992.15	55.87%	172,648.65	29.04%

Table 4.15 summaries the data and shows that BMW fraction derived from the Study is **64.01%** this is based on the waste analysed in the study via physical sorting and WDF analysis, which equates to 909,359.64 tonnes (85.45%) of the total waste arisings in Northern Ireland. The biodegradable percentage reported in the arc21 Study carried out in April 2007 reported a similar figure of 64.8%; however this figure was calculated by analysis of kerbside collected waste only. If the total waste arisings for Northern Ireland are assumed to be 1,064,082.9 as reported in WDF returns for 2006/2007 then we can assume that 674,416.79 tonnes of that is biodegradable.

Table 4.15 Summary Amounts and Percentage of BMW for waste in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage	% of MSW in NI
All kerbside collected waste	593,126.58	67.76%	401,907.78	55.73%
Bring banks	7,240.91	24.81%	1,796.58	0.68%
All CA Site waste	300,021.25	57.54%	172,648.64	29.04%
<i>Subtotal</i>	900,388.74	64.01%	576,346.93	85.45%
TOTAL MSW	1,064,082.9	64.01%	674,416.79	100.00%

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 OVERVIEW

This study has determined the composition of Municipal Solid Waste (MSW) in Northern Ireland and reviewed the percentage of Biodegradable Municipal Waste (BMW) of the MSW for Northern Ireland. The survey combined data collected for kerbside collections of residual, recyclable and compostable waste, bring bank sites and civic amenity sites to achieve these results.

5.2 COMPOSITION OF MUNICIPAL WASTE IN NORTHERN IRELAND

Table 5.1 below details the composition of the municipal waste in Northern Ireland.

Table 5.1 Municipal Waste Composition for Northern Ireland

Categories	Mean Composition
Paper	15.93%
Card	5.10%
Dense Plastic	3.94%
Plastic Film	2.09%
Textiles	4.27%
Glass	14.59%
Miscellaneous Combustibles	9.19%
Miscellaneous Non-Combustibles	4.26%
Ferrous Metal	1.87%
Non-Ferrous Metal	1.55%
WEEE	1.36%
HHW	0.31%
Organic Non-Catering	25.77%
Organic Catering	9.34%
Fines	0.44%

5.3 PERCENTAGE OF BIODEGRADABLE MUNICIPAL WASTE IN NORTHERN IRELAND

Currently, the proportion of MSW which is biodegradable in Northern Ireland is assumed to be 71%. This assumption was calculated as part of the Northern Ireland Household Waste Characterisation Study 2000. The NILAS Regulations require EHS to keep this assumption under review, hence and the main aim of this study has been to calculate, as accurately as possible, the current percentage of municipal waste which is biodegradable. The BMW fraction of municipal waste in Northern Ireland derived from the Study is **64%**. Table 5.2

summarises the biodegradable municipal waste (BMW) percentage for municipal solid waste (MSW) in Northern Ireland.

Table 5.2 BMW Percentage and Tonnages for Municipal Waste in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage
Household kerbside collected waste	593,126.58	67.76%	401,907.78
Bring banks	7,240.91	24.81%	1,796.58
All CA Site waste	300,021.25	57.54%	172,648.64
<i>Subtotal</i>	900,388.74	64.01%	576,346.93
TOTAL MSW	1,064,082.9	64.01%	674,416.79

Note:

1. The BMW % obtained for the study has been applied to the Total MSW tonnage for Northern Ireland. It should be noted that 85% of the municipal waste arisings for Northern Ireland have been analysed as part of this study and an assumption has been made that the %BMW calculated from this waste can be applied to the total municipal waste arisings .

Table 5.3 below highlights the main conclusions of the Study in relation to BMW.

Table 5.3 BMW Calculations

Biodegradable Municipal Waste Calculations – Conclusions
<p><u>Kerbside Collected Household Waste</u></p> <ul style="list-style-type: none"> ▪ The BMW fraction of all kerbside collected waste has been calculated to be 68%. This comprises of: <ul style="list-style-type: none"> → Residual waste collection - 60% BMW percentage → Mixed dry recyclables collection – 78% BMW percentage; and → Garden waste - 94% BMW percentage.
<p><u>Bring Bank Sites</u></p> <ul style="list-style-type: none"> ▪ The BMW fraction of waste collected at Bring Bank Sites has been calculated to be 25%.
<p><u>Civic Amenity Sites</u></p> <ul style="list-style-type: none"> ▪ The BMW fraction of total waste collected at CA Sites has been calculated to be 57% (rubble removed). This comprises of: <ul style="list-style-type: none"> → BMW percentage of recyclable waste collected at Civic Amenity sites - 68%. → BMW percentage of recyclable waste collected at CA Sites (excluding rubble) – 73%. → BMW percentage of residual waste collected at Civic Amenity sites - 47%.
<p><u>MSW</u></p> <ul style="list-style-type: none"> ▪ The BMW fraction of MSW in Northern Ireland has been calculated at 64%.

5.4 WASTE COMPOSITION

The study involved detailed waste compositional analysis and conclusions in relation to the various waste stream compositions are detailed in Table 5.4 below:

Table 5.4 Waste Composition Conclusions

Waste Composition – Conclusions
<p><u>Kerbside Collected Household Waste</u></p> <ul style="list-style-type: none"> ▪ Organic catering waste is the predominant material (38%) in the residual waste stream, followed by Plastic (16%, consisting of Dense Plastic and Plastic Film), Paper (9%) and Miscellaneous Combustibles (8%). ▪ The majority of dry recyclable waste is made up of paper (61.2%) consisting of Newspapers (39.1%), Magazines (11.0%) and recyclable paper (10.5%). Card, Glass and Dense Plastic make up another large percentage (15.3%, 5.6% and 9.3% respectively). ▪ The majority of the bin for garden waste (compostables) contains organic non-catering waste (94.2%), however, a small proportion of contamination is also present. This mostly consists of organic catering waste (57.5%) and paper (25.6%). ▪ A number of differences have been noted in the data for residual bins when it is compared to the results of the Northern Ireland wide waste characterisation study in 2000, these include: an decrease in paper from 10.6% in 2000 to 9.1% in 2007; an increase in the organic catering fraction of the waste from 27.8% to 38.3%; and a rise in dense plastic from 1.3% in 2000 to 8.3% in 2007.
<p><u>Bring Bank Sites</u></p> <ul style="list-style-type: none"> ▪ Mixed Glass is the most predominant material (39.9%) collected in Bring Bank Sites in Northern Ireland, followed by Textiles & Footwear (15.1%), Paper (11.4%), Green Glass (11.3%) and Clear Glass (10.8%).
<p><u>Civic Amenity Sites</u></p> <ul style="list-style-type: none"> ▪ Green Waste is the most predominant material (43.4%) collected for recycling at Civic Amenity sites in Northern Ireland, followed by Wood (17.7%), Scrap Metal (9.9%), Rubble (6.9%), Mixed Glass (3.9%), Card (3.6%) and Electrical Goods (3.2%). ▪ Food Waste is the most predominant material (17.7%) collected in the residual waste for landfill at Civic Amenity sites in Northern Ireland, followed by Soft Furnishings (10.2%), Dense Plastic (7.2%), Paper (6.7%) and DIY wastes (6.2%).

5.5 NEXT STEPS AND RECOMMENDATIONS

Review the BMW% for Northern Ireland

In light of the results from this Study the current biodegradable municipal waste percentage of 71% would appear to be high. This study has shown that the percentage of municipal waste which is biodegradable is 64%.

The EHS as monitoring authority will now report the findings of this study to the allocating authority (Planning and Environmental Policy Group (P&EPG) within the Department of the Environment) with a view to reviewing the regulation 12(2) of the NILAS regulations.

Improve data reporting specifically in relation to CA Sites

Currently District Councils in Northern Ireland are required to report data on municipal waste arisings on a quarterly basis as per NILAS Regulation 10 (5). The data for each quarter must be submitted to the EHS (the Monitoring Authority) within two months after the relevant quarter end.

The use of WDF throughout this project provided valuable information, however currently District Councils do not report on each CA Site individually and this proved to be a disadvantage when reviewing the CA Site waste data, particularly with a view to site selection for sampling. Some District Councils may keep detailed records on each individual CA Site and on materials recycled or disposed whereas others may not. It is suggested that more comprehensive data collection is carried out on all CA Sites and all waste streams handled through CA Sites and a standardised reporting method for this developed.

Future Work

Comparison of waste composition and seasonality in this study has hi-lighted the potential variability and therefore it is recommended that seasonal studies be repeated on a more regular basis to gain more information on these potential trends and anomalies..

Additional analyses in the summer/winter would be extremely valuable to enhance the reliability of the data collected and to allow reliable conclusions regarding seasonality to be made. The “grouped household-based” approach employed for this study is advantageous if further seasonal studies were to be considered as representative samples have been devised in each waste management group and the approach allows repeatability with relative ease.

APPENDIX A

HOUSEHOLDER QUESTIONNAIRE & INFORMATION LEAFLET

Northern Ireland

Household Waste Compositional Analysis

The Environment and Heritage Service and Derry City Council are working together on a Study called a *Waste Compositional Analysis*. The Study will determine how much waste a household either disposes of or recycles, and the make up of this waste. As part of this Study we are asking 210 households across Northern Ireland a number of questions on their recycling habits. Your household has been randomly selected and we would be grateful if you could answer the questions below.

Prize Draw:

You have the opportunity to enter our competition to win a prize. Please complete your contact details overleaf, and return in the Freepost envelope attached. The competition closing date is Friday 2nd November 2007.

You can also fill out the questionnaire anonymously if you prefer.

PLEASE DON'T MAKE THIS ANOTHER BIT OF UNWANTED JUNK MAIL!

1. How many people live in your household?

- One
Two
Three
Four
Five or more

2. Could you please tell us the number of people in your household in each of the age categories below?

Less than 12 years old	12 to 21 years old	21 to 30 years old	30 to 50 years old	50 to 60 years old	Over 60

3. Have you got a home composter?

- Yes Go to Question 4.
No Skip Question 4 and go to Question 5.

4. If you have a home composter, do you use it?

- Yes
No

Northern Ireland

Household Waste Compositional Analysis

5. Do you use charity shops?

- Yes Go to Question 6.
No Skip Question 6 & 7 and go to Question 8.

6. Approximately how often do you donate to a charity shop?

Please specify _____

7. Approximately how often do you purchase from a charity shop?

Please specify _____

8. How close is the nearest Household Waste Recycling Centre/Civic Amenity Site or Bring Bank to your home?

- Less than 1 mile 1-5 miles
Greater than 5 miles Don't know

9. Approximately how many times a year would you visit a Household Waste Recycling Centre/Civic Amenity Site and/or Bring Site?

Please specify _____

10. What materials would you take to the Household Waste Recycling Centre/Civic Amenity Site?

- | | | |
|-----------------------------------|--------------------------------------|---|
| Glass <input type="checkbox"/> | Cans <input type="checkbox"/> | Plastic <input type="checkbox"/> |
| Textiles <input type="checkbox"/> | Green Waste <input type="checkbox"/> | Wood <input type="checkbox"/> |
| Paint <input type="checkbox"/> | Cooking Oil <input type="checkbox"/> | Electrical Goods <input type="checkbox"/> |
| Others <input type="checkbox"/> | Please specify _____ | |

11. Do you think you could recycle more?

- Yes
No
Don't know

12. Do you think your household could further reduce the amount of waste you produce?

- Yes, if we tried harder
We are doing our best
No, I don't think we could

Do you want to find out more about waste? Check out our websites at:

www.wakeuptowaste.org
www.derrycity.gov.uk/recycle

Northern Ireland Household Waste Compositional Analysis

13. In your opinion, what are the main obstacles to recycling?

- Inadequate provision of services
- Lack of time
- Too much hassle
- No access to vehicle
- Other Please specify _____

14. What can we do to help you minimise the amount of waste you produce in your household or to help you recycle more?

Please specify _____

Please feel free to comment on any other aspect of your waste management and recycling service.

PLEASE RETURN THIS TO US IN THE FREEPOST ENVELOPE ATTACHED

Name: _____

Address: _____

Postcode: _____

**THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE
YOUR PARTICIPATION IS GREATLY APPRECIATED**

Do you want to find out more about waste? Check out our websites at:

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www.derrycity.gov.uk/recycle

Northern Ireland Household Waste Compositional Analysis

The Environment and Heritage Service and Newry and Mourne District Council are working together on a Study called a *Waste Compositional Analysis*. The Study will determine how much waste a household either disposes of or recycles, and the make up of this waste. As part of this Study we are asking 210 households across Northern Ireland a number of questions on their recycling habits. Your household has been randomly selected and we would be grateful if you could answer the questions below.

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You have the opportunity to enter our competition to win a prize. Please complete your contact details overleaf, and return in the Freepost envelope attached. The competition closing date is Friday 2nd November 2007.

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PLEASE DON'T MAKE THIS ANOTHER BIT OF UNWANTED JUNK MAIL!

1. How many people live in your household?

- One
Two
Three
Four
Five or more

2. Could you please tell us the number of people in your household in each of the age categories below?

Less than 12 years old	12 to 21 years old	21 to 30 years old	30 to 50 years old	50 to 60 years old	Over 60

3. Have you got a home composter?

- Yes Go to Question 4.
No Skip Question 4 and go to Question 5.

4. If you have a home composter, do you use it?

- Yes
No

Northern Ireland

Household Waste Compositional Analysis

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- Yes Go to Question 6.
No Skip Question 6 & 7 and go to Question 8.

