

# Solid Waste Audit of Tokoroa Landfill

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South Waikato District Council and  
Environment Waikato  
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## Document quality control

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# 1 Introduction

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Under Local Government Act (2002), local territorial authorities are responsible for promoting waste management and waste reduction practices. Pursuant to its responsibilities under Section 286 of the Act, in 2005 South Waikato District Council adopted a Waste Management Plan.

The Plan makes provision for the collection and reduction, re-using, recycling, recovering, and treatment or disposal of waste in the District and provides for the Plan's effective and efficient implementation. In its Waste Management Plan, Council sets a strategic target of a 30% reduction of the waste stream by the year 2011, measured against 1999/2000 baseline levels.

The Waste Management Plan recognises that: *“To set effective policy and measure success, Council needs accurate, reliable information about current waste trends, and measuring success in achieving goals requires sound baseline information and a commitment to continue monitoring. Council obtains information by carrying out surveys of waste streams using Waste Analysis Protocol (WAP).”*

South Waikato District Council's main waste infrastructure asset is the Tokoroa Landfill. The other major policy document relating to solid waste in the District is Council's Landfill Asset Management Plan, adopted in 2006. This Plan describes how the landfill will be managed to support the well-being of the District's population, as determined through the Long Term Community Plan process.

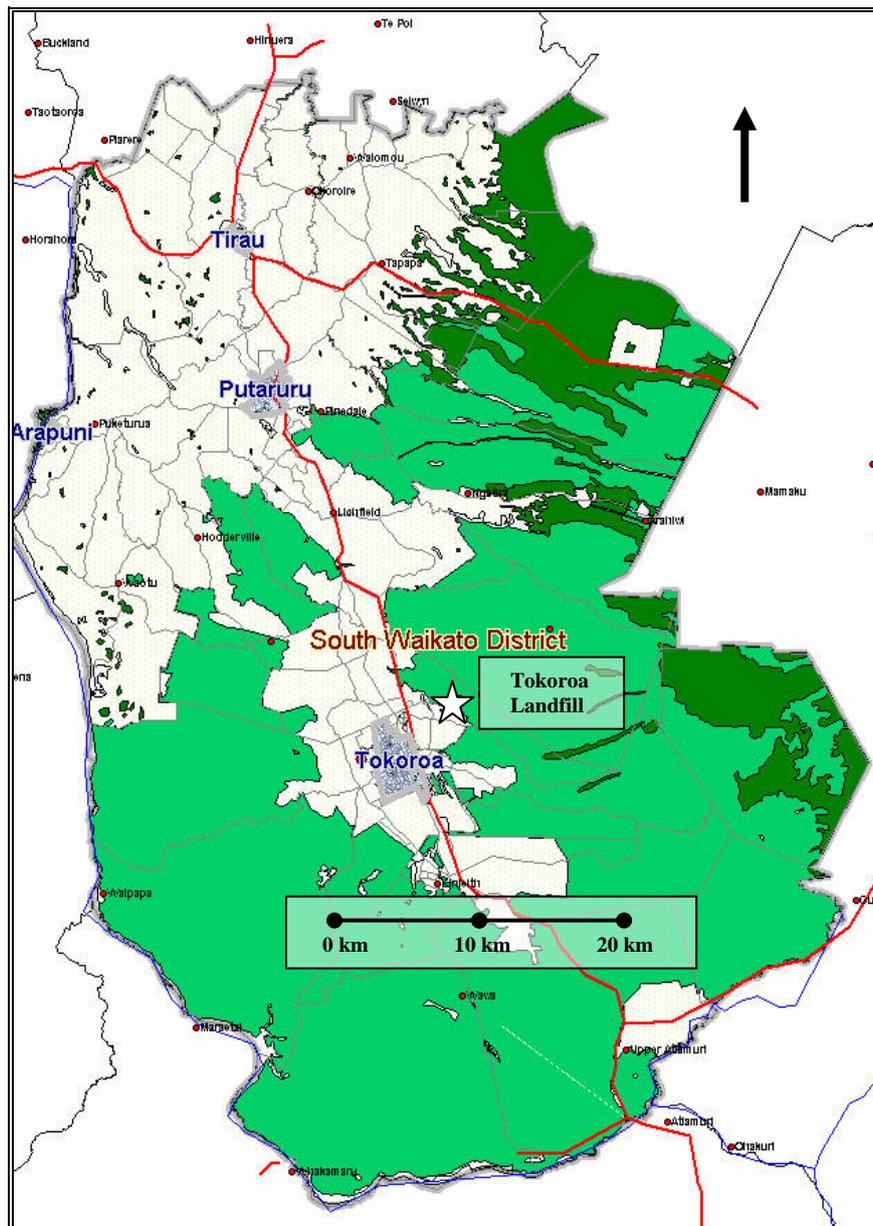
The Asset Management Plan provides for monitoring of the Waste Management Plan target, and states that: *“the accuracy of the data and waste composition need further refinement and this will be achieved through Waste Audits to better determine waste compositions and further modification to measurements of waste volumes.”*

