MWH

BUILDING A BETTER WORLD

Nelson - Tasman SWAP Studies 2012

Prepared for Nelson City Council and Tasman District Council

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Nelson - Tasman SWAP Studies 2012

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1 Introduction

In September 2011 Nelson City Council secured funding from the Ministry for the Environment (MfE) to undertake waste composition surveys for Nelson City Council and Tasman District Council as part of the Councils' on-going investigations to assess the potential use of anaerobic digestion technology for the recovery and recycling of organic waste within the district.

As stated in the deed of funding, the purpose of the project is to "inform and empower joint waste planning for increased and improved recycling and recovering activity through common and consistent data on waste composition in two adjoining Council areas"[1].

The project consists of the following five key stages (as agreed by MfE):

1. Solid waste analysis protocol (SWAP) survey design for three locations feeding two landfill sites.
2. Execution and reporting of two rounds of surveys.
3. Determining the economic feasibility and environmental impact of anaerobic digestion.
4. Development of joint procurement plans for new waste collection, separation and disposal systems.
5. Sharing information and experience gained through this project with other Councils.

In October 2011 the first stage was completed by MWH and the report 'Waste Composition Survey Stage 1 Survey Design' was submitted to MfE by Johan Thiart (Nelson City Council).

In March 2012 the second stage commenced with the first round of SWAP surveys undertaken between 12 March and 4 April. The second round of SWAP surveys was undertaken between 4 November and 28 November.

In addition to providing data for this project, the SWAP surveys will also allow Nelson City Council and Tasman District Council to assess current waste practices and assist with the following:

- implementation of the joint Council Waste Management and Minimisation Plan
- introduction of waste minimisation initiatives
- procurement of new waste collection/ separation and disposal systems
- applying for permission to use a unique emission factor (UEF) under the new NZ Emissions trading scheme (ETS).

The SWAP surveys undertaken as part of this project are in accordance with the NZ ETS requirements and the MfE Solid Waste Analysis Protocol publication[2].

2 Scope

This report is to satisfy Stage 2 of the MfE deed of funding.

The scope of this report is to:

- provide a summary of the data recorded during the SWAP studies in 2012,
- assess the precision achieved by the studies, and
- compare the results between sites, council areas, overtime and with the National Indicator Sites.

[1] Ministry for the Environment (2011), Deed of Funding, MfE, NZ
[2] Ministry for the Environment (2002), Solid Waste Analysis Protocol, MfE, NZ

3 Survey Execution

For waste planning purposes it is important that the approaches to waste composition analysis are standardised between Councils so that results recorded can be compared. To ensure this, the sampling and sorting procedures described in procedure 2 of the MfE Solid Waste Analysis Protocol publication and included in the 'Waste Composition Survey Stage 1 Survey Design' report have been used at all sites as part of the surveys.

SWAP surveys were carried out at the following sites:

- York Valley landfill in Nelson City
- Richmond Resource Recovery Centre (RRC) in Tasman District
- Mariri Resource Recovery Centre (RRC) in Tasman District

These sites were selected as the best locations to sample and assess the waste streams in the two council areas. The following sections provide a summary of the methodology that was undertaken by MWH and highlights some of the site specific procedures adopted.

3.1 Survey Periods

The first round of SWAP surveys were undertaken between 12 March and 4 April 2012 and the second round of SWAP surveys were undertaken between 5 November and 28 November 2012. The following table shows the survey period at each site.

Table 3-1: Survey Periods in 2012

Site	First Round	Second Round
York Valley Landfill	12 – 17 March	5 – 10 November
Richmond RRC	21 – 27 March	13 – 19 November
Mariri RRC	29 March – 4 April	22 – 28 November

The surveys were carried out during site operational hours, shown in Table 3-2 below.

Table 3-2: Site Operational Hours

Site	Opening Hours
York Valley Landfill	8.00am - 4.30pm Monday to Friday, and 12noon - 4.00pm on Saturday. This site is closed on Sunday.
Richmond RRC	8.00am to 5.00pm, Monday to Sunday inclusive
Mariri RRC	9.00 am to 4.00pm, Monday to Saturday and 1.00pm to 4.00pm on Sunday

3.2 Staffing

In addition to one MWH staff member being on site at all times, the surveys were undertaken by three other staff who were familiar with waste having previously worked on the sorting lines were provided by Allied Work Force through a local waste operator, Nelmac. These staff received onsite training in the following areas, prior to the surveys commencing:

- purpose and objectives of the survey
- survey procedures
- waste classifications and categorisation of common and multi-material wastes
- familiarisation with site and equipment
- dealing with the users of the landfill site or RRCs, including confidentiality issues
- emergency procedures.

The previous experience of the Allied Work Force staff was beneficial in ensuring that correct sorting procedures were followed and in being able to categorise materials into their different categories. It also

meant that staff had an awareness of why they were involved in the project. The same staff were used for both rounds of surveys, with an addition staff member provided by Allied Work Force staff on a standby basis in case needed.

3.3 Health and Safety

To ensure health and safety was maintained throughout the project, all staff were also required to complete a health and safety induction from the site operators prior to commencing work on site. All waste samplers were required to have up to date relevant inoculations. A first aid kit was available to the survey team, along with antiseptic soap and water for washing.

Care had to be taken around site machinery as the sampling procedure involved working closely with the excavator or loader. Everyone looked out for each other well and no major incidents occurred during either survey period.

3.4 Equipment

The following equipment was used to undertake the survey:

- electronic weigh bars scale (accurate to 0.1kg)
- gazebo for weather protection
- heavy duty plastic sheeting
- vehicle for transport and running the scales
- brush and shovels for sorting through waste and cleaning the sorting area at the end of the day
- waste containers / recycling bins to place material in after it has been sorted
- appropriate personal protective equipment, including gloves, safety clothing, dust masks, glasses, high visibility vests, safety footwear etc.
- hand wipes and other cleaning products
- first aid kit.

Shovels were borrowed from the site operators and a loader / excavator used by the site operator to provide assistance in moving large items and sampling loads.

3.5 Sampling Regimes and Data Collected

The number of vehicles intended to be surveyed at each site was determined prior to the surveys commencing. A copy of the sampling regimes designed for York Valley Landfill, Richmond RRC, and Mariri RRC are included in Appendix A. These sampling regimes detailed the number of cars, domestic rubbish bag trucks, skips and 'other trucks' to be sampled at each site and the frequency of selection of vehicles.

The sampling regimes were reviewed between the first and second rounds of survey but were not altered as sufficient numbers of each vehicle type were being surveyed.

Data was recorded by filling out pre-prepared data sheets which requested the following information:

- vehicle ID number (given by the site operator)
- time
- day
- type of vehicle
- the source of the waste (municipal solid waste / commercial and industrial / building and demolition / other sources)
- the weight of each of the subcategories of waste.

The site sheets were modified from those provided in the 'Waste Composition Survey Stage 1 Survey Design' report to allow for all the main categories and sub categories highlighted in section 3.7 to be recorded separately. The site sheets were also modified slightly between surveys to make it easier for the survey team to record vehicle details. Specific regular vehicle types and customers recorded during the first round were pre-loaded into the form and could be 'ticked' rather than entering the data separately every time. These changes worked well and allowed the data collected on site to be easily matched with the weighbridge data. Examples of the revised forms that were used are provided in Appendix B.

The following information was provided by Nelson City Council and Tasman District Council from the weighbridge records for each vehicle:

- the total weight of the vehicle
- tare weight
- net weight of the vehicle.

3.6 Sampling

Details of the sampling procedures used at each site are provided in sections 3.6.1 – 3.6.3 below.

3.6.1 York Valley Landfill

The first York Valley Landfill SWAP survey was undertaken from Monday 12 March to Saturday 17 March 2012 inclusive and the second was undertaken from Monday 5 November to Saturday 10 November 2012 inclusive.

The waste was sorted within a designated area close to the active tipping face but away from daily operations. The location had to be moved between the first and second surveys due to the fact that landfill operations had progressed to a different part of the landfill. Figures 3-1 and 3-2 show the location and setup at York Valley Landfill during each survey period.

Figure 3-1: SWAP sampling location at York Valley Landfill

Figure 3-2: Sampling at York Valley Landfill

The sorting area was close to the tipping face so that material could be placed in a pile after analysis and disposed of into the landfill on an on-going basis by the site operator. The surveys impacted slightly on the daily operations of the site but the site operator worked well with the survey team to ensure a 'representative' sample was obtained from sampled vehicles.

York Valley Landfill is not open to the general public and therefore the types of vehicles using the site were limited to truck and trailer units, compactor trucks, open trucks or skip trucks. In general, material from the Nelson City Council Pascoe Street Transfer Station arrived in a compactor bin, municipal and light commercial waste arrived in compactor trucks, and industrial and building material arrived in skips. Figure 3-3 shows examples of some of the vehicle types sampled.

Figure 3-3: A typical compactor bin and compactor truck arriving at York Valley Landfill

To limit the impact on daily operations, customers using the site deposited their waste as normal. A member of the survey team approached the selected vehicle and obtained the driver's weighbridge tag details so the data collected could be compared to the weighbridge data at a later stage.

A representative sample of the waste deposited was then collected by the site operator using the excavator bucket and taken to the sorting area for analysis.

Figure 3-4: Excavator and compactor used at York Valley Landfill

At the sorting area, the load was tipped onto a plastic sheet and from here was moved onto the table where it was sorted and weighed. The use of the plastic sheet allowed the fines to be brushed up at the end of each sampling and sorted into their appropriate categories.