6. Approximately how often do you donate to a charity shop?

Please specify _____

7. Approximately how often do you purchase from a charity shop?

Please specify _____

8. How close is the nearest Household Waste Recycling Centre/Civic Amenity Site or Bring Bank to your home?

- Less than 1 mile 1-5 miles
Greater than 5 miles Don't know

9. Approximately how many times a year would you visit a Household Waste Recycling Centre/Civic Amenity Site and/or Bring Site?

Please specify _____

10. What materials would you take to the Household Waste Recycling Centre/Civic Amenity Site?

- | | | |
|-----------------------------------|--------------------------------------|---|
| Glass <input type="checkbox"/> | Cans <input type="checkbox"/> | Plastic <input type="checkbox"/> |
| Textiles <input type="checkbox"/> | Green Waste <input type="checkbox"/> | Wood <input type="checkbox"/> |
| Paint <input type="checkbox"/> | Cooking Oil <input type="checkbox"/> | Electrical Goods <input type="checkbox"/> |
| Others <input type="checkbox"/> | Please specify _____ | |

11. Do you think you could recycle more?

- Yes
No
Don't know

12. Do you think your household could further reduce the amount of waste you produce?

- Yes, if we tried harder
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Do you want to find out more about waste? Check out our websites at:

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www.newryandmourne.gov.uk/environment/services/brownbin.asp

Northern Ireland Household Waste Compositional Analysis

13. In your opinion, what are the main obstacles to recycling?

- Inadequate provision of services
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- Too much hassle
- No access to vehicle
- Other Please specify _____

14. What can we do to help you minimise the amount of waste you produce in your household or to help you recycle more?

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Please feel free to comment on any other aspect of your waste management and recycling service.

PLEASE RETURN THIS TO US IN THE FREEPOST ENVELOPE ATTACHED

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Northern Ireland Household Waste Compositional Analysis

Dear Householder,

The Environment and Heritage Service and a number of local authorities across Northern Ireland are working together on a Study called a *Waste Compositional Analysis*.

A waste compositional analysis consists of weighing and physically sorting household waste into numerous categories such as paper, plastic, food waste etc. A Northern Ireland wide waste compositional analysis will be carried out in the coming weeks and your household has been randomly selected to participate.

Waste from 35 houses (including your house) will be collected as normal and bulked together; therefore it will not be possible to identify any individual households' waste. The waste will then be taken to a treatment facility and sorted into various categories. This waste data will then enable government to assess current waste management provision.

Please note that waste collections will be carried out as normal. You do not have to do anything differently and we ask you to continue to dispose of your waste as usual and not change your waste habits.

Thank you for your co-operation in this Study.



An Agency within the Department of the
Environment
www.doeni.gov.uk



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**Environment &
Heritage Service**
www.ehsni.gov.uk

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APPENDIX B

QUESTIONNAIRE RESULTS

APPENDIX B: QUESTIONNAIRE RESULTS**B.1 INTRODUCTION**

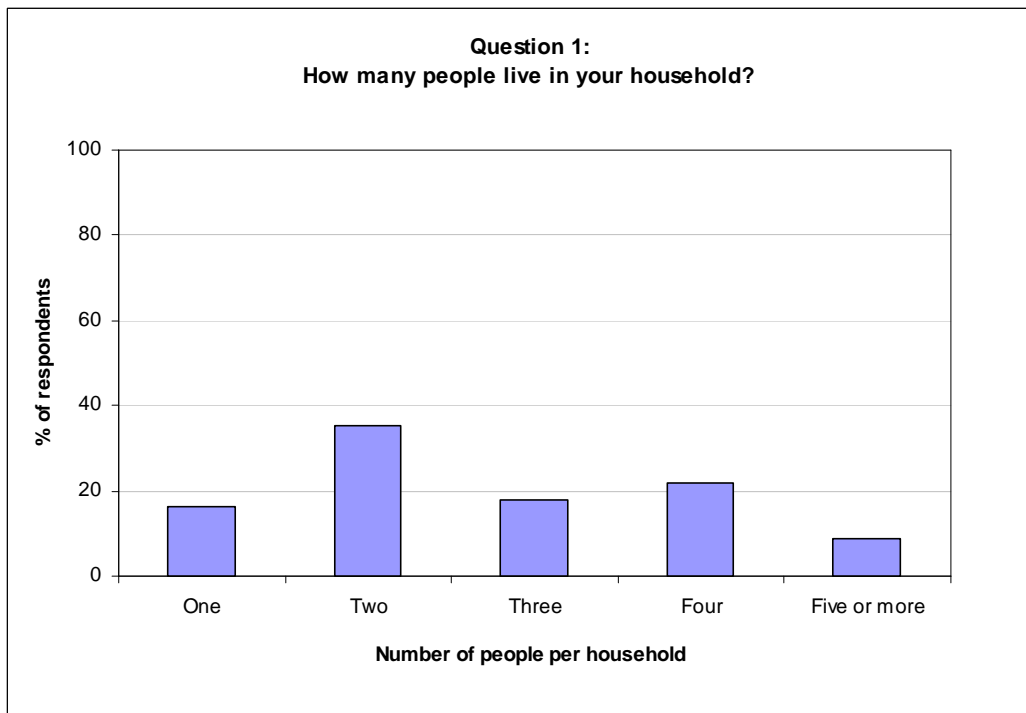
The following section provides details on the information gathered from a questionnaire issued to the households within the SWaMP and North West Waste Region Management Groups. The questionnaires were not issued to the participating District Councils within the arc21 region as these households received a similar questionnaire in June 2007, issued in response to a waste characterisation study undertaken for the arc21 Region. The arc21 results from the May 2007 survey are however included within this report in order to ensure that all three Waste Management Groups were represented in the responses and thus a response was gained for Northern Ireland as a whole. Approximately 210 questionnaires were issued in total (105 to SWaMP and 105 to NWRWVG). The aim of the questionnaire was to ascertain the attitudes of householders with respect to waste prevention, reuse and recycling and to gather information on their awareness of the location of waste management facilities within each of the Council areas.

B.2 PARTICIPATION RATE

A total participation rate of 23% was achieved for this questionnaire. The responses received were representative of all of the socio-economic sectors targeted within the overall study.

B.3 HOUSEHOLD INFORMATION

Figure B.1 shows the number of people living within each of the participating households. It can be seen from the figure that the majority of participants live in two person households (35%) with a relatively even distribution across the other categories of one, three and four person households (16%, 18% and 22%) respectively. Approximately 9% of households had five or more people.

Figure B.1 Number of people living within each household

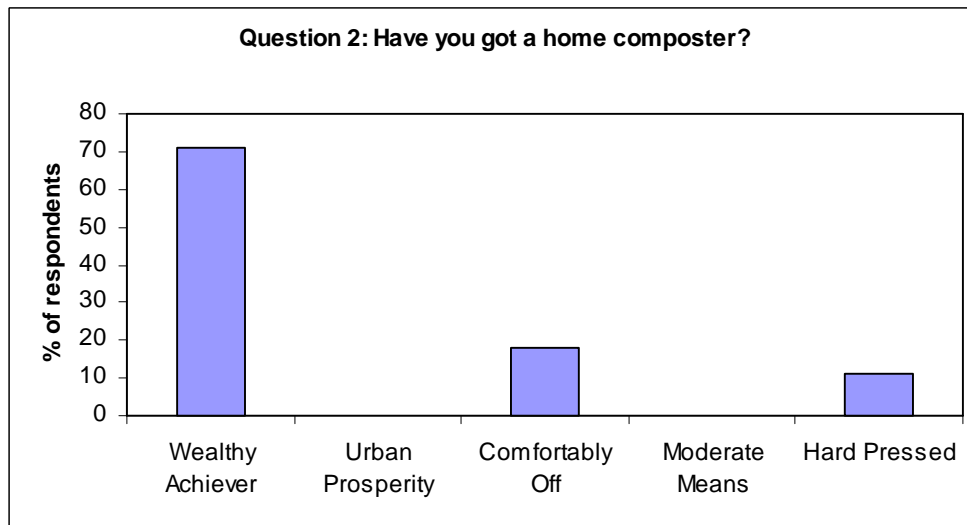
B.4 ATTITUDES TO RECYCLING AND REUSE

Within the questionnaire, there were a number of questions regarding recycling and reuse. The aim of these questions was to ascertain the attitudes of Northern Ireland householders with respect to home composting, the use of charity shops and their use of bring banks and household recycling centres. The responses generated from each of these questions are presented below.

B.4.1 Home Composting

Approximately 23% of householders surveyed were in possession of a home composter, with approximately all of these reporting to make use of this facility. As can be seen from the graph, these respondents were representative of the following ACORN categories:

- Wealthy Achievers (71%)
- Comfortably Off (18%)
- Hard Pressed (11%)

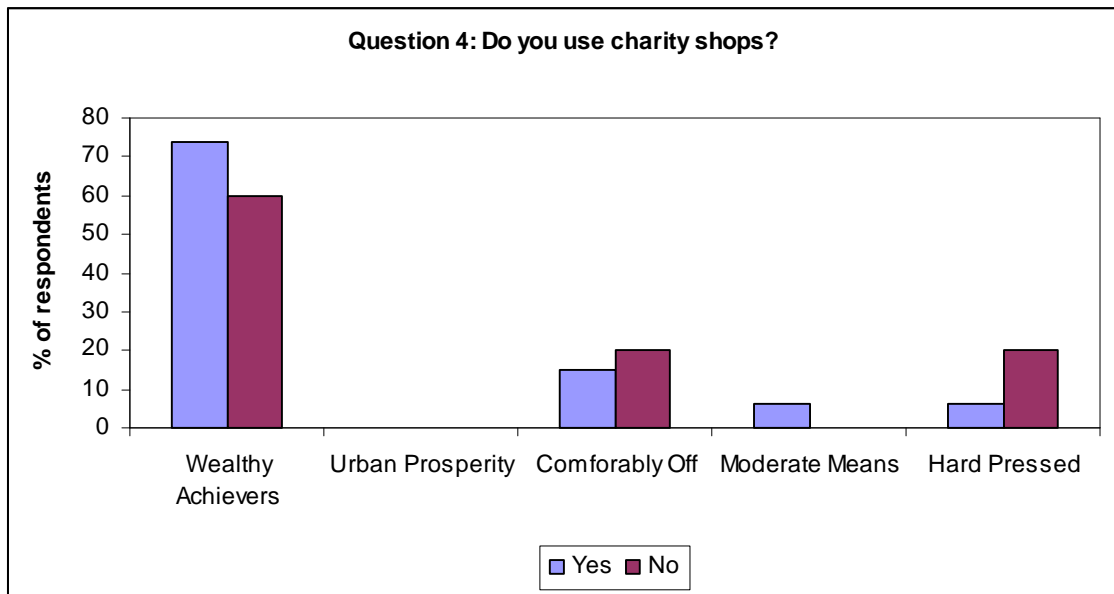
Figure B.2 ACORN categories in Possession of a Home Composter

It is observed therefore that the majority of respondents surveyed (approximately 77%) are not in possession of a home composter, thus providing scope for increasing their provision within Northern Ireland as a means of preventing waste entering the household waste collection system. Further investigation would however be required on this to ensure that the roll out of these units would not have an adverse impact on the progression towards meeting the targets identified within the Northern Ireland Landfill Allowances Scheme (NILAS).

B.4.2 Charity Shops

There were a number of questions within the questionnaire relating to the use of charity shops whereby householders were asked if they made use of charity shops either for the purposes of donation or purchase. The response to these questions is presented below.

The results for this question indicate that the majority of respondents (84%) have reported that they use Charity Shops. These results are presented in Figure B.3 in terms of ACORN classification.

Figure B.3 Use of Charity Shops

Further analysis of this data reveals that the 84% of respondents using Charity Shops for the purposes of either donation or purchase are representative of the following ACORN categories:

- Wealthy Achiever 74%
- Comfortably Off 15%
- Moderate Means 6%
- Hard Pressed 6%

Results from this question shows that approximately 23% of respondents donate twice a year to Charity Shops while 13% donate monthly. A slightly larger percentage (16%) donate three times per year while 8% donate once a year or never respectively. A larger percentage of participants donate to charity shops either four or five or more times per year, with percentages of 21% or 10% respectively. The results indicate that there is therefore considerable potential to increase the frequency of donations.

Further analysis of the data has shown that, in terms of socio economic classes, wealthy achievers donate most often and consistently to charity shops although a substantial percentage of all classes donate monthly, once, twice or three times a year. Of all socio economic classes, those within the moderate means category donate least often. These results are presented in Figure B.4 below.