To further the objectives of these Plans, in 2007 Council commissioned Waste Not Consulting to undertake a waste composition survey of material disposed of at the Tokoroa Landfill, using a procedure based on the Ministry for the Environment's Solid Waste Analysis Protocol. With financial assistance from Environment Waikato, the survey was undertaken in November 2007. The results of the survey are presented in this report.

## 1.1 Regional overview

The South Waikato District is situated in the centre of the North Island. The usually resident population of the District was 22,641 at the time of the 2006 census. The three main population centres, Tokoroa, Putaruru, and Tirau, are joined by State Highway 1, the main transport corridor through the area. The population of the three wards in the District are: Tokoroa Ward – 15,120, Putaruru Ward – 6,200, Tirau Ward – 2,152.

Approximately half of the District is forested. The main economic activities in the District are forestry and pastoral farming, particularly dairying. Around 20% of the workforce is employed directly in these industries, with another 28% being employed in manufacturing associated with these industries. Major industries include the Carter Holt Harvey paper mill at Kinleith and the Fonterra Lichfield dairy factory.



## **1.2 Waste management services in South Waikato District**

South Waikato District is virtually a self-contained waste “catchment”. Nearly all of the waste generated in the District is disposed of in the District, and very little waste from outside is disposed of within the District.<sup>1</sup> South Waikato District Council is the sole provider of public waste disposal facilities in the District. The Council owns the Tokoroa Landfill and a transfer station and greenwaste drop-off point in Putaruru. Residual waste from the Putaruru facility is disposed of at the Tokoroa Landfill. The landfill and transfer station are operated under contract to Council by Roading and Asphalt Ltd.

Available waste services and descriptions of major waste streams are described in the following sections. A more detailed outline of waste streams is provided in Appendix 1.

### **1.2.1 Waste services for the residential sector**

A range of refuse disposal services is available to residents of South Waikato District. Council provides a weekly collection of refuse to about 8000 households in Arapuni, Putaruru, Tirau, and Tokoroa. Refuse is collected from the kerbside in official Council refuse bags. Council distributes over 52,000 free bags annually to households in the kerbside collection area. If households require further bags, they are available from Council offices for \$2.00/bag and from retail outlets. Bags are collected by Council’s contractor, Excell Corp., and the refuse is transported directly to Tokoroa Landfill.

Domestic recycling is collected fortnightly from the kerbside in Arapuni, Putaruru, Tirau, and Tokoroa by South Waikato Achievement Centre under contract to Council.

Public recycling depots are operated at Tokoroa landfill, South Waikato Achievement Centre on Thompson Street, at Waotu, Dunham Park on State Highway 1 Tokoroa, Putaruru Landfill, in Arapuni at the Pioneer Crescent Reserve, and at the Atiamuri Hall.

A private waste operator, Pete’s Bins, also provides a kerbside collection of domestic waste, using 240-litre wheelie bins. The service is used primarily by both rural residents who are not serviced by the Council collection and by some urban residents.

Gantry skip bins are also available to residents from Pete’s Bins for the disposal of large quantities of refuse.

### **1.2.2 Waste services for the commercial sector**

The Council kerbside bagged refuse collection is available for use by the commercial sector in the District. Other than the Council collection, business and industry dispose of their waste either by using one of the services provided by commercial waste operators or by transporting it themselves directly to a transfer station or the Tokoroa Landfill. Waste Management NZ provides front-load bin truck services for the commercial sector in the townships. Pete’s Bins offers wheelie bin and gantry truck collections. Waste collected by these commercial waste operators is disposed of directly to Tokoroa Landfill.

### **1.2.3 Putaruru transfer station**

Small loads of general waste are accepted at the Putaruru transfer station, which is sited on the recently closed landfill. At the facility, the refuse is collected in 9 cubic metre skip bins, which are transported to Tokoroa Landfill for disposal.

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<sup>1</sup> Minor amounts of residential kerbside collections from north of Tirau are known to be disposed of at the Matamata transfer station, outside the District, and the Kinleith mill has its own landfill for process waste.

There is a separate drop-off point for greenwaste at the facility. The greenwaste is stockpiled, then mixed with sewage sludge and transported to Tokoroa Landfill for disposal.