Figure 3-5 Sample placed on plastic sheet to allows fines to be collected

To ensure that sufficient numbers of vehicles were sampled, up to four separate loads were stored at the sorting area at any one time. This approach worked well and ensured there was always material available for sorting. The sampling location meant that the survey team could work closely with the site operator and ensure the survey worked as efficiently as possible.

3.6.2 Richmond RRC

The first Richmond RRC SWAP survey was undertaken from Wednesday 21 March to Tuesday 27 March 2012 inclusive and the second was undertaken from Tuesday 13 November to Monday 19 November 2012 inclusive.

Waste was sorted on the concrete pad on the southern side of the tipping pit. This area is not open to the public and commercial trucks.

Figure 3-6: Sampling location at Richmond RRC

At the Richmond RRC, large vehicles entering the site are required to be weighed or produce a weighbridge docket before disposing of any material. The vehicle registration number of any sampled vehicles was recorded so that the data collected could be compared to the weighbridge records.

Generally domestic vehicles are not weighed at the Richmond RRC and therefore during the first round of surveys 100% of the load from selected domestic vehicles was analysed. Temporary changes to the traffic layout at the Richmond RRC were made during the second round of surveys to require all vehicles to be weighed in and out of the site. This allowed for representative samples to be taken from domestic vehicles as well as commercial vehicles.

Figure 3-7: Vehicles arriving at Richmond RRC

The types of large vehicles using the site were similar to those seen at the York Valley Landfill with some vehicles using both the York Valley Landfill and the Richmond RRC sites. In general, the large vehicles were either compactor trucks, open trucks or skip trucks. Municipal and light commercial waste

typically arrived in compactor trucks, and industrial and building material arrived in open trucks or skips. Domestic vehicles included cars, vans, utes and trailers.

To limit the impact on daily operations, customers using the site deposited their waste as normal into the tipping pit as shown in Figure 3-8.

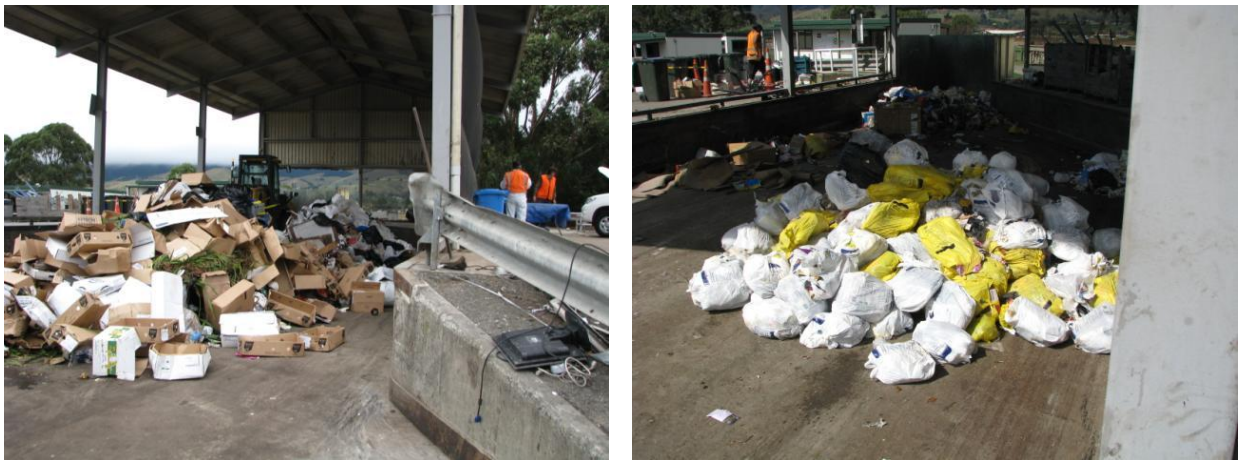

Figure 3-8: Material deposited in the pit at Richmond RRC

Once the waste was in the tipping pit a 'representative' sample was taken by the site operator using the loader bucket and brought over to the sorting area for analysis. The location of the sorting area allowed for the easy disposal of waste back into the tipping pit after analysis.

Figure 3-9: Examples of samples taken at Richmond RRC

Initially at the sorting area, the load sample was tipped onto a plastic sheet and then moved onto the table where it was sorted and weighed. A number of seagulls visit the Richmond RRC site and so the procedure had to be changed and the sample deposited directly onto the concrete pad and covered with the plastic sheet to keep the gulls away. Covering the material with the sheet also helped to limit the amount of litter generated on windy days. The fines were still easily brushed up from the concrete pad at the end of each sampling and sorted into their appropriate categories.

Up to three separate loads were stored at the sorting area to ensure that sufficient numbers of vehicles were sampled and that there was always materials available for sorting. This approach worked well and the sampling location meant that the survey team could work closely with the site operator. The need for the loader to be used for other tasks around the site meant that the site operator was not always available to take samples. When this situation arose, the sampling team would need to enter the tipping pit to collect a sample as shown in Figure 3-10. This was not always possible due to the nature of the material deposited or other vehicles arriving. If a sample could not be taken prior to other material being deposited on top, this vehicle was not sampled. The pit was cleared as soon as was practicable and the next available vehicle was then sampled. This generally affected domestic vehicle sampling rather than the commercial trucks as the pit was often cleared ahead of a large load arriving.

Figure 3-10: Sampling by survey team at Richmond RRC

While the gazebo provided good protection from the sun it had to be weighted down during windy days and did not stop material from the sorting area being blown away. A number of litter collections had to be undertaken during windy days to ensure the area remained tidy.

3.6.3 Mariri RRC

The first Mariri RRC SWAP survey was undertaken from Thursday 29 March to Wednesday 4 April 2012 inclusive and the second was undertaken from Thursday 22 November to Wednesday 28 November 2012 inclusive.

The waste was sorted on a concrete pad on the western side of the tipping pit and this area was closed off to the public during the survey. This area also allowed easy disposal of waste back into the pit after analysis.

Figure 3-11: SWAP sampling location at Mariri RRC

Like Richmond, large vehicles entering the Mariri RRC are required to be weighed or produce a weighbridge docket before disposing of any material. The vehicle registration number of any sampled vehicles was recorded so that the data collected could be compared to the weighbridge records at a later stage. Domestic vehicles are not currently weighed at the Mariri RRC and it was not practical to change the traffic layout at this site to weigh all vehicles in and out. 100% of the load from selected domestic vehicles was therefore analysed during both surveys.

The types of large vehicles using the site were similar to those seen at the York Valley Landfill and Richmond RRC site, although there are generally more transactions of smaller loads at Mariri RCC. Figure 3-12 shows some of the commercial vehicles using the site.

Figure 3-12: Commercial vehicles arriving at Mariri RRC

To limit the impact on daily operations, customers using the site deposited their waste as normal into the tipping pit as shown in Figure 3-13.

Figure 3-13: Material deposited in the pit at Mariri RRC

Once the waste was in the tipping pit a 'representative' sample, or the entire load for selected domestic vehicles, was taken by the site operator using the excavator and brought over to the sorting area for analysis.

Figure 3-14: Examples of samples taken at Mariri RRC

To ensure that sufficient numbers of vehicles were sampled and that there was always material available for sorting, up to four separate loads could be stored at the sorting area. Loads were covered with plastic sheeting to minimise the amount of flies and bees attracted to the material. This approach worked well and the sampling location meant that the survey team could work closely with the site operator.

The need for the operator to undertake other tasks around the site meant that the site operator was not always available to take samples. When this situation arose the sampling team would need to enter the tipping pit to collect a sample. This was not always possible due to nature of material deposited and the fact that Mariri is a busy site so other vehicles would soon arrive and cover over the load to be sampled. As at Richmond RRC, if a sample could not be taken prior to other material being deposited on top, this vehicle was not sampled. The pit was cleared as soon as was practicable and the next available vehicle was then sampled.

3.7 Classifications

Once a representative sample had been taken by the site operator, the samples were sorted into designated crates or wheelie bins, lifted onto the digital scales and the weight recorded at the end of the sample, or when full.

Figure 3-15: Material being separated into its individual categories

To ensure that the data collected can be used for as many applications as possible in the future, the samples were sorted into the following 20 categories and then combined back into the 14 main categories for reporting purposes here.

Table 3-3: Waste Categories

Main categories	Subcategories
Cardboard	
Ferrous metals	Steel cans Other ferrous metals
Putrescibles - Food waste	
Putrescibles - Garden waste	
Glass	
Nappies and sanitary	
Non-ferrous metals	Aluminium cans Other non-ferrous metals
Paper	Newsprint, Office paper Other paper
Plastics	Type 1 plastics Type 2 plastics Other plastics
Potentially hazardous	
Rubber	
Rubble / concrete / soil / polystyrene	
Textiles	
Timber	

Any waste identified as potentially hazardous was only handled if it was safe to do so (such as batteries, paint, chemical containers etc.). Bags received from medical facilities or nursing homes containing drips and colostomy bags were not sorted and the whole bag was classified as 'potentially hazardous'.

4 Results

4.1 Sample size

As part of the autumn round of SWAP surveys (March/April) there were 217 vehicles sampled out of the 221 intended to be sampled as set out in the sampling regimes in Appendix A. The number of vehicles sampled at each site is set out in Table 4-1 below. The average amount of material analysed during the autumn survey round was 168kg per vehicle.