Figure B.4 Frequency of Donation to Charity Shops

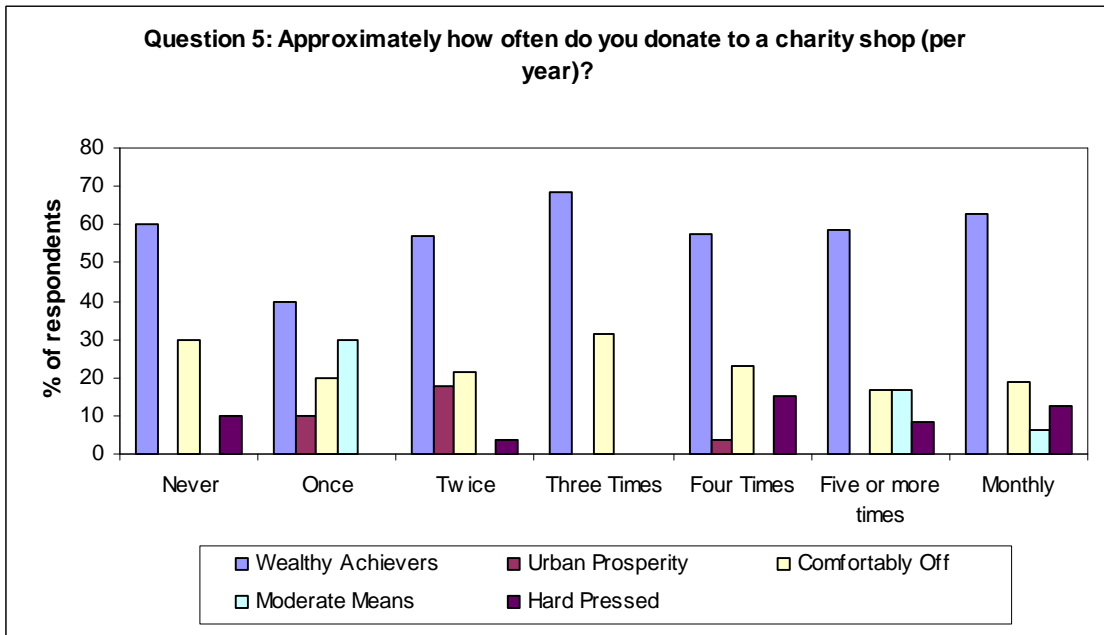
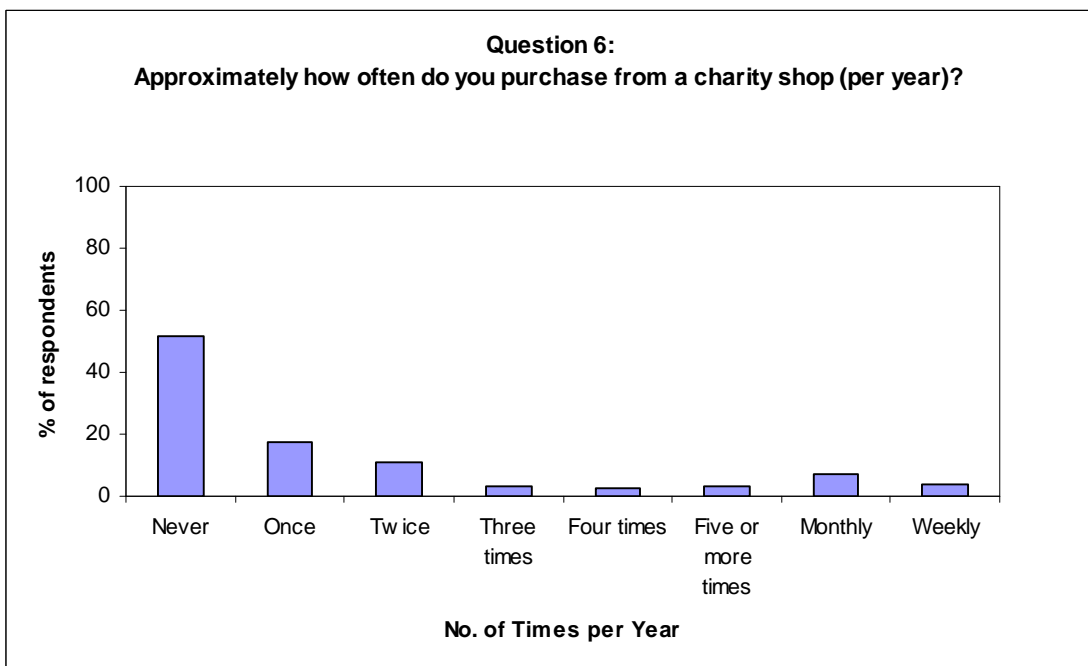


Figure B.5 below shows that approximately 52% of respondents do not purchase from charity shops, while 17% purchase items annually, with the majority of these being quoted as being Christmas cards. Approximately, 4% of respondents purchase items on a weekly basis and 7% purchase items on a monthly basis. There is therefore the potential scope for encouraging reuse through this medium within Northern Ireland, especially within the higher social classes as the responses to this question have indicated that the wealthy achievers and comfortably off classes purchase less often than the other social classes.

Figure B.5 Frequency of Purchase from a Charity Shop

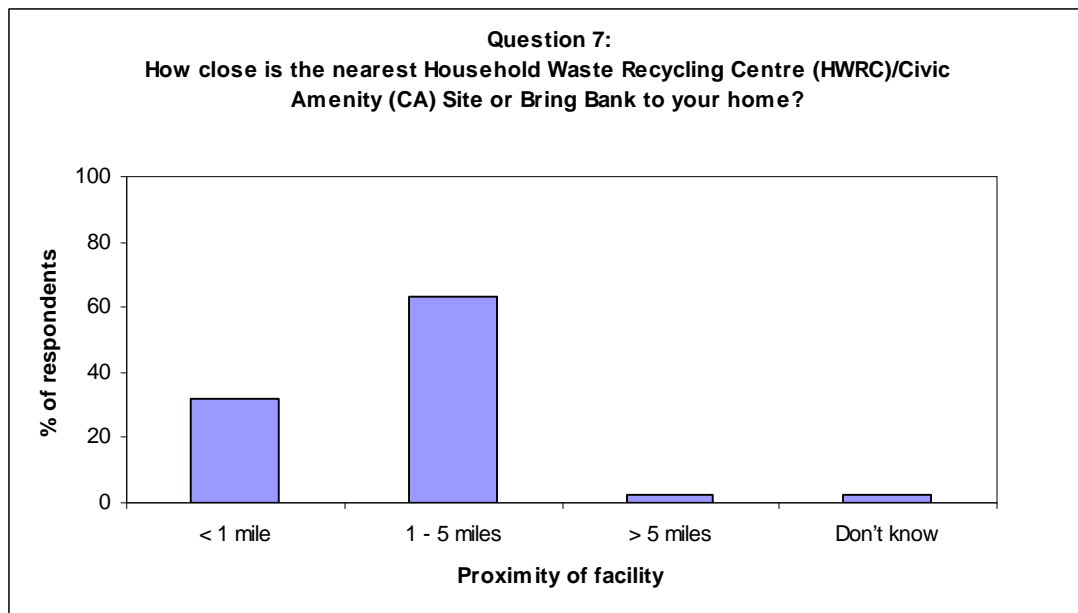


B.4.3 Household Waste Recycling Centres and Bring Banks

A number of questions were asked to ascertain the use of Household Waste Recycling Centres and Bring Banks within the Region. The aim of these questions was to establish awareness of these facilities and also the frequency of their use as well as to ascertain the types and the quantities of materials being taken to them.

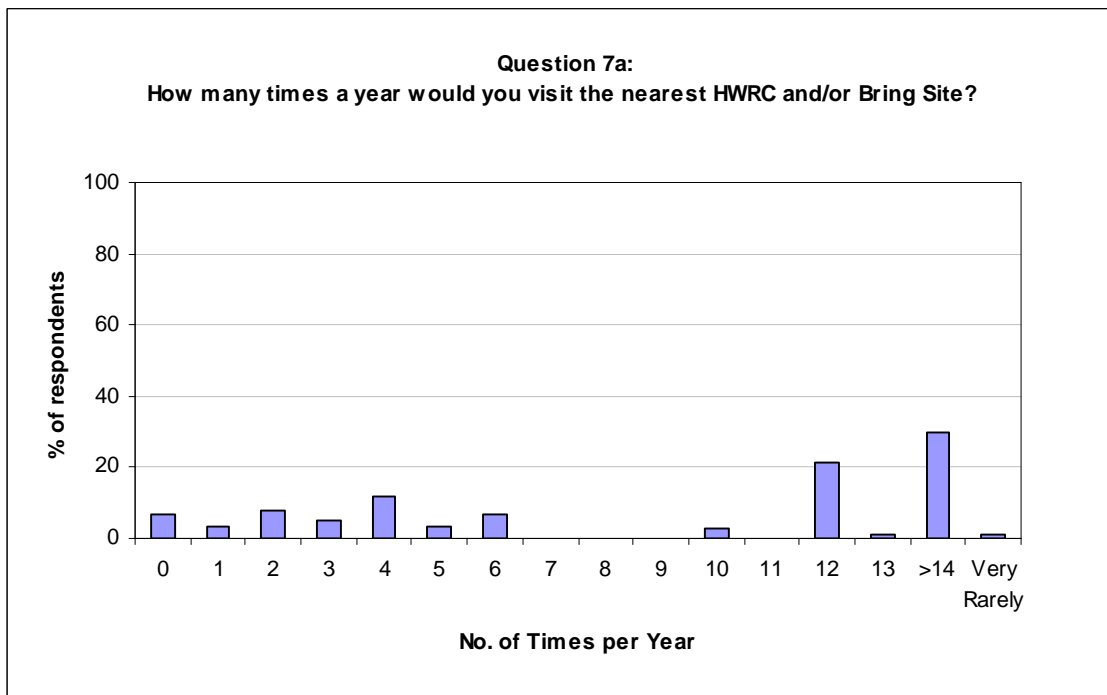
The results of the questionnaire indicate that the majority of respondents have reported that there is a Household Waste Recycling Centre or Bring Bank within a five mile radius of their home. Approximately 32% of respondents reported to live within one mile of their nearest centre and 63% between 1 – 5 miles of the nearest centre. The results of this question are encouraging in that all respondents appeared to be aware of their nearest facility, with consistency being noted within each of the different housing areas. These results are presented in Figure B.6 below.

Figure B.6 Proximity of Household Waste Recycling Centres and Bring Banks



Only 7% of respondents do not make use of Household Waste Recycling Centres. Figure B.7 shows that 30% visit more than fourteen times per year, followed by 21% visiting monthly and 3% visiting ten times per year. When considering the responses within socio economic categories, those within the wealthy achievers category used the facilities most often, with the majority stating that they use the facilities more than twelve times per year.

Figure B.7 Frequency of Use of Household Waste Recycling Centres and Bring Banks

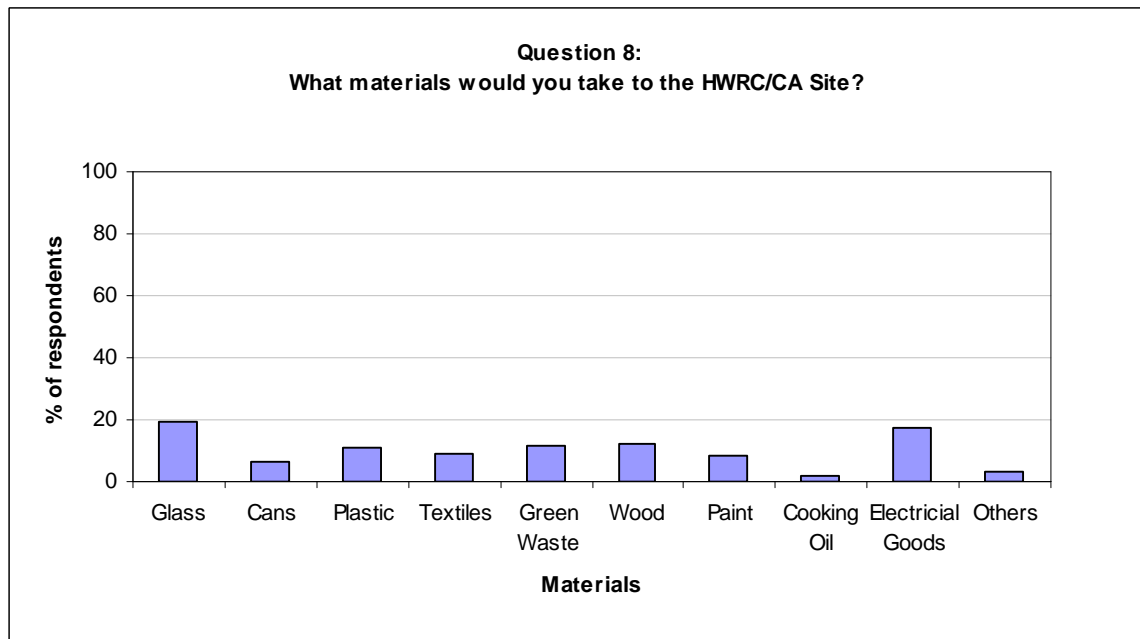


The most common materials taken to Household Waste Recycling Centres or Bring Banks, as illustrated in Figure B.8 were as follows:

- Glass 18%
- Electrical Goods 17%
- Wood 12%
- Plastic 11%
- Green waste 12%
- Paint 8%
- Textiles 9%
- Cans 7%
- Cooking Oil 2%
- Others 3%

The others category within this question contained the following items:

- Residual household waste
- Batteries
- Aerosols
- Ink Cartridges
- Engine Oil.