#### **1.2.4 Tokoroa Landfill**

The Tokoroa Landfill is located on Newell Road, on the northern side of Tokoroa. The site has an area of approximately 47 hectares, of which approximately nine hectares are used for the landfilling operation.

All vehicles entering the landfill pass over the weighbridge. Traffic movements through the weighbridge are categorised by the operator according to codes that record the type of vehicle, the customer, and the refuse type. Very small loads are not weighed, but charged at a flat rate. Other vehicles are weighed when entering and again when departing and charged by the tonne for disposal. Refuse charges at the Landfill are given in Appendix 2.

Within the landfill, there is a forecourt area with separate drop-off points for greenwaste, paper and cardboard, car bodies, scrap metal, whiteware, and recyclable containers. In this forecourt area there is also a drop-off point for small numbers of bags of domestic refuse.

All vehicles disposing of residual waste discharge at the same point at the landfill working face.

The greenwaste disposed of at the separate drop-off point is stockpiled and mulched on an as-needed basis. The mulch is then used as cover material.

There are four wastewater treatment plants in the District that generate sewage sludge and millscreenings. A total of approximately 1000 tonnes of sludge are disposed of annually at the landfill. The sludge is disposed of about four times per year.

When sludge is being disposed of, it is dumped into a trench and allowed to dewater. It is then mixed with stockpiled greenwaste to make the material more manageable before spreading on the landfill face.

Approximately 100-150 cubic metres of bark per month from the Carter Holt Harvey Kinleith paper mill are stockpiled at the site and used as cover material.

## 2 Methodology

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The Tokoroa Landfill was surveyed for a four-day period from 7-11 November 2007 using the methodology outlined in the following sections. This methodology has been adapted by Waste Not Consulting from the Ministry for the Environment's Solid Waste Analysis Protocol 2002 (SWAP). Waste Not Consulting was contracted by MfE in 2007 to use this methodology for its SWAP Baseline Data Programme at four sites nationwide.

### 2.1 Visual waste classification

With the technique developed by Waste Not for visual waste classification, while each vehicle was being unloaded on the tipping floor the surveyor assessed the relative weight of each constituent present in the load on the basis of volume and density. Absolute weights of individual materials were not estimated; rather, the proportion of weight represented by each material was estimated. These data were recorded as a proportion, by weight, for each constituent present in the load.

For vehicle loads in which it was difficult to distinguish the individual constituents, a generic composition, based on previous sort and weigh surveys of that type of vehicle load, was used as a template for the composition, and was adjusted according to the materials that were visible. For example, a front-loader carrying large amounts of supermarket or restaurant waste was assessed as having a higher-than-average proportion of food waste.

For some specific waste streams, such as domestic bagged or wheelie bin refuse, an assumed composition was used for calculations, but no composition data were recorded for individual vehicle loads. Waste Not has collected an extensive range of data on this type of domestic refuse, and has tailored the composition data to suit the types of services, such as kerbside recycling, available locally to householders.

When the visual survey was completed, the data on proportion of weights were combined with weighbridge records of the weight for each load, and a weight for each of the individual materials in the load was calculated. For small loads that were not weighed at the weighbridge, the load weight was estimated based on previously-determined averages for the specific vehicle and load type. These known averages have been made available by disposal facilities that weigh every vehicle load entering the facility.

### 2.2 Waste classifications

Descriptions of the classifications used for the visual waste audit are given in Appendix 3.

### 2.3 "Activity source" of waste loads entering landfill

For visual waste surveys such as described in this report, Waste Not has developed a set of categories for the "activity source" of waste that are aimed at providing the information that is most useful for monitoring waste streams and effectively targeting waste minimisation initiatives and policies. Information on the "activity source" of individual waste loads was gathered as the waste was unloaded, either by observation of the waste itself or by questioning the vehicle driver.

The categories that have been used for the Tokoroa Landfill audit are:

1. **Kerbside collection** – waste collected from residential and commercial premises by either council or private kerbside waste collections

2. **Residential** – all waste originating from residential premises other than that covered by one of the other, more specific classifications (includes drop-offs of bagged domestic waste)
3. **Industrial/commercial/institutional (ICI)** – waste from industrial, commercial, and institutional sources.
4. **Construction and demolition** – waste materials from the construction or demolition of a building or structure
5. **Landscaping** – waste from landscaping activity and garden maintenance, both domestic and commercial, and from earthworks activity
6. **Transfer station** – waste from transfer stations
7. **Special wastes** – a subjective classification that includes any substantial waste stream (such as biosolids, landfill cover material, infrastructural cleanfill, or industrial wastes), that significantly affects the overall composition of the waste stream and may be markedly different from waste streams at other disposal facilities.