Table 4-1: Summary of Sampling during Autumn Surveys

Site	Number of vehicles sampled	Intended number of vehicles to be sampled	Total sample weight
York Valley Landfill	81	91	16,074
Richmond RRC	78	70	14,037
Mariri RRC	58	60	6,430

As part of the spring round of SWAP surveys (November) there were 360 vehicles sampled. The number of vehicles sampled at each site is set out in Table 4-2 below. The average amount of material analysed during the spring survey round was 118kg per vehicle.

Table 4-2: Summary of Sampling during Spring Surveys

Site	Number of vehicles sampled	Intended number of vehicles to be sampled	Total sample weight
York Valley Landfill	94	91	17,620
Richmond RRC	130	70	12,848
Mariri RRC	136	60	11,914

The number of each vehicle type using each site and the total number sampled at each site is shown in Table 4-3 and 4-4. So that the survey data can be easily compared with the gate records the vehicle descriptions used in this report are those used in the weighbridge software at each site, therefore the vehicle types recorded vary slightly between Nelson City and Tasman District.

Table 4-3: Summary of Vehicles during Survey – Nelson City

		Nelson City (York Valley Landfill)	
		No. of vehicles using the site	No. of vehicles sampled
Autumn Survey Period	Compactor	83	29
	Open Truck	32	8
	Skips and Mini Bins	78	31
	Transfer Station	15	12
	Truck & Trailer	3	1
Spring Survey Period	Compactor	95	42
	Open Truck	30	21
	Skips and Mini Bins	72	20
	Transfer Station	13	7
	Truck & Trailer	4	4
Combined Survey Period	Compactor	178	71
	Open Truck	62	29
	Skips and Mini Bins	150	51
	Transfer Station	28	19
	Truck & Trailer	7	5

Table 4-4: Summary of Vehicles during Survey - Tasman District

		Richmond RRC		Mariri RRC		Tasman District Total	
		No. of vehicles using the site	No. of vehicles sampled	No. of vehicles using the site	No. of vehicles sampled	No. of vehicles using the sites	No. of vehicles sampled
Autumn Survey Period	Compactor	55	31	30	8	85	39
	Domestic Vehicle	162	22	176	17	338	39
	Domestic Vehicle & Trailer	166	5	132	4	298	9
	Open truck	18	4	20	7	38	11
	Skip and Mini Bins	40	16	36	22	76	38
Spring Survey Period	Compactor	62	49	47	27	109	76
	Domestic Vehicle	177	31	246	65	423	96
	Domestic Vehicle & Trailer	142	21	182	8	324	29
	Open truck	27	8	17	18	44	26
	Skip and Mini Bins	73	21	85	18	158	39
Combined Survey Period	Compactor	117	80	77	35	194	115
	Domestic Vehicle	339	53	422	82	761	135
	Domestic Vehicle & Trailer	308	26	314	12	622	38
	Open truck	45	12	37	25	82	37
	Skip and Mini Bins	113	37	121	40	234	77

The overall amount of each vehicle type sampled as a percentage of the total amount of waste disposed of during the sample period is shown in Figure 4-1.

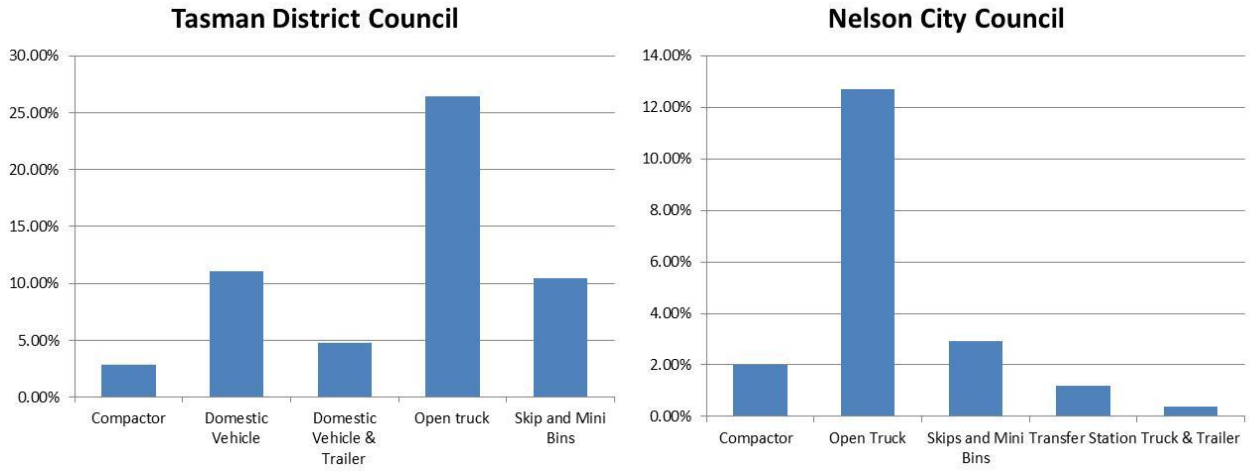

Figure 4-1 Percentage of Vehicle Type sampled

4.2 Uniform Loads

A number of uniform loads were observed at each of the sites during the sample period. At York Valley landfill this included one load of red sand from a restoration project, screenings from the WWTP which were decomposed and not possible to separate, a number of loads of rejected salmon, one load of unwanted books, and a number of loads of single sheets of glass from a local glass manufacturer. Figure 4-2 shows examples of the types of single loads observed.

Figure 4-2: Examples of uniform loads observed at York Valley Landfill

At Richmond RRC, single loads of glass from a local glass manufacturer were also observed along with skips full of timber. These are shown in Figure 4-3.

Figure 4-3: Examples of uniform loads observed at Richmond RRC

As well as uniform loads, a number of loads contained a high proportion of a single category. This included large volumes of cardboard, plastic bottles, packaged meats, plastic wrapping and vegetables such as tomatoes and apples. Figure 4-4 shows examples of the types of single categories observed.

Figure 4-4: Examples of single categories observed

Observations during the second round of surveys also noted an increase in the amount of televisions and electronic materials being disposed of as shown in Figure 4-5.

Figure 4-5: E-Waste observed

4.3 Waste Composition data

From the weights recorded during the first round of SWAP surveys, the following waste composition has been determined for each of the sites, Council areas and the combined region. This is presented in Table 4-5 below.

Table 4-5: Waste Composition analysed during Autumn Surveys

Category	Tasman District			Nelson City	Nelson - Tasman
	Mariri RRC	Richmond RRC	Mariri – Richmond Combined	York Valley Landfill	
Paper	12.3%	8.4%	9.6%	9.7%	9.7%
Cardboard	4.4%	9.2%	7.7%	5.8%	6.6%
Plastics	12.4%	15.1%	14.3%	10.5%	12.2%
Food waste	16.6%	22.3%	20.5%	12.2%	15.8%
Garden Waste	14.0%	10.7%	11.7%	20.6%	16.7%
Ferrous Metals	3.2%	1.5%	2.0%	2.8%	2.5%
Non Ferrous Metals	0.8%	1.0%	1.0%	1.3%	1.2%
Glass	4.1%	8.5%	7.2%	5.5%	6.2%
Textiles	5.8%	3.6%	4.3%	5.7%	5.1%
Nappies and Sanitary	3.8%	4.8%	4.5%	1.7%	2.9%
Rubble/concrete/soil	6.0%	4.7%	5.1%	8.6%	7.1%
Timber	8.6%	6.8%	7.4%	13.5%	10.8%
Rubber	7.3%	1.7%	3.4%	0.7%	1.9%
Potentially Hazardous	0.8%	1.7%	1.4%	1.2%	1.3%

From the weights recorded during the second round of SWAP surveys, the following waste compositions have been determined for each of the sites, Council areas and the combined region. This is presented in Table 4-5 below.

Table 4-6: Waste Composition analysed during Spring Surveys

Category	Tasman District			Nelson City	Nelson - Tasman
	Mariri RRC	Richmond RRC	Mariri – Richmond Combined	York Valley Landfill	
Paper	13.6%	7.8%	9.6%	9.8%	9.7%
Cardboard	7.8%	9.9%	9.2%	6.0%	7.6%
Plastics	17.1%	15.3%	15.8%	13.1%	14.4%
Food waste	9.8%	11.9%	11.3%	12.2%	11.8%
Garden Waste	11.4%	7.0%	8.3%	13.7%	11.1%
Ferrous Metals	5.7%	2.3%	3.4%	2.8%	3.1%
Non Ferrous Metals	0.6%	0.7%	0.6%	2.2%	1.4%
Glass	2.4%	14.5%	10.8%	1.7%	6.2%
Textiles	5.6%	4.5%	4.8%	8.4%	6.7%
Nappies and Sanitary	3.3%	2.5%	2.8%	1.6%	2.2%
Rubble/concrete/soil	7.8%	2.6%	4.2%	6.20%	5.2%
Timber	12.6%	16.1%	15.1%	18.3%	16.7%
Rubber	1.4%	2.6%	2.2%	3.1%	2.7%
Potentially Hazardous	1.0%	2.4%	2.0%	0.9%	1.5%

Table 4-7 shows the combined waste composition for 2012 for each of the sites surveyed, Council areas and the combined region.