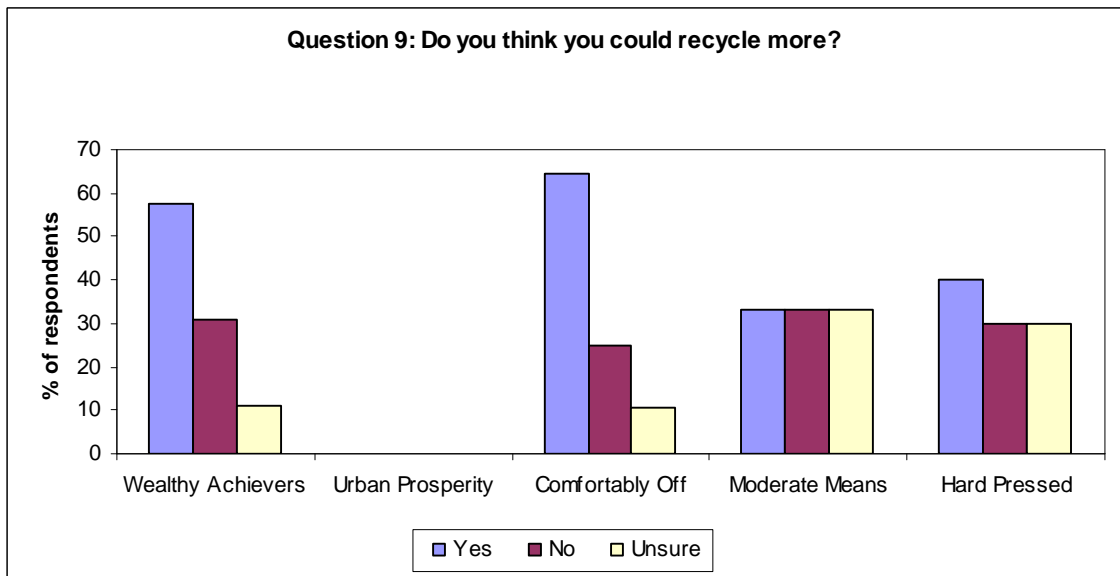
Figure B.8 Most Popular Materials taken to a Household Waste Recycling Centre

B.5 RECYCLING OPINIONS

A number of questions were asked to ascertain whether respondents felt that they could do more in terms of recycling or reduction of household waste. Over half of respondents (57%) were of the opinion that they could recycle more whilst 40% thought that they could do more to reduce the amount of waste that they were producing within their household. Approximately 28% thought that they could not recycle any more while the remaining 16% were unsure. In terms of waste reduction, 42% of respondents thought that they were doing their best in terms of reducing their household waste while the remaining 18% considered that they could not do anything further to reduce their household waste.

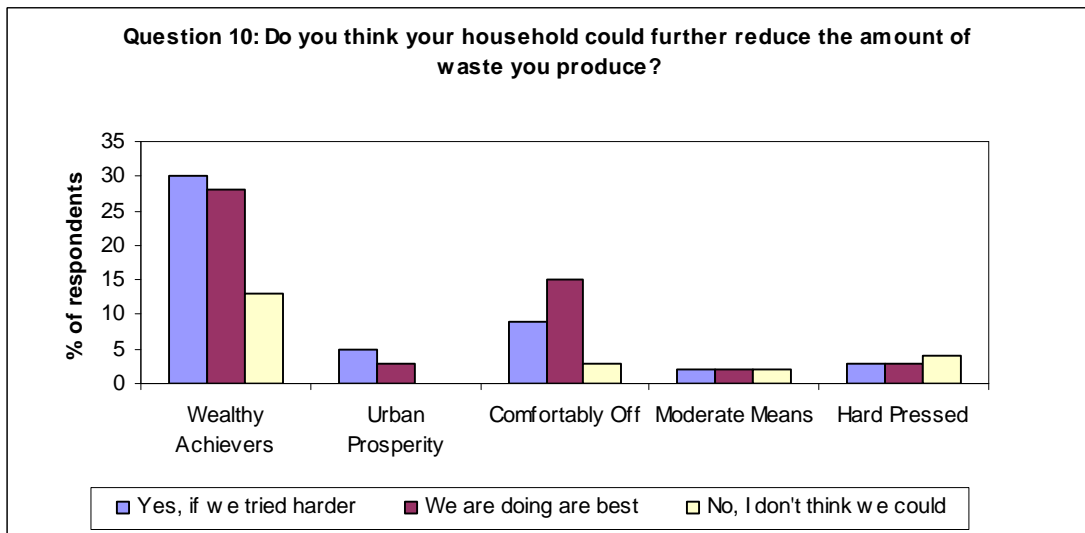
Figure B.9 presents this data in terms of ACORN classification. The majority of respondents in the Wealthy Achievers Category (58%) thought that they could recycle more than they are doing at present. This pattern of results was consistent amongst the Comfortably Off and Hard Pressed Categories where 64% and 40% of respondents respectively considered that they could recycle more but was not consistent amongst the Moderate Means category in which respondents were equally split between being able to recycle more and considering that they were doing their best in terms of recycling. There were no responses to this question from those in the Urban Prosperity category.

Figure B.9 Recycling Within Households



The results for this question indicate that 40% of respondents considered that they could do more to reduce the amount of waste produced by their household whilst 42% considered that they were doing their best and only 18% were of the opinion that there was nothing further that they could do. Figure B.10 illustrates these results in terms of ACORN classifications

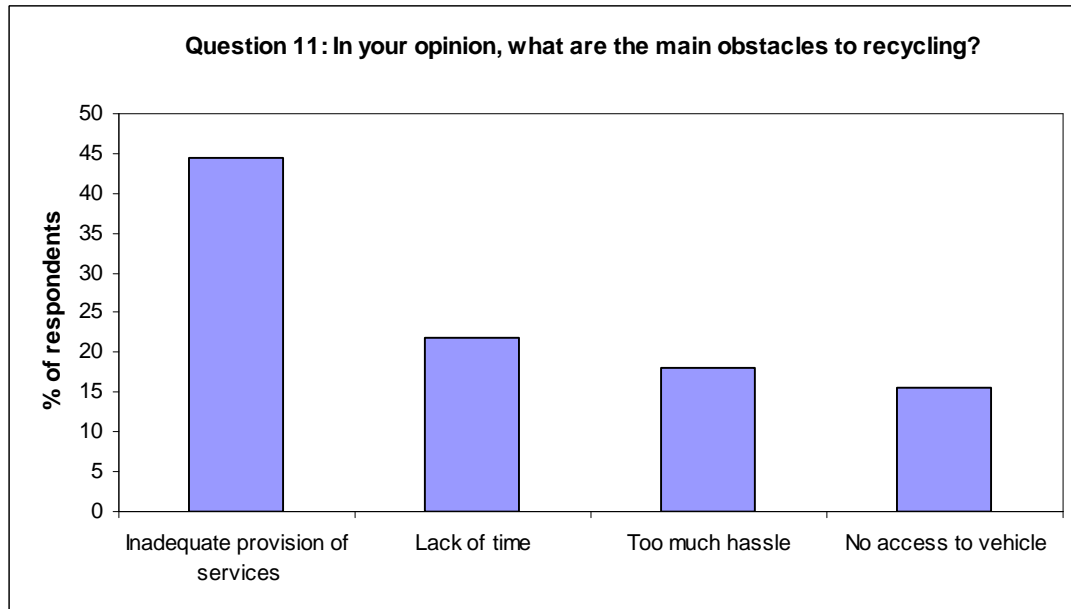
Figure B.10 Waste Reduction According to ACORN classification



In terms of ACORN classification, approximately 30% of respondents in the Wealthy Achievers Category thought that they could recycle more than they are doing at present. This pattern of results was not consistent amongst all ACORN categories, except in the Urban Prosperity category. The majority of respondents in the Comfortably Off category considered that were doing their best to reduce the amount of waste they produce. The majority of respondents in the Hard Pressed category did not consider that they could do anything more

to reduce the amount of waste that they produce. The results for the Moderate Means category were equally split amongst all responses.

Figure B.11 Obstacles to Recycling



There were a number of obstacles noted to recycling within the questionnaire returns and these are illustrated in Figure B.11. These results illustrate that Inadequate Provision of Services was noted as the main obstacle to recycling, with 45% of respondents noting this as the main obstacle. Respondents also noted 'Other' responses as obstacles to recycling, these responses included:

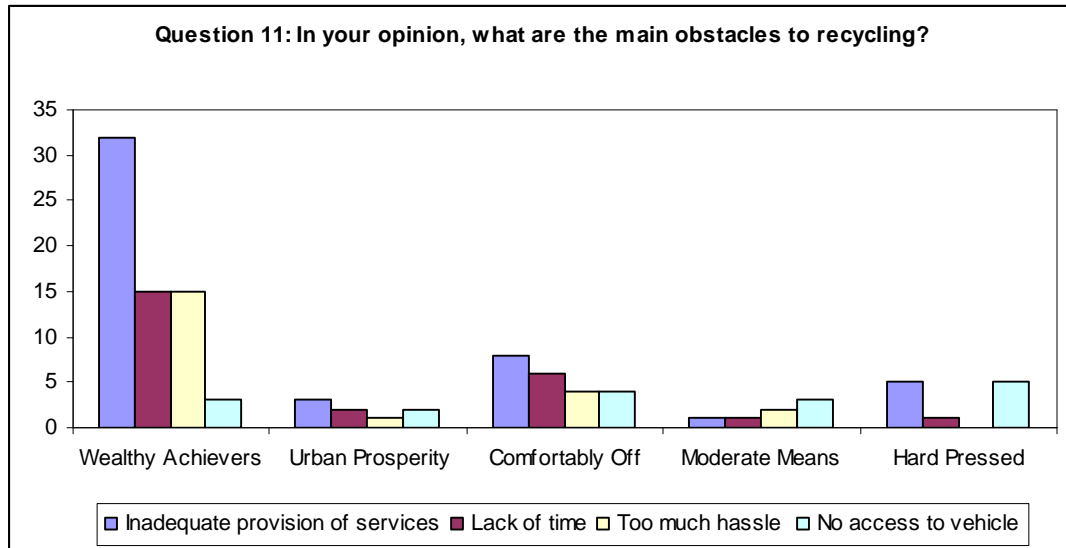
- Lack of awareness of the importance of recycling. A number of residents commented that more advertisement or information on the importance of recycling is required.
- Distance of recycling centres from population centres, especially for those residents not in possession of a vehicle.
- An inadequate household collection service. A number of households commented that the household collection system should be expanded to collect more materials while one householder suggested that there should be more bring sites and/or recycling centres.
- One respondent commented that the lack of brown bins within their District Council area was acting as an obstacle to recycling.
- One respondent commented that congestion within household recycling centres acted as an obstacle.

One respondent did however comment that there are no obstacles to recycling.

Within the ACORN Categorisation, the majority of the respondents within the Wealthy Achievers category (32%) referred to “inadequate of provision of services” as being the main obstacle to recycling. This is also the pattern within the Comfortably Off category, where the

majority of respondents considered “inadequate of provision of services” as the main obstacle to recycling. The results of this are illustrated in Figure B.12.

Figure B.12 Obstacles to Recycling Categorised into ACORN Categories.



The final question asked what EHS and the District Councils could do to help minimise the amount of waste produced and maximise recycling.

A summary of suggested improvements highlighted by households are as follows:

- Encourage supermarkets and other retailers to reduce the packaging on all products
- Provide more bring sites within each District Council area.
- More provision for the collection of additional materials at the kerbside and/or bring sites (suggested materials included organic kitchen waste, opaque plastic and waxed cartons, all paper, glass, textiles and plastic food containers).
- Provide facilities at household waste recycling centres for plastic bags and electrical goods.
- Maintain education and awareness initiatives and provide more advertisement of the importance of waste reduction and recycling.
- Provide more information to schools.
- Provide all householders with a home composter.
- Provide a weekly collection for blue bins.
- Ban plastic bags.
- Make civic amenity sites easier to use.

It should be noted that, in addition to the comments listed above, there were also a number of positive comments noted within the questionnaire returns whereby respondents recorded that they were happy with the present level of service provided by their District Council.

The final section of the questionnaire gave respondents the opportunity to provide final comments on any other aspects of their waste management and recycling service. There were a number of comments provided and these are summarised below:

- A number of respondents commented that they were happy with the service they were receiving with one commenting that the recycling service that they had was an excellent means of encouraging recycling programmes within the home. It was suggested that any deficiencies were not with the service but with the public making full use of the service.
- One respondent commented that the blue bins within the household have been very useful in aiding recycling efforts within the home.
- One respondent suggested that it would be beneficial for the black bin to be emptied twice every three weeks and the blue bin once every three weeks.
- One respondent suggested that more bins are required for housing estates and within city centres due to the distances to the current recycling centres. This is considered to be an issue for those not in possession of a car.
- One respondent commented that it is an inconvenience that District Councils do not collect waste on bank holidays.
- Plastic food containers should be accepted within the blue bins as this waste constitutes a large portion of the household waste stream.
- A number of respondents commented that the provision of brown bins would aid in recycling efforts within the home.

APPENDIX C

WASTE SORTING CATEGORIES

APPENDIX C: WASTE SORTING CATEGORIES**Table C.1 Kerbside Collected Waste Sorting Categories**

Primary Tier	Secondary Tier	Examples
Paper	Newspapers	Local & National Newspapers (Broadsheets & Tabloids), non-glossy stapled magazines
	Magazines	Glossy magazines & glossy paper (gummed & stapled spines)
	Other Recyclable Paper	Letters, junk mail, phone books, books, office paper, Yellow Pages
	Paper Packaging	Paper bags
	Non-recyclable Paper	Tissue paper, wall paper, sanitary tissue paper, fish & chip wrappers, photographs
Card	Liquid Cartons	All card drinks cartons, fabric conditioner cartons.
	Board Packaging	Corrugated Card – Thick / Heavy card packaging
	Card Packaging	Thin Card Packaging (Grey card) – cereal boxes, egg boxes
	Other Card	Greetings cards, train tickets, beer mats
Dense Plastic	Plastic Bottles	All Plastic Bottles
	Dense Plastic Packaging	Expanded polystyrene packaging, food trays, pizza bases, yoghurt pots
	Other Dense Plastic	Video tapes, CD cases, CD's , toys, disposable razors, all non-packaging dense plastic
Plastic Film	Other plastic film	Plastic bags, document wallets, refuse bags,
	Packaging film	Crisp packets, sweet wrappers, bread bags, potato bags, food wrapping film, gift wrap
Textiles	Textiles	Clothing, rags, sheets, curtains, towels, fabric off cuts, balls of wool, wash cloths
	Shoes	All footwear
Glass	Glass Bottles & Jars – Green	All green glass bottles & jars
	Glass Bottles & Jars – Clear	All clear glass bottles & jars
	Glass Bottles & Jars – Brown	All brown glass bottles & jars
	Other Glass	All other glass – windows glass, light bulbs, decorative ornaments and mirrors

Table C.1 Kerbside Collected Waste Sorting Categories (Continued...)