For the Tokoroa Landfill audit, the visual survey of waste composition was used for vehicles carrying “general” waste, which, using the categories listed above, comprised residential, ICI, C&D, and landscaping waste. Information on kerbside collections, transfer station wastes, and special wastes was collected from weighbridge records and discussions with the facility operators.

## 2.4 Identification of vehicle types

As loads carried by different vehicle types are not affected in similar ways by waste reduction initiatives, all vehicles carrying refuse were identified by the surveyor as being one of the following types:

- Cars
- Trailers (including utes, vans, and small trucks)
- Front-loader trucks
- Gantry trucks
- Compactor trucks
- Huka trucks (including “Smart skip” type vehicles)
- Other trucks (such as tip trucks and box trucks).

No Huka trucks disposed of refuse during the survey at Tokoroa Landfill.

A description of the different types of trucks used for transporting waste and a discussion of the potential for recovery of materials is included in Appendix 11.

## 2.5 Data analysis and reporting

From the data collected directly by the visual survey, it was possible to generate information on:

- The proportion and composition of waste from each “activity” source
- The proportion and composition of waste being carried by each vehicle type
- The composition of the overall waste stream entering the facility.

The data analysis process started with obtaining the complete weighbridge records for the period of the audit. Initially, the weighbridge data were used to obtain the net load weights of the vehicles that were surveyed. These were used to calculate the weight of the different materials included in each load.

Based on the classifications of waste loads used by the weighbridge, the weighbridge data for the audit period were then analysed to determine the quantities of specific identifiable waste

streams, such as Council kerbside collections. Individual private vehicles disposing of kerbside collections were identified from the survey results, and the weekly tonnage of those vehicles calculated from the weighbridge records.

Average weekly tonnages for sewage sludge and bark used for cover material were obtained from consultation with staff at the landfill and Council officers.

The composition of the “overall” waste stream was calculated by amalgamating the compositions of the separate, component waste streams in proportion to their presence in the overall waste stream.

## **2.6 Health and safety**

The surveyor at Tokoroa Landfill was equipped with all personal protective equipment necessary for working in a disposal facility environment. Prior to the start of the survey, safety procedures were discussed with site management.

## 3 Results

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### 3.1 Notes on survey and data

The survey at Tokoroa Landfill took place from November 7-11 2007 for approximately nine hours per day using the methodology outlined in Section 2. The information from the survey has been used to determine the composition and activity source of what is described in the following sections as the “general” waste stream. The “general” waste stream comprises refuse loads arising from construction and demolition activity, industrial/commercial/institutional activity, landscaping and earthworks, and residential activity.

Waste streams specifically excluded from the “general” waste stream include:

- kerbside collections of refuse (both Council and private)
- sewage sludge
- greenwaste disposed of at separate drop-off point
- waste from Putaruru transfer station
- bark and other materials designated as cover material.

The five waste streams excluded from the analysis of “general” waste are included in the analysis of the “overall” waste stream.

The results from the four days of surveying have been extrapolated to represent a one-week disposal of waste at the Landfill by combining the survey results and information from the landfill operator with an analysis of the weighbridge records for the period November 5-11. This multi-factorial analysis resulted in the following interpretations of data being used to develop the average weekly “overall” waste flow presented in Section 3.3.

**Sewage sludge** – Sewage sludge is disposed of approximately four times per year and this occurred during the survey period. The sludge is discharged into a trench, mixed with greenwaste, and allowed to dewater for approximately a six-week period before being spread as cover material. Over a two-day period during the survey, approximately 237 tonnes of sludge were discharged. Operators and Council staff agreed that this was a typical amount. Extrapolated to an annual basis, this represents approximately 1000 tonnes per year, or an average of 18 tonnes per week. The figure of 18 tonnes per week of “special” waste is used in the calculations of the “overall” weekly waste stream to landfill.

**Bark and other cover materials** – Bark from the Carter Holt Harvey Kinleith mill is discharged at the landfill on approximately a monthly basis for use as a cover material. This material is disposed of at no charge, is not weighed at the weighbridge, and no vehicle count is kept. The landfill operator estimated that approximately six 20-cubic yard truck/trailer deliveries were made each month, resulting in a total of 120 cubic yards per month. At an assumed density of 300 kg per cubic yard, this represents approximately 36 tonnes per month, or 9 tonnes per week. The figure of 9 tonnes per week of “cover material” is used in the calculations of the “overall” weekly waste stream to landfill. A small amount of cleanfill is also disposed of at the landfill and coded by the weighbridge as being “Cover material – clean”. This material is also included in the “Cover material” category for the analysis of the “overall” waste stream.