Table 4-7: 2012 Waste Composition

Category	Tasman District			Nelson City	Nelson - Tasman
	Mariri RRC	Richmond RRC	Mariri – Richmond Combined	York Valley Landfill	
Paper	13.0%	8.0%	9.6%	9.8%	9.7%
Cardboard	6.3%	9.6%	8.6%	5.9%	7.1%
Plastics	15.0%	15.2%	15.1%	11.8%	13.4%
Food waste	12.8%	16.5%	15.4%	12.2%	13.7%
Garden Waste	12.6%	8.6%	9.8%	17.1%	13.8%
Ferrous Metals	4.6%	1.9%	2.8%	2.8%	2.9%
Non Ferrous Metals	0.7%	0.8%	0.8%	1.8%	1.3%
Glass	3.2%	11.9%	9.2%	3.6%	6.2%
Textiles	5.7%	4.1%	4.6%	7.1%	5.9%
Nappies and Sanitary	3.5%	3.5%	3.5%	1.7%	2.5%
Rubble/concrete/soil	7.0%	3.6%	4.6%	7.4%	6.1%
Timber	10.8%	12.0%	11.6%	15.9%	13.9%
Rubber	4.0%	2.2%	2.7%	1.9%	2.3%
Potentially Hazardous	0.9%	2.1%	1.7%	1.1%	1.4%

Figures 4-6 to 4-11 show each of the compositions in graphical form.