Primary Tier	Secondary Tier	Examples
Miscellaneous Combustibles	Treated Wood	Any painted or treated wood
	Untreated Wood	Untreated (recyclable) wood, DIY off cuts, boxes, fencing, shelves
	Furniture	Complete (reusable) items of furniture made of plastic, wood, fabric & foam
	Disposable Nappies	Disposable nappies, Sanitary towels and pads including incontinence pads
	Other Misc. Combustibles	Fluff, vacuum bags, sponges, soap, fake leather clothes, hand-bags, foam, tyres
	Carpet and Underlay	Carpet, rugs, carpet samples, bath mats, underlay
Miscellaneous Non-combustibles	Construction and Demolition	Floor tiles, plaster, rubble, sawdust, gravel, sand, cement
	Other Misc. Non-Combustibles	Stones, crockery, porcelain ornaments, flower pots, cinder
Ferrous Metal	Food cans	Magnetic food cans
	Beverage cans	Magnetic drinks cans
	Other ferrous metal	Coat hangers, nails, screws, cutlery, door furniture, car parts, Magnetic aerosols
Non-ferrous metal	Food cans	Non-magnetic food cans
	Beverage cans	Non-magnetic drinks cans
	Other non ferrous metal	Non-magnetic aerosols, Aluminium foil, copper pipe, decorative furnishings, jewellery
WEEE (Waste Electronic & Electrical Equipment)	White goods	Fridges, cookers, dishwashers, microwave ovens, heaters
	Large electronic goods	Vacuum cleaners, computers, hi-fi's, printers, radios
	TV's and monitors	Glass cathode ray tubes
	Other WEEE	Keyboards, wires, irons, lamps, kettles, personal stereos, electronic toys
HHW (Hazardous Household Waste)	Household Batteries	All household batteries
	Car Batteries	All car batteries
	Engine Oil	Engine Oil
	Asbestos	Asbestos sheets, asbestos tiles, asbestos pipes, asbestos iron boards
	Other potentially hazardous	White spirit, thinners, paint, insecticides, bleach, chemicals,
	Identifiable clinical waste	Drugs, tablets & packaging, blood soiled dressings, used syringes, soiled medical items

Table C.1 Kerbside Collected Waste Sorting Categories (Continued)

Primary Tier	Secondary Tier	Examples
Organic non-catering	Garden Waste	Twigs, leaves, grass cuttings, hedges trimmings, cut flowers
	Soil	Soil
	Other Organic	Dead animals, excrement, bone, cat litter
Organic catering	Home Compostable Kitchen Waste	Fruit & vegetable peelings, tea bags, liquids
	Non-home Compostable Kitchen Waste	Meat, processed food, bread, egg shells, chocolate, biscuits, cheese
Fines	Fines (Less than 10 mm)	< 10mm diameter particles

Table C.2 CA Site Collected Waste Sorting Categories

Primary Tier	Secondary Tier	Examples
Paper	All Paper	Local & National Newspapers (Broadsheets & Tabloids), non-glossy stapled magazines, glossy magazines & glossy paper (gummed & stapled spines), letters, junk mail, phone books, books, office paper, Yellow Pages, paper bags, tissue paper, wall paper, sanitary tissue paper, fish & chip wrappers, photographs
Card	All Card	All card drinks cartons, fabric conditioner cartons, Corrugated Card – Thick / Heavy card packaging, Thin Card Packaging (Grey card) – cereal boxes, egg boxes, greetings cards, train tickets, beer mats
Dense Plastic	All Dense Plastic	All Plastic Bottles, expanded polystyrene packaging, food trays, pizza bases, yoghurt pots, video tapes, CD cases, CD's , toys, disposable razors, all non-packaging dense plastic
Plastic Film	All Plastic Film	Plastic bags, document wallets, refuse bags, crisp packets, sweet wrappers, bread bags, potato bags, food wrapping film, gift wrap
Textiles	Textiles and Shoes	Clothing, rags, sheets, curtains, towels, fabric off cuts, balls of wool, wash cloths and all footwear
Glass	Glass Bottles & Jars – Green	All green glass bottles & jars
	Glass Bottles & Jars – Clear	All clear glass bottles & jars
	Glass Bottles & Jars – Brown	All brown glass bottles & jars
	Other Glass	All other glass – windows glass, light bulbs, decorative ornaments and mirrors
Miscellaneous Combustibles	Disposable Nappies	Disposable nappies, Sanitary towels and pads including incontinence pads
	Furniture	Complete (reusable) items of furniture made of plastic, wood, fabric & foam
	Wood	Wood including wooden furniture that is not reusable
	MDF, board etc	MDF, board & MDF furniture, worktops
	Chipboard	Chipboard & chipboard based furniture, worktops
	Hardboard	Hardboard

Table C.2 CA Site Collected Waste Sorting Categories

Primary Tier	Secondary Tier	Examples
Miscellaneous Combustibles	Laminated Flooring	Laminated Flooring
	Carpets & Underlay	Carpets & Underlay
	Soft Furnishings	Soft Furnishings, cushions & mattresses
Miscellaneous Non-Combustibles	DIY & Other Miscellaneous Non-Combustibles	Stones, crockery, porcelain ornaments, flower pots, cinder, floor tiles, plaster, rubble, sawdust, gravel, sand, cement etc.
	Other Miscellaneous Non-Combustibles	Other Miscellaneous Non-Combustibles
Ferrous Metal	All Ferrous Metal	Magnetic food cans, drinks cans, coat hangers, nails, screws, cutlery, door furniture, car parts, magnetic aerosols etc.
Non-Ferrous Metal	All Non-Ferrous Metal	Non-Magnetic food cans, drinks cans, coat hangers, nails, screws, cutlery, door furniture, car parts, magnetic aerosols etc.
Waste Electrical & Electronic Equipment (WEEE)	Small WEEE	Vacuum cleaners, computers, hi-fi's, printers, radios, keyboards, wires, irons, lamps, kettles, personal stereos, electronic toys etc
	Large WEEE	Microwave or larger appliances
	TVs & Monitors	CRT (Glass Cathode Ray Tubes), TVs & Monitors
Hazardous Household Waste (HHW)	All Hazardous Household Waste (HHW)	All HHW – household batteries, car batteries, engine oil, asbestos, white spirit, thinners, paint, insecticides, bleach, chemicals, drugs, tablets & packaging, blood soiled dressings, used syringes etc
Organic Non-Catering	Garden Waste	Twigs, leaves, grass cuttings, hedge trimmings, cut flowers
	Soil	Soil
	Other Organic	Dead animals, excrement, bone, cat litter
Organic Catering	Food Waste	All food waste
Fines	Fines (Less than 10 mm)	< 10mm diameter particles

APPENDIX D

STATISTICAL PRINCIPLES AND RESULTS

STATISTICAL PRINCIPALS FOR USE IN WASTE COMPOSITION ANALYSES

Due to the variability of municipal solid waste materials, estimates of municipal solid waste composition are only approximate in nature. Similar to the methods used by statisticians in conducting opinion polls, for example, limited samples of solid waste must be used to describe the characteristics of the entire “population”. While it may be desirable to sort every load of solid waste produced and collected by households and businesses to determine the “exact” composition of the waste stream, usually the entire quantity of solid waste being generated cannot be economically or practically sorted.

Therefore, a representative sampling method must be used to obtain study samples and these samples must be analysed to estimate the composition of the entire waste stream. Sampling methods for characterising solid waste have evolved significantly since the early 1970’s. Today, the industry offers mathematically advanced, yet practical and economically viable techniques to characterise municipal solid waste.

The statistical terms that are the most commonly used to characterise solid waste are explained below.

Population: A collection of items of interest in research. In this project it is the kerbside collected household waste generated in the arc21 region.

Mean: the mathematical average of all the items in a sample. The formula is

$$\bar{X} = \frac{1}{N} \sum_{i=1}^N X_i$$

Weighted Mean: The weighted mean is a mean where there is some variation in the relative contribution of individual data values to the mean. Each data value (X_i) has a weight assigned to it (W_i). Data values with larger weights contribute more to the weighted mean and data values with smaller weights contribute less to the weighted mean. The formula is

$$\bar{X}_w = \frac{\sum W_i X_i}{\sum W_i}$$

Standard Deviation: it is the most commonly used measure of statistical dispersion. Simply put, it measures how spread out the values in a data set are. The formula is

$$S = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2}$$

Coefficient of variation: Whilst the standard deviation is an absolute measure of the average dispersion of the individual contamination values around the mean contamination, the coefficient of variation is a relative measure of the dispersion. It allows for comparisons of the variations of populations with significantly different mean values, i.e. two sets of data could conceivably have the same standard deviation despite the mean values being very different. The coefficient of variation allows comparison of these two data sets. The coefficient of variation is equal to the standard deviation divided by the mean.

Accuracy: An accurate measurement is one that is very close to the true value of a phenomenon

Confidence interval: The confidence interval is an expression of statistical accuracy. It provides the upper and lower limits of the “actual” population mean based on the sampled mean and variance of the observed sampled data. For example, sample mean for the waste category newspaper may be 5% for a certain generator, with a confidence interval of +/- 1%. This implies that the true population mean for paper is between 4 and 6 percent.

Confidence level: given the limited sample size used in calculating the mean, it is also important to know how much confidence we have that the true population mean does in fact, fall within the 4% to 6% range. The term used to qualify the amount of confidence we have is the “level of confidence”, an expression of how certain we are the true mean falls within the stated confidence interval. For example if the level of confidence is 95%, we are 95% certain that the true population mean is within the stated confidence interval.

Combining the terms confidence interval and level of confidence, we use the phrase “95% confidence interval”. Applying this term to the previous example, we would be 95% certain that the true population mean would fall within the 4% to 6% range. Other levels of confidence could be calculated, such as 80% or 99%. However, the 95% level of confidence has been accepted as standard practice in waste composition studies by the industry. A confidence level of 95% has been used for this study.

For example, Newspapers contained in Table 5 “Kerbside Collected Household Residual Waste (per Household)” it is expected that the population mean for newspapers is contained in the range from 0.02 kg to 0.41 kg.

Further, the level of confidence and the confidence interval have an inverse relationship. For example, for an 80% level of confidence, the confidence interval will be narrower than if the level of confidence were 95%. In general, the more samples that are sorted, the narrower the confidence interval becomes for any given level of confidence.

Outlier: refers to individual samples that have uncharacteristic or extreme material composition. Sample variability. For example, it is common to find approximately 30% organic in any sorted household residual waste sample. However, a load may be selected and sorted that contains 20% organic. Statistically speaking, the sample that contains 20% organic would be considered an “outlier”

Stratification: It is a statistical subdivision of the in-homogeneous parent population (e.g. waste arising of an area) into (more) homogeneous sub populations (non overlapping groups, e.g. waste from a certain type of housing), called strata. It presents the advantage of increasing the accuracy of results and reducing the sample size. The stratification used for this study was the ACORN.