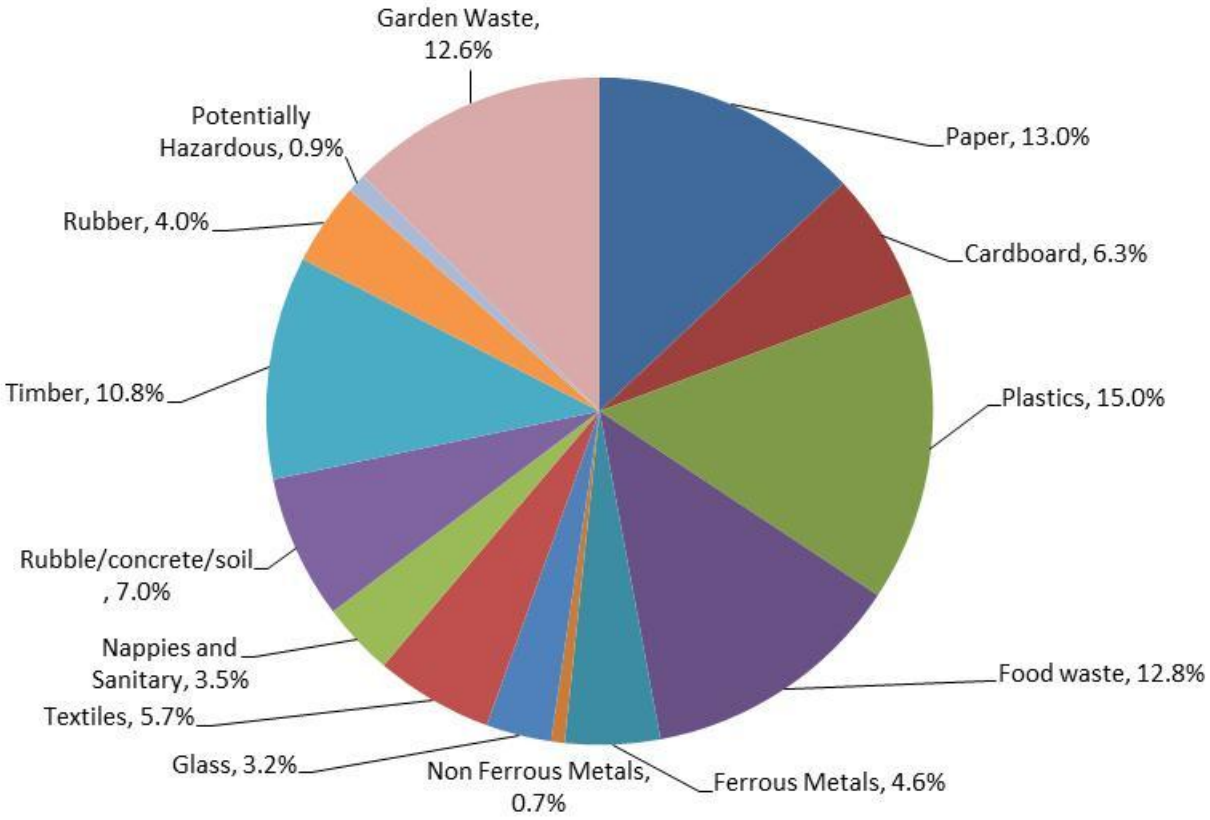

Figure 4-6: Mariri RRC Waste Composition

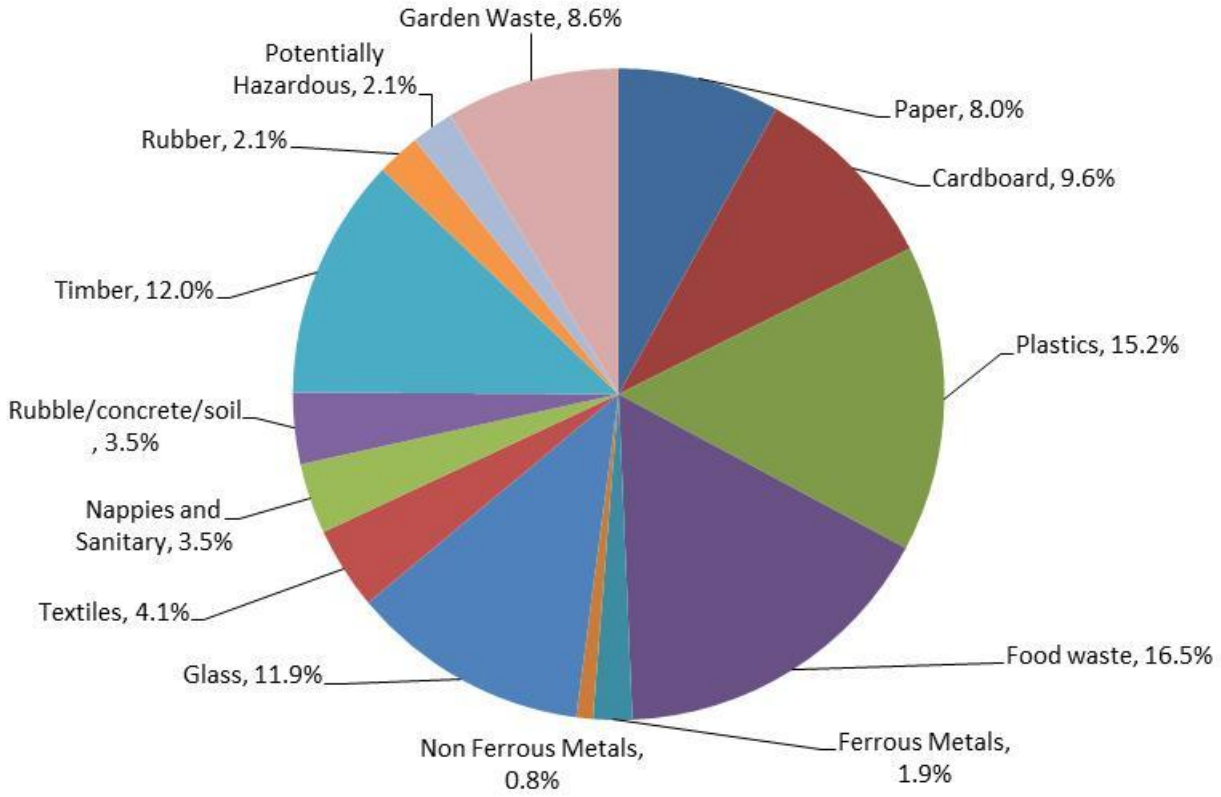

Figure 4-7: Richmond RRC Waste Composition

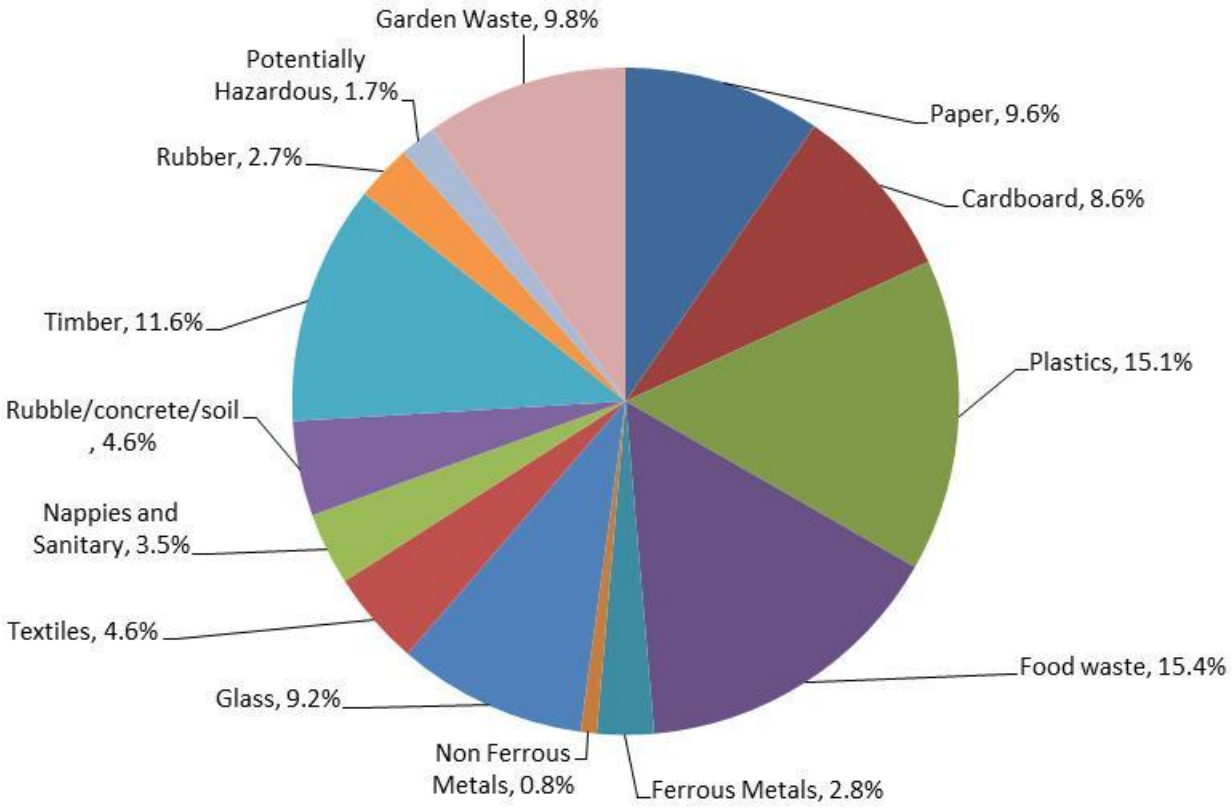

Figure 4-8: Tasman District Waste Composition

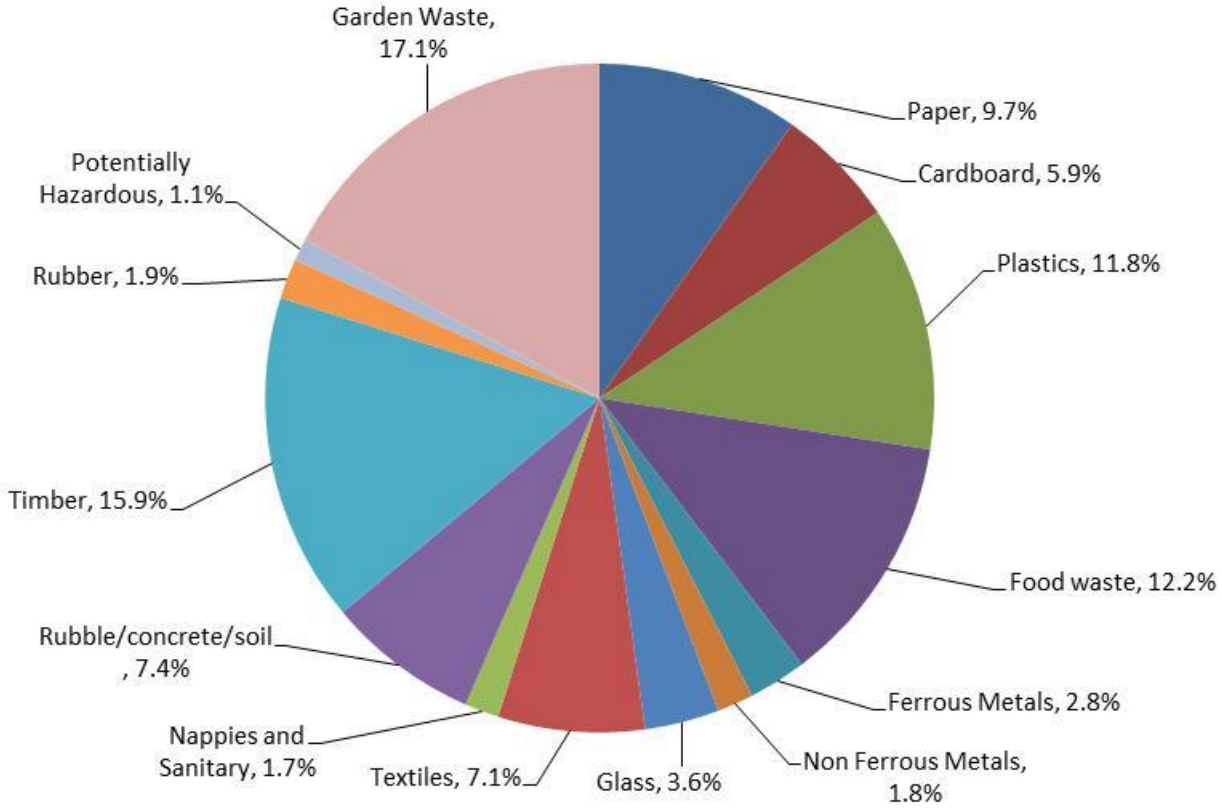

Figure 4-9: Nelson City (York Valley Landfill) Waste Composition

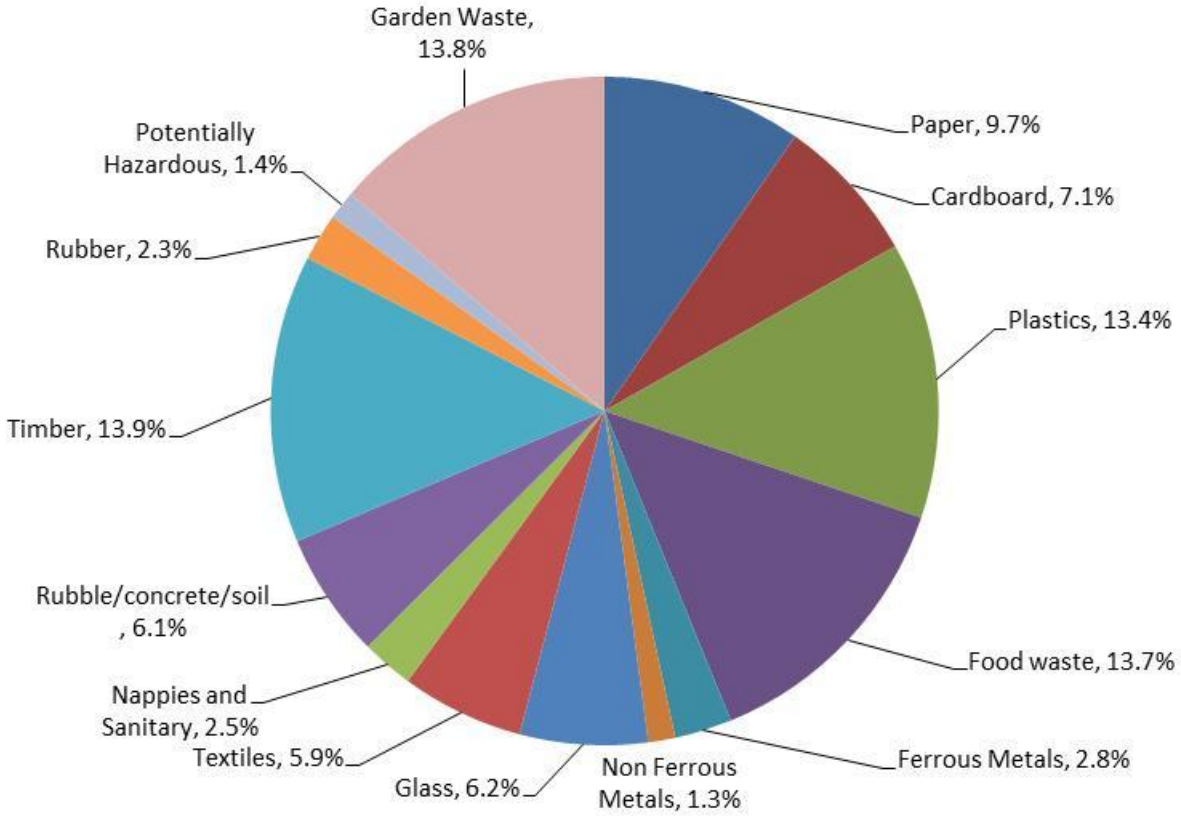

Figure 4-10: Nelson - Tasman Waste Composition 2012

4.4 Precision

Understanding the difference between accuracy and precision is important. The accuracy of a measurement as set out in the SWAP protocol refers to "how close the estimated value is to the true value; that is, how much 'bias' there is in the reported result". The precision of a measurement system as set out in the SWAP protocol is "a measure of the variability of estimates of a measure. For instance, a very large sample could yield an estimated annual paper component of 26.2 ± 0.2% (95% confidence interval). This would be very precise"[3].

To understand the likelihood that the results would be repeated if the survey was undertaken again, the precision achieved by each of the surveys and overall was calculated. Table 4-8 provides a summary of the precision achieved for the overall Tasman District data, the Nelson City data and the combined Nelson-Tasman data.

Table 4-8: Precision achieved

Category	Tasman composition	95% confidence interval	Nelson composition	95% confidence interval	Nelson-Tasman composition	95% confidence interval
Paper	9.6%	± 1.7%	9.8%	± 4.0%	9.7%	± 1.7%
Cardboard	8.6%	± 1.7%	5.9%	± 3.0%	7.1%	± 1.2%
Plastics	15.1%	± 2.2%	11.8%	± 1.9%	13.4%	± 2.0%
Food waste	15.4%	± 2.7%	12.2%	± 3.1%	13.7%	± 2.5%
Garden Waste	9.8%	± 2.7%	17.1%	± 4.8%	13.8%	± 2.8%
Ferrous Metals	2.8%	± 1.3%	2.8%	± 1.0%	2.8%	± 0.7%
Non Ferrous Metals	0.8%	± 0.3%	1.8%	± 0.9%	1.3%	± 0.6%
Glass	9.2%	± 3.4%	3.6%	± 2.4%	6.2%	± 1.7%
Textiles	4.6%	± 1.1%	7.1%	± 3.0%	5.9%	± 1.6%
Nappies and Sanitary	3.5%	± 0.9%	1.7%	± 0.6%	2.5%	± 0.6%
Rubble/concrete/soil	4.6%	± 1.6%	7.4%	± 2.6%	6.1%	± 1.9%
Timber	11.6%	± 3.3%	15.9%	± 4.0%	13.9%	± 3.2%
Rubber	2.7%	± 1.4%	1.9%	± 0.9%	2.3%	± 0.9%
Potentially Hazardous	1.7%	± 0.7%	1.1%	± 0.5%	1.4%	± 0.5%

[3] Ministry for the Environment (2002), Solid Waste Analysis Protocol, MfE, NZ

5 Discussion and Analysis

5.1 Tasman District waste over time

Waste composition surveys have been previously undertaken in Tasman District in 2004 and 2007. In that period since 2004 there have been notable changes to waste management practices in the District. In 2004, Tasman District Council introduced a recycling bin scheme to the district, starting in Richmond and spreading out over a large percentage of the district by 2005. All of those customers who previously had access to a domestic waste collection service were provided with a recycling bin and the domestic waste and recycling bins are collected and emptied once a week.