COMPOSITIONAL ANALYSIS RESULTS

Table 1 Mean Composition of all kerbside collected household waste (per household)

Secondary Categories	Composition
Newspapers	12.2%
Magazines	3.9%
Other Recyclable Paper	4.8%
Paper Packaging	0.2%
Non-recyclable Paper	2.2%
Liquid Cartons	0.4%
Board Packaging	2.6%
Card Packaging	3.6%
Other Card	0.0%
Plastic Bottles	4.5%
Dense Plastic Packaging	2.5%
Other Dense Plastic	0.9%
Other Plastic Film	3.4%
Packaging Film	2.0%
Textiles	1.7%
Shoes	0.5%
Glass Bottles & Jars - Green	2.1%
Glass Bottles & Jars - Clear	2.5%
Glass Bottles & Jars – Brown	1.4%
Other Glass	0.1%
Treated Wood	0.3%
Untreated Wood	0.3%
Furniture	0.0%
Disposable Nappies	4.4%
Other Misc. Combustibles	0.4%
Carpet and Underlay	0.4%
Construction and Demolition	0.8%
Other Misc. Non-combustibles	1.4%
Ferrous Food Cans	1.0%
Ferrous Beverage Cans	0.7%
Other ferrous Metal	0.5%
Non Ferrous Food Cans	0.4%
Non Ferrous Beverage Cans	0.3%
Other non ferrous metal	0.6%
White goods	1.0%
Large electronic goods	0.0%
TV's and monitors	0.0%
Other WEEE	0.4%
Household Batteries	0.0%
Car Batteries	0.0%
Engine Oil	0.0%
Asbestos	0.0%
Other potentially hazardous	0.1%
Identifiable clinical waste	0.2%
Garden Waste	7.6%
Soil	0.8%
Other Organic	0.4%
Home Compostable Kitchen Waste	9.3%
Non-home comp Kitchen Waste	16.3%
Fines (Less than 10 mm)	0.9%

Table 2 Mean Composition of the kerbside collected household residual waste

Secondary Categories	Composition
Newspapers	2.0%
Magazines	1.2%
Other Recyclable Paper	2.4%
Paper Packaging	0.3%
Non-recyclable Paper	3.3%
Liquid Cartons	0.4%
Board Packaging	1.3%
Card Packaging	2.7%
Other Card	0.0%
Plastic Bottles	3.7%
Dense Plastic Packaging	3.5%
Other Dense Plastic	1.1%
Other Plastic Film	4.9%
Packaging Film	3.1%
Textiles	2.4%
Shoes	0.8%
Glass Bottles & Jars – Green	2.9%
Glass Bottles & Jars – Clear	3.1%
Glass Bottles & Jars – Brown	1.4%
Other Glass	0.2%
Treated Wood	0.4%
Untreated Wood	0.4%
Furniture	0.0%
Disposable Nappies	6.2%
Other Misc. Combustibles	0.5%
Carpet and Underlay	0.7%
Construction and Demolition	1.6%
Other Misc. Non-combustibles	2.4%
Ferrous Food Cans	0.8%
Ferrous Beverage Cans	0.5%
Other ferrous Metal	0.8%
Non-Ferrous Food Cans	0.2%
Non-Ferrous Beverage Cans	0.1%
Other non ferrous metal	0.8%
White goods	1.1%
Large electronic goods	0.0%
TV's and monitors	0.0%
Other WEEE	0.6%
Household Batteries	0.0%
Car Batteries	0.1%
Engine Oil	0.0%
Asbestos	0.0%
Other potentially hazardous	0.2%
Identifiable clinical waste	0.2%
Garden Waste	1.4%
Soil	1.0%
Other Organic	0.4%
Home Compostable Kitchen Waste	13.9%
Non-home comp Kitchen Waste	24.4%
Fines (Less than 10 mm)	1.2%

Table 3 Mean composition of the kerbside collected household recyclable waste

Secondary Categories	Actual Collected	Recyclable	Contamination
Newspapers	39.1%	41.5%	0.0%
Magazines	11.0%	11.6%	0.0%
Other Recyclable Paper	10.5%	11.0%	0.0%
Paper Packaging	0.2%	0.2%	0.0%
Non-recyclable Paper	0.4%	0.0%	6.5%
Liquid Cartons	0.6%	0.0%	14.8%
Board Packaging	7.7%	8.3%	0.0%
Card Packaging	6.8%	7.2%	0.0%
Other Card	0.2%	0.2%	0.0%
Plastic Bottles	8.0%	8.6%	0.0%
Dense Plastic Packaging	1.1%	0.0%	26.2%
Other Dense Plastic	0.3%	0.0%	6.6%
Other Plastic Film	0.5%	0.0%	7.7%
Packaging Film	0.3%	0.0%	5.5%
Textiles	0.3%	0.3%	0.0%
Shoes	0.0%	0.0%	0.0%
Glass Bottles & Jars – Green	1.6%	1.7%	0.0%
Glass Bottles & Jars – Clear	2.7%	2.8%	0.0%
Glass Bottles & Jars – Brown	1.3%	1.4%	0.0%
Other Glass	0.0%	0.0%	0.0%
Treated Wood	0.0%	0.0%	0.2%
Untreated Wood	0.0%	0.0%	0.3%
Furniture	0.0%	0.0%	0.0%
Disposable Nappies	0.2%	0.0%	2.4%
Other Misc. Combustibles	0.1%	0.0%	0.9%
Carpet and Underlay	0.0%	0.0%	0.0%
Construction and Demolition	0.0%	0.0%	0.0%
Other Misc. Non-combustibles	0.1%	0.0%	0.4%
Ferrous Food Cans	1.7%	1.8%	0.0%
Ferrous Beverage Cans	1.2%	1.3%	0.0%
Other ferrous Metal	0.3%	0.3%	0.0%
Non-Ferrous Food Cans	0.7%	0.7%	0.0%
Non-Ferrous Beverage Cans	0.9%	1.0%	0.0%
Other non ferrous metal	0.2%	0.3%	0.0%
White goods	0.0%	0.0%	0.7%
Large electronic goods	0.1%	0.0%	3.1%
TV's and monitors	0.0%	0.0%	0.0%
Other WEEE	0.2%	0.0%	2.4%
Household Batteries	0.0%	0.0%	0.2%
Car Batteries	0.0%	0.0%	0.0%
Engine Oil	0.0%	0.0%	0.0%
Asbestos	0.0%	0.0%	0.0%
Other potentially hazardous	0.1%	0.0%	1.3%
Identifiable clinical waste	0.2%	0.0%	1.9%
Garden Waste	0.1%	0.0%	3.2%
Soil	0.0%	0.0%	0.0%
Other Organic	0.0%	0.0%	0.0%
Home Compostable Kitchen Waste	0.2%	0.0%	3.5%
Non-home comp Kitchen Waste	1.3%	0.0%	12.2%
Fines (Less than 10 mm)	0.0%	0.0%	0.2%

Table 4 Composition of the kerbside collected household compostable waste

Secondary Categories	Actual Collected	Recyclable	Contamination
Newspapers	0.3%	0.0%	14.8%
Magazines	0.0%	0.0%	0.0%
Other Recyclable Paper	0.3%	0.0%	10.7%
Paper Packaging	0.0%	0.0%	0.1%
Non-recyclable Paper	0.0%	0.0%	0.1%
Liquid Cartons	0.0%	0.0%	0.0%
Board Packaging	0.1%	0.0%	0.7%
Card Packaging	0.0%	0.0%	0.0%
Other Card	0.0%	0.0%	0.0%
Plastic Bottles	0.0%	0.0%	0.2%
Dense Plastic Packaging	0.0%	0.0%	0.0%
Other Dense Plastic	0.0%	0.0%	0.3%
Other Plastic Film	0.0%	0.0%	7.1%
Packaging Film	0.2%	0.0%	2.4%
Textiles	0.0%	0.0%	0.4%
Shoes	0.0%	0.0%	0.0%
Glass Bottles & Jars - Green	0.0%	0.0%	0.0%
Glass Bottles & Jars - Clear	0.1%	0.0%	0.7%
Glass Bottles & Jars - Brown	0.0%	0.0%	0.0%
Other Glass	0.0%	0.0%	0.0%
Treated Wood	0.0%	0.0%	0.0%
Untreated Wood	0.1%	0.0%	1.0%
Furniture	0.0%	0.0%	0.0%
Disposable Nappies	0.0%	0.0%	0.0%
Other Misc. Combustibles	0.2%	0.0%	2.5%
Carpet and Underlay	0.0%	0.0%	0.0%
Construction and Demolition	0.0%	0.0%	0.0%
Other Misc. Non-combustibles	0.2%	0.0%	1.4%
Ferrous Food Cans	0.0%	0.0%	0.1%
Ferrous Beverage Cans	0.0%	0.0%	0.0%
Other ferrous Metal	0.0%	0.0%	0.0%
Non-Ferrous Food Cans	0.0%	0.0%	0.0%
Non-Ferrous Beverage Cans	0.0%	0.0%	0.0%
Other non ferrous metal	0.0%	0.0%	0.0%
White goods	0.0%	0.0%	0.0%
Large electronic goods	0.0%	0.0%	0.0%
TV's and monitors	0.0%	0.0%	0.0%
Other WEEE	0.0%	0.0%	0.0%
Household Batteries	0.0%	0.0%	0.0%
Car Batteries	0.0%	0.0%	0.0%
Engine Oil	0.0%	0.0%	0.0%
Asbestos	0.0%	0.0%	0.0%
Other potentially hazardous	0.0%	0.0%	0.0%
Identifiable clinical waste	0.0%	0.0%	0.0%
Garden Waste	90.9%	94.8%	0.0%
Soil	5.0%	5.2%	0.0%
Other Organic	0.0%	0.0%	0.0%
Home Compostable Kitchen Waste	1.8%	0.0%	48.1%
Non-home comp Kitchen Waste	1.0%	0.0%	9.4%
Fines (Less than 10 mm)	0.0%	0.0%	0.0%

Table 5 Composition of Kerbside Collected Household Residual Waste (per Household)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	1.96%	0.16%	3.75%	0.21kg	0.02kg	0.41kg
Magazines	1.24%	0.82%	1.65%	0.14kg	0.09kg	0.18kg
Other Recyclable Paper	2.38%	1.33%	3.42%	0.26kg	0.15kg	0.37kg
Paper Packaging	0.28%	0.00%	0.58%	0.03kg	0.00kg	0.06kg
Non-Recyclable Paper	3.28%	2.29%	4.27%	0.36kg	0.25kg	0.47kg
Liquid Cartons	0.37%	0.02%	0.71%	0.04kg	0.00kg	0.08kg
Board Packaging	1.29%	0.69%	1.88%	0.14kg	0.08kg	0.21kg
Card Packaging	2.66%	1.79%	3.53%	0.29kg	0.20kg	0.39kg
Other Card	0.01%	0.00%	0.03%	0.00kg	0.00kg	0.00kg
Plastic Bottles	3.73%	1.20%	6.27%	0.41kg	0.13kg	0.68kg
Dense Plastic Packaging	3.46%	1.43%	5.48%	0.38kg	0.16kg	0.60kg
Other Dense Plastic	1.14%	0.14%	2.14%	0.12kg	0.02kg	0.23kg
Other Plastic Film	4.86%	4.35%	5.36%	0.53kg	0.48kg	0.59kg
Packaging Film	3.07%	1.84%	4.29%	0.33kg	0.20kg	0.47kg
Textiles	2.44%	1.77%	3.11%	0.27kg	0.19kg	0.34kg
Shoes	0.77%	0.27%	1.26%	0.08kg	0.03kg	0.14kg
Glass Bottles & Jars - Green	2.86%	0.94%	4.79%	0.31kg	0.10kg	0.52kg
Glass Bottles & Jars - Clear	3.10%	0.62%	5.59%	0.34kg	0.07kg	0.61kg
Glass Bottles & Jars - Brown	1.40%	0.48%	2.32%	0.15kg	0.05kg	0.25kg
Other Glass	0.18%	0.00%	0.36%	0.02kg	0.00kg	0.04kg
Treated Wood	0.35%	0.00%	0.75%	0.04kg	0.00kg	0.08kg
Untreated Wood	0.41%	0.07%	0.74%	0.04kg	0.01kg	0.08kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	6.15%	5.15%	7.15%	0.67kg	0.56kg	0.78kg
Other Misc. Combustibles	0.45%	0.00%	1.12%	0.05kg	0.00kg	0.12kg
Carpet and Underlay	0.73%	0.00%	1.85%	0.08kg	0.00kg	0.20kg
Construction and Demolition	1.60%	0.00%	3.24%	0.17kg	0.00kg	0.35kg
Other Misc. Non-combustibles	2.41%	0.16%	4.66%	0.26kg	0.02kg	0.51kg
Food Cans	0.82%	0.34%	1.30%	0.09kg	0.04kg	0.14kg
Beverage Cans	0.54%	0.06%	1.02%	0.06kg	0.01kg	0.11kg
Other Ferrous Metal	0.76%	0.36%	1.15%	0.08kg	0.04kg	0.13kg
Food Cans	0.24%	0.04%	0.45%	0.03kg	0.00kg	0.05kg
Beverage Cans	0.11%	0.00%	0.29%	0.01kg	0.00kg	0.03kg
Other Non Ferrous Metal	0.78%	0.46%	1.10%	0.09kg	0.05kg	0.12kg
White Goods	1.06%	0.00%	2.88%	0.12kg	0.00kg	0.31kg
Large Electronic Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.57%	0.30%	0.83%	0.06kg	0.03kg	0.09kg
Household Batteries	0.02%	0.01%	0.04%	0.00kg	0.00kg	0.00kg
Car Batteries	0.05%	0.00%	0.11%	0.01kg	0.00kg	0.01kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.16%	0.00%	0.32%	0.02kg	0.00kg	0.04kg
Identifiable Clinical Waste	0.19%	0.00%	0.55%	0.02kg	0.00kg	0.06kg
Garden Waste	1.35%	0.44%	2.25%	0.15kg	0.05kg	0.25kg
Soil	0.93%	0.00%	1.97%	0.10kg	0.00kg	0.22kg
Other Organic	0.44%	0.00%	1.72%	0.05kg	0.00kg	0.19kg
Home Compostable Kitchen Waste	13.92%	4.91%	22.94%	1.52kg	0.54kg	2.51kg
Non-Home Comp Kitchen Waste	24.35%	14.91%	33.80%	2.66kg	1.63kg	3.69kg
Fines (Less than 10 mm)	1.16%	0.23%	2.10%	0.13kg	0.03kg	0.23kg
Total	100.00%			10.93kg	5.20kg	16.95kg

Table 6 Composition of Kerbside Collected Household Recyclable Waste (per Household) (Collected)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	39.09%	32.85%	45.33%	1.80kg	1.52kg	2.09kg
Magazines	11.01%	0.00%	23.58%	0.51kg	0.00kg	1.09kg
Other Recyclable Paper	10.46%	5.09%	15.84%	0.48kg	0.23kg	0.73kg
Paper Packaging	0.23%	0.01%	0.44%	0.01kg	0.00kg	0.02kg
Non-Recyclable Paper	0.39%	0.22%	0.57%	0.02kg	0.01kg	0.03kg
Liquid Cartons	0.61%	0.26%	0.96%	0.03kg	0.01kg	0.04kg
Board Packaging	7.71%	5.60%	9.82%	0.36kg	0.26kg	0.45kg
Card Packaging	6.76%	3.93%	9.59%	0.31kg	0.18kg	0.44kg
Other Card	0.18%	0.00%	0.39%	0.01kg	0.00kg	0.02kg
Plastic Bottles	7.95%	6.25%	9.66%	0.37kg	0.29kg	0.45kg
Dense Plastic Packaging	1.05%	0.58%	1.52%	0.05kg	0.03kg	0.07kg
Other Dense Plastic	0.28%	0.04%	0.52%	0.01kg	0.00kg	0.02kg
Other Plastic Film	0.53%	0.28%	0.78%	0.02kg	0.01kg	0.04kg
Packaging Film	0.29%	0.10%	0.48%	0.01kg	0.00kg	0.02kg
Textiles	0.25%	0.00%	0.56%	0.01kg	0.00kg	0.03kg
Shoes	0.03%	0.00%	0.09%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	1.64%	0.00%	6.89%	0.08kg	0.00kg	0.32kg
Glass Bottles & Jars - Clear	2.65%	0.00%	5.34%	0.12kg	0.00kg	0.25kg
Glass Bottles & Jars - Brown	1.29%	0.04%	2.53%	0.06kg	0.00kg	0.12kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.04%	0.00%	0.10%	0.00kg	0.00kg	0.00kg
Untreated Wood	0.03%	0.00%	0.07%	0.00kg	0.00kg	0.00kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	0.18%	0.01%	0.34%	0.01kg	0.00kg	0.02kg
Other Misc. Combustibles	0.08%	0.00%	0.18%	0.00kg	0.00kg	0.01kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	0.05%	0.00%	0.13%	0.00kg	0.00kg	0.01kg
Food Cans	1.68%	0.40%	2.95%	0.08kg	0.02kg	0.14kg
Beverage Cans	1.18%	0.62%	1.74%	0.05kg	0.03kg	0.08kg
Other Ferrous Metal	0.28%	0.09%	0.47%	0.01kg	0.00kg	0.02kg
Food Cans	0.67%	0.09%	1.25%	0.03kg	0.00kg	0.06kg
Beverage Cans	0.89%	0.00%	1.91%	0.04kg	0.00kg	0.09kg
Other Non Ferrous Metal	0.21%	0.00%	0.48%	0.01kg	0.00kg	0.02kg
White Goods	0.02%	0.00%	0.05%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	0.13%	0.00%	0.51%	0.01kg	0.00kg	0.02kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.18%	0.00%	0.45%	0.01kg	0.00kg	0.02kg
Household Batteries	0.02%	0.00%	0.07%	0.00kg	0.00kg	0.00kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.09%	0.00%	0.26%	0.00kg	0.00kg	0.01kg
Identifiable Clinical Waste	0.20%	0.00%	0.54%	0.01kg	0.00kg	0.03kg
Garden Waste	0.11%	0.01%	0.21%	0.01kg	0.00kg	0.01kg
Soil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	0.23%	0.00%	0.51%	0.01kg	0.00kg	0.02kg
Non-Home Comp Kitchen Waste	1.28%	0.00%	3.02%	0.06kg	0.00kg	0.14kg
Fines (Less than 10 mm)	0.03%	0.00%	0.06%	0.00kg	0.00kg	0.00kg
Total	100.00%			4.61kg	2.61kg	6.93kg

Table 7 Composition of Kerbside Collected Household Recyclable Waste (per Household) (Recycled)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	41.47%	33.73%	49.20%	1.79kg	1.46kg	2.13kg
Magazines	11.55%	0.00%	24.29%	0.50kg	0.00kg	1.05kg
Other Recyclable Paper	10.99%	5.44%	16.54%	0.47kg	0.23kg	0.71kg
Paper Packaging	0.24%	0.01%	0.46%	0.01kg	0.00kg	0.02kg
Non-Recyclable Paper	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Liquid Cartons	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Board Packaging	8.28%	6.24%	10.33%	0.36kg	0.27kg	0.45kg
Card Packaging	7.23%	4.46%	9.99%	0.31kg	0.19kg	0.43kg
Other Card	0.20%	0.00%	0.42%	0.01kg	0.00kg	0.02kg
Plastic Bottles	8.55%	6.49%	10.61%	0.37kg	0.28kg	0.46kg
Dense Plastic Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Dense Plastic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Plastic Film	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Packaging Film	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Textiles	0.29%	0.00%	0.69%	0.01kg	0.00kg	0.03kg
Shoes	0.04%	0.00%	0.11%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	1.67%	0.00%	6.96%	0.07kg	0.00kg	0.30kg
Glass Bottles & Jars - Clear	2.75%	0.00%	5.51%	0.12kg	0.00kg	0.24kg
Glass Bottles & Jars - Brown	1.41%	0.16%	2.66%	0.06kg	0.01kg	0.11kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Untreated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Combustibles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	1.84%	0.37%	3.32%	0.08kg	0.02kg	0.14kg
Beverage Cans	1.27%	0.76%	1.79%	0.06kg	0.03kg	0.08kg
Other Ferrous Metal	0.29%	0.09%	0.49%	0.01kg	0.00kg	0.02kg
Food Cans	0.71%	0.10%	1.32%	0.03kg	0.00kg	0.06kg
Beverage Cans	0.95%	0.00%	2.06%	0.04kg	0.00kg	0.09kg
Other Non Ferrous Metal	0.25%	0.00%	0.60%	0.01kg	0.00kg	0.03kg
White Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Household Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Identifiable Clinical Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Garden Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Soil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Non-Home Comp Kitchen Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Fines (Less than 10 mm)	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Total	100.00%			4.32kg	2.50kg	6.37kg

Table 8 Composition of Kerbside Collected Household Recyclable Waste (per Household) (Contamination)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Magazines	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Recyclable Paper	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Paper Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Non-Recyclable Paper	6.45%	0.00%	12.93%	0.02kg	0.00kg	0.04kg
Liquid Cartons	14.82%	4.45%	25.20%	0.04kg	0.01kg	0.07kg
Board Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Card Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Card	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Plastic Bottles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Dense Plastic Packaging	26.15%	0.74%	51.56%	0.08kg	0.00kg	0.15kg
Other Dense Plastic	6.62%	0.00%	14.78%	0.02kg	0.00kg	0.04kg
Other Plastic Film	7.68%	2.38%	12.99%	0.02kg	0.01kg	0.04kg
Packaging Film	5.50%	2.03%	8.98%	0.02kg	0.01kg	0.03kg
Textiles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Shoes	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Clear	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Brown	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.21%	0.00%	0.57%	0.00kg	0.00kg	0.00kg
Untreated Wood	0.31%	0.00%	0.84%	0.00kg	0.00kg	0.00kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	2.36%	0.69%	4.03%	0.01kg	0.00kg	0.01kg
Other Misc. Combustibles	0.89%	0.13%	1.64%	0.00kg	0.00kg	0.00kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	0.42%	0.00%	1.40%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Non Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
White Goods	0.65%	0.00%	1.42%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	3.08%	0.00%	12.00%	0.01kg	0.00kg	0.03kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	2.39%	0.00%	5.41%	0.01kg	0.00kg	0.02kg
Household Batteries	0.20%	0.00%	1.83%	0.00kg	0.00kg	0.01kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	1.30%	0.00%	4.24%	0.00kg	0.00kg	0.01kg
Identifiable Clinical Waste	1.87%	0.00%	4.92%	0.01kg	0.00kg	0.01kg
Garden Waste	3.17%	0.00%	6.41%	0.01kg	0.00kg	0.02kg
Soil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	3.46%	0.00%	6.98%	0.01kg	0.00kg	0.02kg
Non-Home Comp Kitchen Waste	12.23%	0.00%	28.52%	0.04kg	0.00kg	0.08kg
Fines (Less than 10 mm)	0.23%	0.03%	0.44%	0.00kg	0.00kg	0.00kg
Total	100.00%			0.29kg	0.03kg	0.60kg

Table 9 Composition of Kerbside Collected Household Compostable Waste (per Household) (Collected)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	0.27%	0.00%	1.97%	0.01kg	0.00kg	0.05kg
Magazines	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Recyclable Paper	0.27%	0.00%	1.99%	0.01kg	0.00kg	0.06kg
Paper Packaging	0.01%	0.00%	0.04%	0.00kg	0.00kg	0.00kg
Non-Recyclable Paper	0.01%	0.00%	0.05%	0.00kg	0.00kg	0.00kg
Liquid Cartons	0.00%	0.00%	0.02%	0.00kg	0.00kg	0.00kg
Board Packaging	0.05%	0.00%	0.34%	0.00kg	0.00kg	0.01kg
Card Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Card	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Plastic Bottles	0.02%	0.00%	0.11%	0.00kg	0.00kg	0.00kg
Dense Plastic Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Dense Plastic	0.01%	0.00%	0.05%	0.00kg	0.00kg	0.00kg
Other Plastic Film	0.01%	0.00%	0.19%	0.00kg	0.00kg	0.01kg
Packaging Film	0.16%	0.00%	1.15%	0.00kg	0.00kg	0.03kg
Textiles	0.01%	0.00%	0.04%	0.00kg	0.00kg	0.00kg
Shoes	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Clear	0.07%	0.00%	0.54%	0.00kg	0.00kg	0.02kg
Glass Bottles & Jars - Brown	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Untreated Wood	0.09%	0.00%	0.62%	0.00kg	0.00kg	0.02kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Combustibles	0.21%	0.00%	1.53%	0.01kg	0.00kg	0.04kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	0.15%	0.00%	1.08%	0.00kg	0.00kg	0.03kg
Food Cans	0.00%	0.00%	0.03%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.03%	0.00kg	0.00kg	0.00kg
Other Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Non Ferrous Metal	0.00%	0.00%	0.01%	0.00kg	0.00kg	0.00kg
White Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Household Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Identifiable Clinical Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Garden Waste	90.86%	33.96%	147.76%	2.53kg	0.95kg	4.11kg
Soil	4.99%	0.00%	36.62%	0.14kg	0.00kg	1.02kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	1.82%	0.00%	12.59%	0.05kg	0.00kg	0.35kg
Non-Home Comp Kitchen Waste	1.01%	0.00%	7.39%	0.03kg	0.00kg	0.21kg
Fines (Less than 10 mm)	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Total	100.00%			2.78kg	0.95kg	5.96kg

Table 10 Composition of Kerbside Collected Household Compostable Waste (per Household) (Recycled)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Magazines	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Recyclable Paper	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Paper Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Non-Recyclable Paper	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Liquid Cartons	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Board Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Card Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Card	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Plastic Bottles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Dense Plastic Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00gkg
Other Dense Plastic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Plastic Film	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Packaging Film	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Textiles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Shoes	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Clear	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Brown	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Untreated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Combustibles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Non Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
White Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Household Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Identifiable Clinical Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Garden Waste	94.81%	61.91%	127.70%	2.49kg	1.63kg	3.36kg
Soil	5.19%	0.00%	38.09%	0.14kg	0.00kg	1.00kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Non-Home Comp Kitchen Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Fines (Less than 10 mm)	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Total	100.00%			2.63kg	1.63kg	4.36kg

Table 11 Composition of Kerbside Collected Household Compostable Waste (per Household) (Contamination)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	14.83%	0.00%	108.81%	0.02kg	0.00kg	0.17kg
Magazines	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Recyclable Paper	10.67%	0.00%	78.28%	0.02kg	0.00kg	0.12kg
Paper Packaging	0.05%	0.00%	0.35%	0.00kg	0.00kg	0.00kg
Non-Recyclable Paper	0.08%	0.00%	0.62%	0.00kg	0.00kg	0.00kg
Liquid Cartons	0.02%	0.00%	0.18%	0.00kg	0.00kg	0.00kg
Board Packaging	0.69%	0.00%	5.05%	0.00kg	0.00kg	0.01kg
Card Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Card	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Plastic Bottles	0.15%	0.00%	1.06%	0.00kg	0.00kg	0.00kg
Dense Plastic Packaging	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Dense Plastic	0.33%	0.00%	2.41%	0.00kg	0.00kg	0.00kg
Other Plastic Film	7.10%	0.00%	116.76%	0.01kg	0.00kg	0.18kg
Packaging Film	2.44%	0.00%	17.89%	0.00kg	0.00kg	0.03kg
Textiles	0.39%	0.00%	2.86%	0.00kg	0.00kg	0.00kg
Shoes	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Green	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Glass Bottles & Jars - Clear	0.68%	0.00%	5.01%	0.00kg	0.00kg	0.01kg
Glass Bottles & Jars - Brown	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Glass	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Treated Wood	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Untreated Wood	1.02%	0.00%	7.45%	0.00kg	0.00kg	0.01kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Combustibles	2.49%	0.00%	18.25%	0.00kg	0.00kg	0.03kg
Carpet and Underlay	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Construction and Demolition	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Misc. Non-combustibles	1.37%	0.00%	10.04%	0.00kg	0.00kg	0.02kg
Food Cans	0.13%	0.00%	0.99%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.03%	0.00%	0.25%	0.00kg	0.00kg	0.00kg
Other Ferrous Metal	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Food Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Beverage Cans	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Non Ferrous Metal	0.04%	0.00%	0.33%	0.00kg	0.00kg	0.00kg
White Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Large Electronic Goods	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Household Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Car Batteries	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Identifiable Clinical Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Garden Waste	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Soil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Organic	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Home Compostable Kitchen Waste	48.13%	0.00%	222.14%	0.07kg	0.00kg	0.34kg
Non-Home Comp Kitchen Waste	9.35%	0.00%	68.61%	0.01kg	0.00kg	0.10kg
Fines (Less than 10 mm)	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Total	100.00%			0.15kg	0.00kg	1.02kg