Before this initiative was introduced, no domestic recycling collection services were available. The Tasman District Council bag size also reduced in size from 60l to 45l at this time (max weight of 14kg reduced to 12kg). This reduction in size coincided with the introduction of the domestic wheelie bin service in the district (although this service does not cover all rural areas).

In June 2011 the Tasman District Council introduced two different sizes of Council refuse bags. The smaller white bags at 45l and the larger yellow bags at 60l. Upgrades to the Richmond RRC and Mariri RRC to encourage recycling have also been made.

Figure 5-1 shows the changes in the assessed waste composition for Tasman District since 2004. It should be noted that both the 2004 survey and the 2007 survey were carried out over a single week. The 2004 survey was conducted in September (spring) and the 2007 survey was conducted in June (winter). The 2007 survey also included a combination of weight and visual assessments, with visual inspections being made of all skips entering the site. The 2004 and 2007 waste compositions are for the sampled vehicles only and have not been scaled to reflect the overall proportions and numbers of different vehicle types using the site. Comparison of the results of the 2012 survey to the earlier surveys therefore cannot be done with any certainty. However, for the purposes of this report, it is assumed that the sample taken during these surveys is representative of all vehicles using the site.

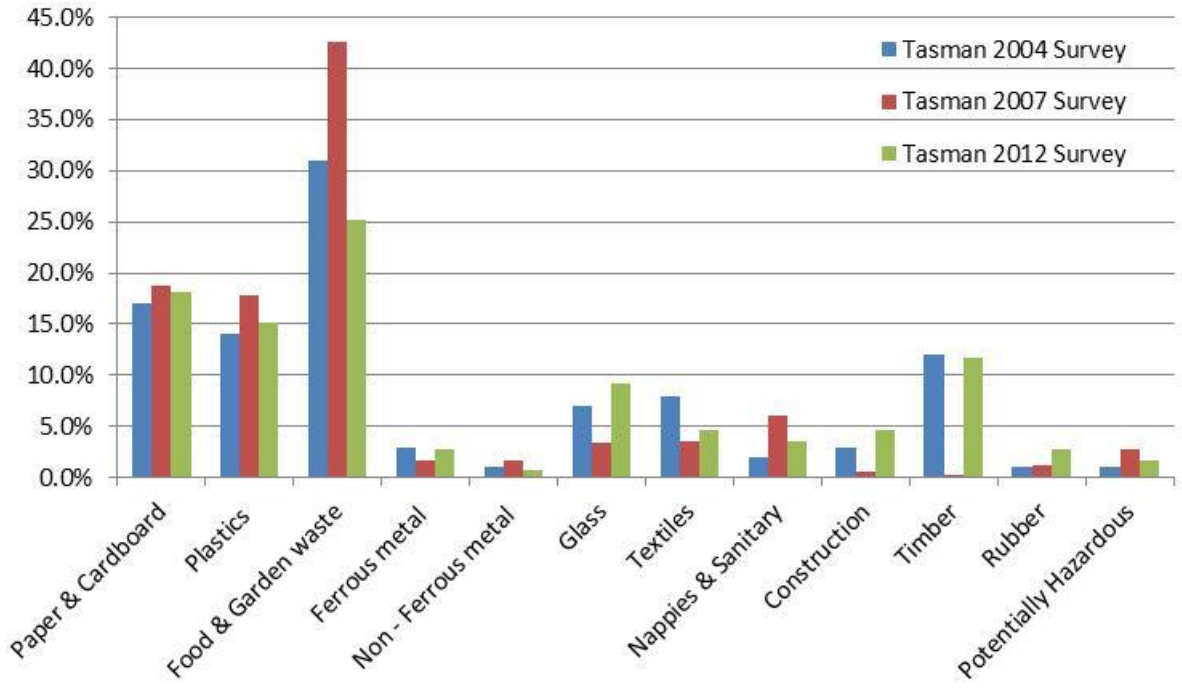

Figure 5-1: Tasman District Council Waste Composition over time

There is considerable variability in the surveyed proportions of putrescibles (food and garden waste) however, the 2012 SWAP results show an overall decrease of putrescibles in the waste stream from 31% in 2004 and 43% in 2007 to 25% in 2012.

The percentages for paper & cardboard and for plastics are relatively consistent across the surveys however, there is greater variability in the proportion of the minor constituents.

Construction material and timber in 2012 (5% and 12% respectively) is similar to the 2004 (3% and 12% respectively). The equivalent materials included in the 2007 data (0.5% and 0.2% respectively) only include the waste that was sampled by weight. The visual inspection data of skips included more construction waste and therefore is likely to increase this percentage considerably if included.

5.2 Nelson City waste over time

In Nelson City residents have access to a weekly council-facilitated domestic refuse collection and disposal service. This service is a user pays service and customers can purchase:

- blue plastic bags that are available for purchase at most supermarkets and from Council or
- bins that can be rented or purchased from the Nelmac that require prepaid liners.

There are also a number of private collectors offering a range of services and bins both in Nelson City and Tasman District which customers can chose to purchase instead.

In November 2004 Nelson City Council introduced a weekly kerbside 55 litre crate-based recycling collection service to almost all properties. This recycling collection service alternates between glass and "the rest" fortnightly.

A previous survey of waste composition in Nelson was undertaken in 2006. Figure 5-2 shows the changes in waste composition data for Nelson city since 2006.

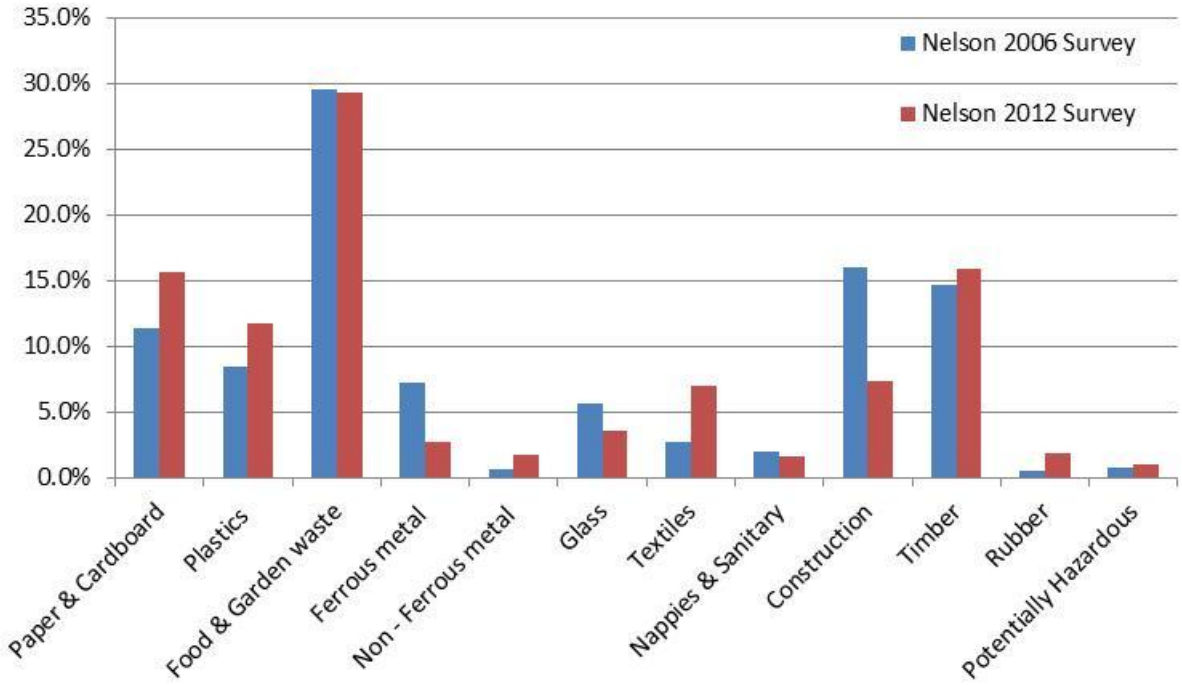

Figure 5-2: Nelson City Council Waste Composition over time

It should be noted that the 2006 survey was carried out over a single week and was based on visual assessments using tonnage conversion factors. The 2006 survey has not been scaled to reflect the total amount and vehicle types using the site. Like in Tasman District comparison of the results of the 2012 survey to the earlier surveys cannot be done with any certainty. However, for the purposes of this report, it is assumed that the sample taken during the 2006 survey is representative of all vehicles using the site.

The 2012 SWAP results show an increase in paper & cardboard and plastics (16% and 12% respectively) from the 2006 percentages of 11% and 9% respectively. Textiles have increased from 3% in 2006 to 7% in 2012. The total amount of putrescibles (food and garden waste) has remained around 29% and timber around 15%. Construction material percentages have reduced from 16% to 7%, ferrous metal from 7% to 3% and glass from 6% to 4%.

5.3 Comparison between sites

Mariri and Richmond RRC's provide recycling facilities on site to encourage the recovery of material prior to waste entering the pit and being sent to Eves Valley Landfill. The York Valley Landfill is the final disposal point and any recycling happens offsite.

Figure 5-3 shows the differences in waste composition data between each site.

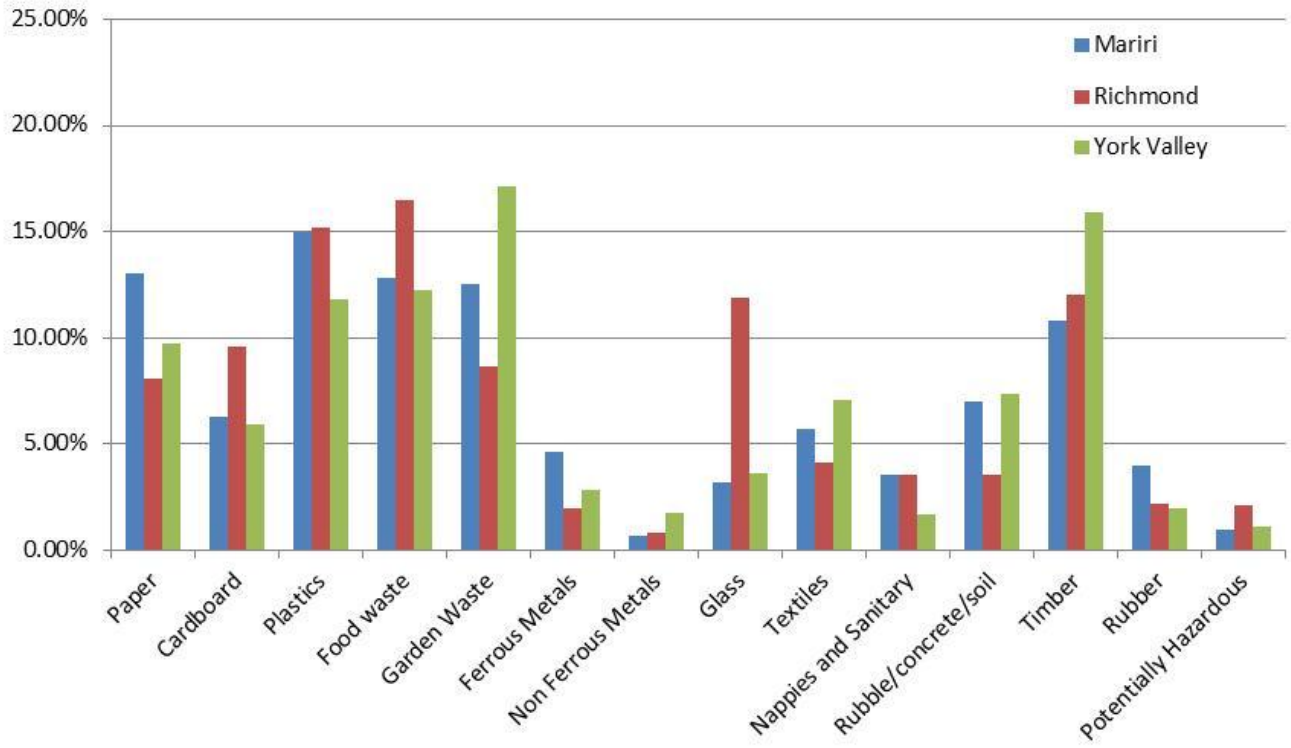

Figure 5-3: Comparison between sites 2012

From the 2012 SWAP results higher percentages of garden waste and timber (17% and 16% respectively) were observed at the York Valley Landfill rather than at the RRC's (average 10% and 12% respectively). The Richmond RRC showed higher percentages of cardboard (10%), food waste (17%) and glass (12%) than either the Mariri RRC or the York Valley Landfill which had approximate 6 % cardboard, 12% food waste and 3% glass each.

The largest quantities of glass observed were from glass manufactures with entire skip loads of sheet glass being disposed of as shown in Figure 5-4.

Figure 5-4: Sheet glass disposed of at Richmond RRC

Figure 5-5 shows the differences in waste composition data between Tasman District and Nelson City .

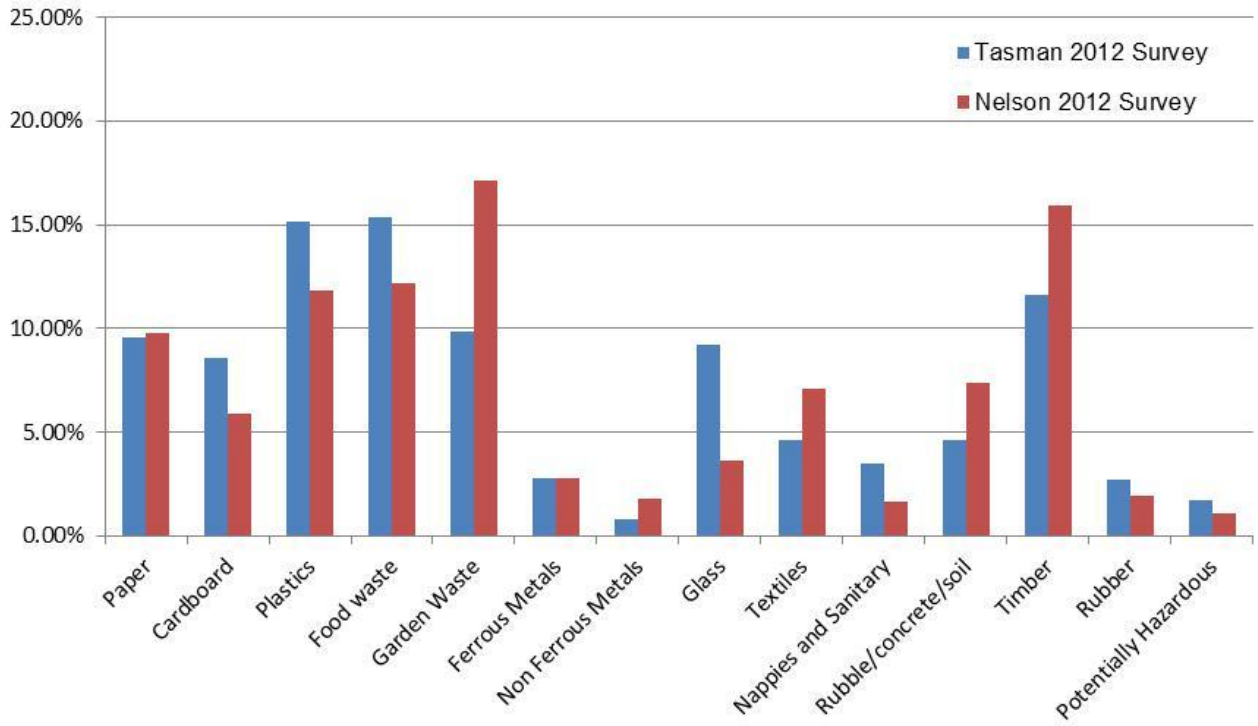

Figure 5-5: Comparison between Councils 2012

The 2012 SWAP results show a higher amount of construction material being disposed of in Nelson City than in Tasman District with 7% of rubble/concrete/soil and 16% of timber being observed in Nelson City compared to 5% of rubble/concrete/soil and 12% of timber being observed in Tasman District. Garden waste was higher in Nelson City at 17% compared to Tasman District at 10%, but the percentage of food waste (15%) in Tasman District was higher than that observed in Nelson (12%).

Tasman District shows higher percentages of recyclable such as cardboard (9%), plastics (15%) and glass (9%) compared with Nelson City Council with compositions of 6% cardboard, 12% plastics and 4% glass.

A higher percentage of textiles were observed in Nelson while a higher percentage of Nappies were observed in Tasman District. Other minor components were comparable between the two Council areas.

Figure 5-6 shows the differences in waste composition data between Tasman District, Nelson City and the National Indicator sites.

The SWAP data for the National Indicator Sites was collected by the Ministry for the Environment (MfE) in 2007-2008 in order to establish baseline waste composition data for New Zealand and detect any trends over time. The National Indicator Sites include provincial and major urban sites.