Table 12 Average Composition of all Kerbside Collected Household Waste (per Household)

Categories	Mean	Lower bound	Upper bound	Mean	Lower bound	Upper bound
Newspapers	12.22%	9.24%	15.20%	2.10kg	1.59kg	2.61kg
Magazines	3.87%	0.95%	6.78%	0.66kg	0.16kg	1.17kg
Other Recyclable Paper	4.76%	3.64%	5.89%	0.82kg	0.62kg	1.01kg
Paper Packaging	0.24%	0.02%	0.47%	0.04kg	0.00kg	0.08kg
Non-Recyclable Paper	2.20%	1.65%	2.75%	0.38kg	0.28kg	0.47kg
Liquid Cartons	0.44%	0.13%	0.75%	0.08kg	0.02kg	0.13kg
Board Packaging	2.55%	1.91%	3.19%	0.44kg	0.33kg	0.55kg
Card Packaging	3.65%	3.00%	4.29%	0.63kg	0.52kg	0.74kg
Other Card	0.03%	0.01%	0.06%	0.01kg	0.00kg	0.01kg
Plastic Bottles	4.52%	2.60%	6.44%	0.78kg	0.45kg	1.11kg
Dense Plastic Packaging	2.48%	1.37%	3.60%	0.43kg	0.24kg	0.62kg
Other Dense Plastic	0.88%	0.02%	1.74%	0.15kg	0.00kg	0.30kg
Other Plastic Film	3.38%	2.42%	4.35%	0.58kg	0.42kg	0.75kg
Packaging Film	2.03%	1.23%	2.83%	0.35kg	0.21kg	0.49kg
Textiles	1.73%	0.97%	2.49%	0.30kg	0.17kg	0.43kg
Shoes	0.52%	0.16%	0.88%	0.09kg	0.03kg	0.15kg
Glass Bottles & Jars - Green	2.08%	0.35%	3.81%	0.36kg	0.06kg	0.65kg
Glass Bottles & Jars - Clear	2.50%	0.24%	4.77%	0.43kg	0.04kg	0.82kg
Glass Bottles & Jars - Brown	1.41%	0.41%	2.41%	0.24kg	0.07kg	0.41kg
Other Glass	0.11%	0.00%	0.24%	0.02kg	0.00kg	0.04kg
Treated Wood	0.31%	0.00%	0.73%	0.05kg	0.00kg	0.12kg
Untreated Wood	0.28%	0.06%	0.50%	0.05kg	0.01kg	0.09kg
Furniture	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Disposable Nappies	4.37%	3.68%	5.06%	0.75kg	0.63kg	0.87kg
Other Misc. Combustibles	0.44%	0.00%	1.04%	0.08kg	0.00kg	0.18kg
Carpet and Underlay	0.37%	0.00%	0.91%	0.06kg	0.00kg	0.16kg
Construction and Demolition	0.78%	0.00%	1.85%	0.13kg	0.00kg	0.32kg
Other Misc. Non-combustibles	1.44%	0.00%	3.03%	0.25kg	0.00kg	0.52kg
Food Cans	0.98%	0.45%	1.50%	0.17kg	0.08kg	0.26kg
Beverage Cans	0.71%	0.33%	1.09%	0.12kg	0.06kg	0.19kg
Other Ferrous Metal	0.52%	0.26%	0.78%	0.09kg	0.04kg	0.13kg
Food Cans	0.37%	0.18%	0.56%	0.06kg	0.03kg	0.10kg
Beverage Cans	0.26%	0.14%	0.38%	0.04kg	0.02kg	0.07kg
Other Non Ferrous Metal	0.57%	0.46%	0.67%	0.10kg	0.08kg	0.12kg
White Goods	0.98%	0.00%	2.66%	0.17kg	0.00kg	0.46kg
Large Electronic Goods	0.04%	0.00%	0.14%	0.01kg	0.00kg	0.02kg
TV's and Monitors	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other WEEE	0.42%	0.11%	0.73%	0.07kg	0.02kg	0.13kg
Household Batteries	0.03%	0.00%	0.05%	0.00kg	0.00kg	0.01kg
Car Batteries	0.03%	0.00%	0.07%	0.01kg	0.00kg	0.01kg
Engine Oil	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Asbestos	0.00%	0.00%	0.00%	0.00kg	0.00kg	0.00kg
Other Potentially Hazardous	0.12%	0.00%	0.24%	0.02kg	0.00kg	0.04kg
Identifiable Clinical Waste	0.23%	0.00%	0.56%	0.04kg	0.00kg	0.10kg
Garden Waste	7.56%	0.30%	14.81%	1.30kg	0.05kg	2.54kg
Soil	0.82%	0.00%	1.75%	0.14kg	0.00kg	0.30kg
Other Organic	0.35%	0.00%	1.34%	0.06kg	0.00kg	0.23kg
Home Compostable Kitchen Waste	9.31%	2.39%	16.23%	1.60kg	0.41kg	2.79kg
Non-Home Comp Kitchen Waste	16.26%	8.44%	24.07%	2.79kg	1.45kg	4.14kg
Fines (Less than 10 mm)	0.86%	0.09%	1.62%	0.15kg	0.02kg	0.28kg
Total	100.00%			17.18kg	8.11kg	26.68kg

Table 13 CA Sites in Northern Ireland – Recyclable Waste Generated and Composition

	Waste Generated (Tonnes per annum)	Waste Composition
Aluminum cans	0.86	0.00%
Automotive batteries	688.18	0.53%
Books	1.99	0.00%
Brown glass	249.84	0.19%
Card	4,612.00	3.56%
Clear glass	647.57	0.50%
Flouresent tubes	48.50	0.04%
Fridges & freezers	2,394.34	1.85%
Green glass	829.44	0.64%
Green waste only	56,300.58	43.40%
Mineral oil	362.87	0.28%
Mixed cans	137.89	0.11%
Mixed glass	5,085.44	3.92%
Mixed paper and card	509.62	0.39%
Other compostable waste	802.61	0.62%
Other electrical goods	4,207.68	3.24%
Other materials	2,285.40	1.76%
Other scrap metal	12,888.51	9.94%
Other white goods	660.90	0.51%
Paint	341.41	0.26%
Paper	2,659.88	2.05%
Plastics	387.39	0.30%
Post consumer non automotive batteries	9.13	0.01%
Rubble	8,970.90	6.92%
Steel cans	0.25	0.00%
Textiles & footwear	1,652.41	1.27%
Vegetable Oil	57.90	0.04%
Wood	22,930.12	17.68%
Total	129,723.59	100.00%

Table 14 CA Sites in Northern Ireland – Residual Waste Generation and Composition

	Waste Generated (Tonnes per annum)	Waste Composition
Paper	12,094.38	6.75%
Card	9,371.50	5.23%
Dense Plastic	12,866.11	7.18%
Plastic film	6,645.83	3.71%
Textiles and shoes	10,160.17	5.67%
Clear Glass Bottles and Jars	2,298.06	1.28%
Brown Glass Bottles and Jars	911.81	0.51%
Green & Blue Glass Bottles and Jars	1,304.57	0.73%
Other Glass	1,131.80	0.63%
Disposable Nappies	2,368.77	1.32%
Furniture	2,251.27	1.26%
Wood	7,792.13	4.35%
MDF, board etc	1,740.16	0.97%
Chipboard	7,758.85	4.33%
Hardboard	1,339.92	0.75%
Laminated Flooring	1,276.50	0.71%
Carpets and Underlay	9,771.18	5.45%
Soft Furnishings	18,308.75	10.21%
Other Misc. Combustibles	21.39	0.01%
DIY & Other Misc. Non-Combustibles	11,115.74	6.20%
Other Misc. Non-Combustibles	1,111.06	0.62%
All Ferrous Metal	1,673.58	0.93%
All Non- Ferrous Metal	2,558.41	1.43%
Small WEEE	1,170.19	0.65%
Large WEEE	0.00	0.00%
TV's and monitors	289.20	0.16%
All HHW	643.73	0.36%
Garden Waste	8,124.50	4.53%
Soil	2,692.50	1.50%
Other Organic	6,067.87	3.38%
Food Waste	31,797.70	17.74%
Fines (Less than 10mm)	2,610.94	1.46%
Total	179,268.56	100.00%

Table 15 Summary of the Total Municipal Waste Composition for Northern Ireland

	Mean (%)	Lower bound (%)	Upper bound (%)
Paper	15.93%	0.00%	38.61%
Card	5.10%	0.43%	9.77%
Dense Plastic	3.94%	0.00%	7.94%
Plastic Film	2.09%	0.00%	5.15%
Textiles	4.27%	0.00%	9.76%
Glass	14.59%	0.00%	39.11%
Miscellaneous Combustibles	9.19%	0.00%	20.79%
Miscellaneous Non-Combustibles	4.26%	0.61%	7.90%
Ferrous Metal	1.87%	0.07%	3.66%
Non-Ferrous Metal	1.55%	0.00%	3.25%
WEEE	1.36%	0.00%	3.44%
HHW	0.31%	0.00%	0.73%
Organic Non-Catering	25.77%	0.00%	64.15%
Organic Catering	9.34%	0.00%	24.53%
Fines	0.44%	0.00%	1.09%

Table 16 Summary of the Total Municipal Waste Arisings for Northern Ireland

	Mean (kg)	Lower bound (kg)	Upper bound (kg)
Paper	144,885.10	0.00	351,140.27
Card	46,388.02	3,926.64	88,849.40
Dense Plastic	35,788.69	0.00	72,220.61
Plastic Film	18,993.08	0.00	46,841.57
Textiles	38,788.68	0.00	88,713.17
Glass	132,668.43	0.00	355,677.81
Miscellaneous Combustibles	83,554.23	0.00	189,056.08
Miscellaneous Non-Combustibles	38,703.92	5,543.56	71,864.29
Ferrous Metal	16,962.82	648.98	33,276.65
Non-Ferrous Metal	14,065.64	0.00	29,583.60
WEEE	12,378.80	0.00	31,284.13
HHW	2,864.30	0.00	6,669.12
Organic Non-Catering	234,383.15	0.00	583,322.92
Organic Catering	84,962.85	0.00	223,034.65
Fines	3,971.93	0.00	9,921.48
Totals	909,359.64	10,119.18	2,181,455.75

Table 17 BMW percentage calculation of waste separately collected for recycling at CA Sites (from WDF)

Waste Categories	Total Annual Tonnage from WDF	% Composition	% Biodegradable Content	% Biodegradable Content	Total Tonnage Biodegradable
Aluminum cans	0.86	0.0%	0%	0.0%	0.00
Aluminum foil	0.00	0.0%	0%	0.0%	0.00
Automotive batteries	688.18	0.5%	0%	0.0%	0.00
Books	1.99	0.0%	0%	0.0%	0.00
Brown glass	249.84	0.2%	0%	0.0%	0.00
Card	4612.00	3.6%	100%	3.6%	4,612.00
Clear glass	647.57	0.5%	0%	0.0%	0.00
Co-mingled materials	0.00	0.0%	0%	0.0%	0.00
Fluorescent tubes	48.50	0.0%	0%	0.0%	0.00
Fridges & freezers	2394.34	1.8%	0%	0.0%	0.00
Green glass	829.44	0.6%	0%	0.0%	0.00
Green waste only	56300.58	43.4%	100%	43.4%	56,300.58
Mineral oil	362.87	0.3%	0%	0.0%	0.00
Mixed cans	137.89	0.1%	0%	0.0%	0.00
Mixed glass	5085.44	3.9%	0%	0.0%	0.00
Mixed paper and card	509.62	0.4%	100%	0.4%	509.62
Other compostable waste	802.61	0.6%	100%	0.6%	802.61
Other electrical goods	4207.68	3.2%	0%	0.0%	0.00
Other materials	2285.40	1.8%	0%	0.0%	0.00
Other scrap metal	12888.51	9.9%	0%	0.0%	0.00
Other white goods	660.90	0.5%	0%	0.0%	0.00
Paint	341.41	0.3%	0%	0.0%	0.00
Paper	2659.88	2.1%	100%	2.1%	2,659.88
Plastics	387.39	0.3%	0%	0.0%	0.00
Post consumer non automotive batteries	9.13	0.0%	0%	0.0%	0.00
Rubble	8970.90	6.9%	0%	0.0%	0.00
Steel cans	0.25	0.0%	0%	0.0%	0.00
Textiles & footwear	1652.41	1.3%	50%	0.6%	826.205
Vegetable Oil	57.90	0.0%	100%	0.04%	57.90
Wood	22930.12	17.7%	100%	17.7%	22,930.12
TOTAL	129723.59	100.00%		68.38%	88,698.91

Table 18 Summary Amounts and Percentage of BMW for waste accepted at CA Site facilities in Northern Ireland

	Total tonnage WDF	% BMW	Biodegradability Tonnage	% of MSW in NI
CA Site residual	179,268.56	46.83%	83,943.66	16.85%
CA Site recyclable	129,723.59	68.38%	88,704.99	12.19%
All CA Site waste	308,992.15	55.87%	172,648.65	29.04%