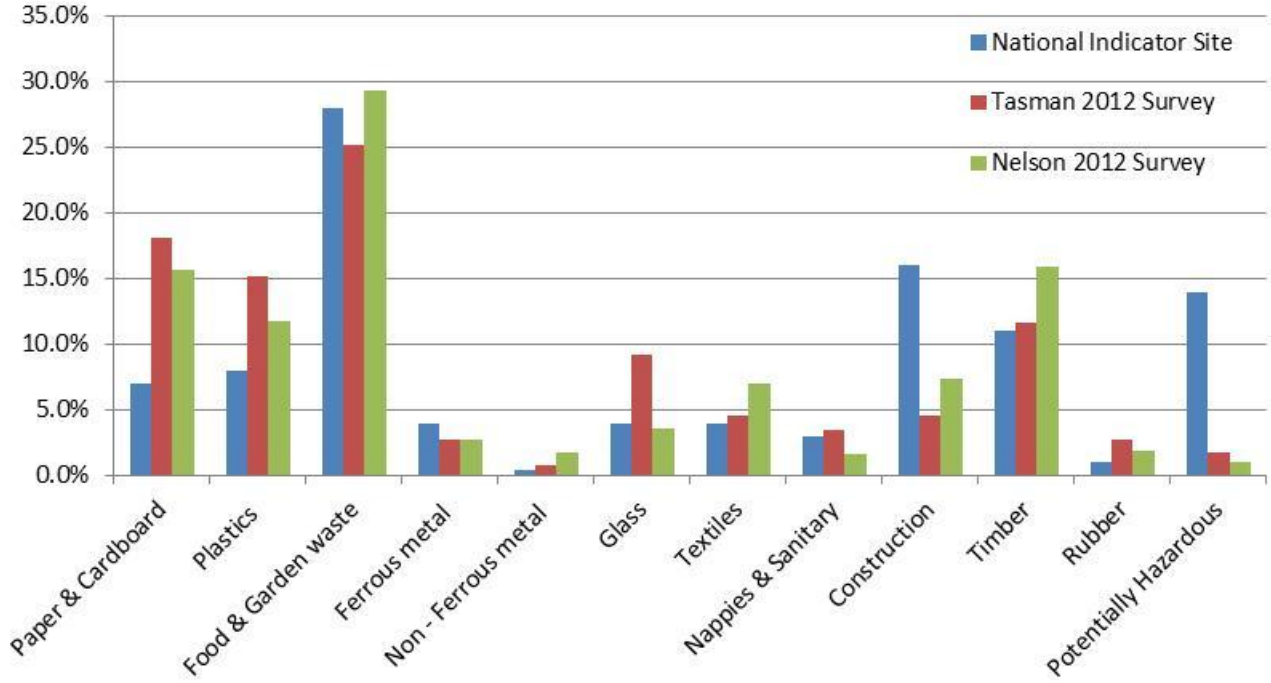

Figure 5-6: Nelson & Tasman Waste Composition compared with MfE National Indicator Sites

The results show that a higher percentage of recyclable materials such as paper, cardboard and plastics in the Nelson-Tasman region than was recorded for the indicator sites. Putrescibles (food and garden waste) are comparable between the Nelson-Tasman region and the indicator sites at approximately 28%. Glass shows higher percentages in Tasman District however the Nelson City results are comparable with the indicator sites. Construction material is higher at the indicator sites (16%) than the Nelson Tasman Region (6%) although timber is higher for the Nelson Tasman Region (14%) than recorded at the indicator sites (11%). The percentage of potentially hazardous material is significantly higher at the indicator sites (14%) than recorded for the Nelson Tasman Region (1%). This may relate to differences in the types of materials being classified as potentially hazardous at each site.

6 Summary

This Nelson - Tasman SWAP Studies 2012 report provides a summary of the composition of waste being disposed of within the Nelson-Tasman region during the following two survey periods:

- 12 March and 4 April 2012, and
- 5 November and 28 November 2012

These surveys were undertaken in accordance with procedure 2 of the MfE Solid Waste Analysis Protocol publication and the results provide a representative picture of the Nelson – Tasman Region.

The report also sets out the precision achieved by the surveys and compares the results between sites and surveys. This report will help to inform the remaining stages of the project and empower joint waste planning for increased and improved recycling and recovery actives in the Nelson Tasman region.

For future planning purposes however, it should be noted that an increase in the percentage of a particular waste component over time may not mean an overall increase in the total amount of that waste component and therefore further work would be required to be able to assess any changes in the overall quantities being disposed of in the Nelson Tasman Region over time.

Appendix A Intended Sampling Regimes

York Valley Sampling Plan

Number of staff	3.50
Number of days	6
Hours per day	7.5
Person Hours	158

		General Rubbish	Transfer Station	Skips and Mini Bins	Demolition	Street Litter	Buller District Council
	Calculations	bag trucks	compactor bins	skips and mini bins	skips and open tops	compactor trucks	truck and trailer
Number of Vehicles / week	A (assumed)	67	13	89	7	7	3
Mean Load Weight (kg)	B (assumed)	2343	7815	2211	2451	1616	19730
Time to sort (minutes)	C (assumed)	90	90	90	60	90	90
Total Weight (kg)	D = A x B	156,596	100,626	196,434	16,946	11,385	56,739
	E = D x sqrtC	1,485,597	954,621	1,863,536	131,260	108,010	538,276
Distribution of Effort	F = E/Total(E)	0.29	0.19	0.37	0.03	0.02	0.11
Person-hours	G = F x Person Hrs	46	30	58	4	3	17
Vehicles to Sample	H = G x 60/C	31	13	39	4	2	3
Sampling Interval	I = A/H	3	1	3	2	4	1
Average Vehicles/Day	J = H/6	6	3	7	1	1	1

Total No. of vehicles intended to be sampled at York Valley = 91

Richmond RRC Sampling Plan

Number of staff	3.50
Number of days	6
Hours per day	8
Person Hours	168

	Calculations	bag trucks	compactors	loose rubbish	cars
Number of Vehicles / week	A (assumed)	12	32	59	38
Mean Load Weight (kg)	B (assumed)	1500	1326	1200	802
Time to sort (minutes)	C (assumed)	180	180	180	60
Total Weight (kg)	D = A x B	18,000	42,432	70,800	30,476
	E = D x sqrtC	241,495	569,285	949,882	236,066
Distribution of Effort	F = E/Total(E)	0.12	0.29	0.48	0.12
Person-hours	G = F x Person Hrs	20	48	80	20
Vehicles to Sample	H = G x 60/C	7	16	27	20
Sampling Interval	I = A/H	2	3	3	2
Average Vehicles/Day	J = H/7	1	3	4	3

Total No. of vehicles intended to be sampled at Richmond RRC = 70

Mariri RRC Sampling Plan

Number of staff	3.50
Number of days	6
Hours per day	8
Person Hours	168

	Calculations	bag trucks	compactors	loose rubbish	cars
Number of Vehicles / week	A (assumed)	2	33	77	133
Mean Load Weight (kg)	B (assumed)	1425	2410	631	117
Time to sort (minutes)	C (assumed)	180	180	180	90
Total Weight (kg)	D = A x B	2,850	79,530	48,587	15,561
	E = D x sqrtC	38,237	1,067,007	651,863	147,625
Distribution of Effort	F = E/Total(E)	0.02	0.56	0.34	0.08
Person-hours	G = F x Person Hrs	3	94	57	13
Vehicles to Sample	H = G x 60/C	1	31	19	9
Sampling Interval	I = A/H	2	2	5	16
Average Vehicles/Day	J = H/7	1	5	3	2

Total No. of vehicles intended to be sampled at Mariri RRC = 60

Appendix B Data Sheets

York Valley Landfill - Site Data Sheets

SWAP Survey November 2012

MWH ref Z18827

Date:	Nov-12	Total weight	
Time :		Tare weight -	
		Net weight :	
Vehicle Reg :			
York Valley Tag No:			

Vehicle Details

Company:

- Buller DC
- Can Plan
- Duane Whiting
- Envirowaste
- Fitzgerald Construction
- Fulton Hogan (Transfer station)
- Graeme Marshall
- Nelmac
- Talleys
- Waste Management
- Other _____

Source:

- Municipal
- Commercial and industrial
- Building and demolition
- Greenwaste
- Other _____

Description _____

Vehicle type:

- Compactor
- Small Compactor
- Mini Bin
- Skip bin
- Transfer Station
- Truck & Trailer
- Other _____

Comments: _____

Category	Load #						Weight (record weight to 2dp, e.g. 4.65 kg)							Tare weight
1. News Paper	1		2		3									
	4		5		6							sub-total (kg)		
2. Office Paper	1		2		3									
	4		5		6							sub-total (kg)		
3. Other Paper	1		2		3									
	4		5		6							sub-total (kg)		
4. Cardboard	1		2		3									
(boxes, cartons)	4		5		6							sub-total (kg)		
5. Other Plastics	1		2		3									
(packaging)	4		5		6							sub-total (kg)		
6. Type 1 Plastics	1		2		3									
(drink bottles)	4		5		6							sub-total (kg)		
7. Type 2 Plastics	1		2		3									
(Milk bottles)	4		5		6							sub-total (kg)		
8. Food scraps / other organic	1		2		3									
(putrescibles, non-garden only	4		5		6							sub-total (kg)		
9. Steel Cans	1		2		3									
(magnetic cans)	4		5		6							sub-total (kg)		
10. Other Steel	1		2		3									
(Ferrous metals)	4		5		6							sub-total (kg)		
11. Aluminium/ copper etc	1		2		3									
(Non-ferrous metals)	4		5		6							sub-total (kg)		
12. Aluminium Cans	1		2		3									
	4		5		6							sub-total (kg)		
13. Glass	1		2		3									
(bottles, jars)	4		5		6							sub-total (kg)		
14. Textiles	1		2		3									
(clothing, carpet)	4		5		6							sub-total (kg)		
15. Nappies & sanitary	1		2		3									
	4		5		6							sub-total (kg)		
16. Rubble / concrete / soil	1		2		3									
(concrete, gib, sand etc)	4		5		6							sub-total (kg)		
17. Timber	1		2		3									
(framing, plywood, pallets)	4		5		6							sub-total (kg)		
18. Rubber	1		2		3									
(tyres)	4		5		6							sub-total (kg)		
19. Potentially hazardous	1		2		3									
	4		5		6							sub-total (kg)		
20. Garden Waste	1		2		3									
(grass, tree cuttings)	4		5		6							sub-total (kg)		
Comments:												**TOTAL (kg)**		