**Greenwaste to separate drop-off point** – Greenwaste discharged at the separate drop-off point is stockpiled, mulched on an as-needed basis, and mixed with sewage sludge or used as cover material. The weighbridge codes loads of greenwaste separately (Green waste, green waste kg, and wheelie bins green) and these loads are charged at a lower disposal rate than general waste. During the survey, it was found that 84% (by weight) of loads coded by the

weighbridge as being greenwaste were disposed of directly to the landfill discharge face, and only 16% (by weight) to the separate drop-off point. For the analysis of the weekly waste stream, 84% by weight of the material coded as being greenwaste during the period November 5-11 is included in the “general” waste stream and 16% of the material is included as “cover” material in the “overall” waste stream. It was also noted by the surveyor that a substantial number of loads of general waste were coded by the weighbridge operator as being greenwaste, and charged the lower disposal rate. This has not been taken into account in the analysis.

### 3.2 General waste

#### 3.2.1 “Activity source” of general waste

The “general” waste being disposed of at Tokoroa Landfill excludes:

- kerbside collections of refuse (both Council and private)
- sewage sludge
- greenwaste disposed of at separate drop-off point
- waste from Putaruru transfer station
- bark and other materials designated as cover material.

During the survey period, data were gathered on 165 loads of general waste. This includes waste from C&D, ICI, landscaping, and residential activity. As each load of general waste was disposed of, the activity that had resulted in the waste’s generation was assessed and recorded.

From the weighbridge records for the survey week, it was estimated that 141 tonnes of general waste were disposed of at the facility. This total includes the estimated 84% of material coded as “Green waste” at the weighbridge that was disposed of directly to the discharge face. These loads are classified as landscaping waste. Table 3.1 below shows the percentage of loads originating from each activity, the percentage of total weight, and the tonnes per week.

**Table 3.1 - Activity source of general waste –November 5-11 2007**

	% of loads	% of total weight	Tonnes per week
<b>C&amp;D</b>	6%	5%	7 T/week
<b>ICI</b>	23%	43%	60 T/week
<b>Landscaping</b>	28%	34%	47 T/week
<b>Residential</b>	43%	19%	26 T/week
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>141 T/week</b>

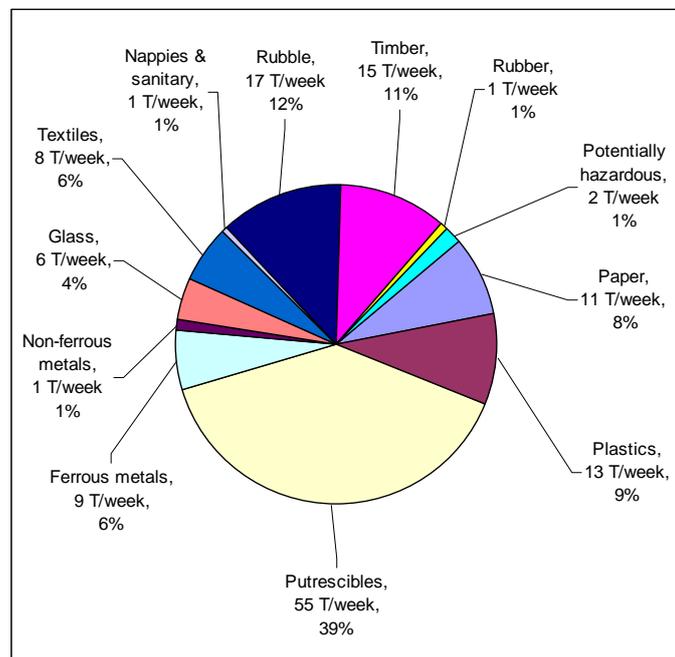
Residential activity was the source of 43% of all loads of waste, but these loads accounted for only 19% of the total weight of general waste. This is due to a large number of residential waste loads being relatively small, such as when bags of domestic refuse are dropped off. C&D loads accounted for 6% of vehicle loads and 5% of total weight. Most of the C&D loads were small household-scale loads carried by trailer. Waste from landscaping activity generated 28% of loads, and 34% of the total weight. While a high proportion of landscaping loads were trailer-sized, a few loads, from garden waste contractors and an earthmoving business, weighed over 3 tonnes. Loads of waste from industrial/commercial/institutional sources were the largest source of general waste, by weight, comprising 43% of the total. The average load weight for ICI waste was much greater than for the other sources, as many of the loads were transported by gantry trucks and front-loaders.

### 3.2.2 Primary composition of general waste

The primary composition of the general waste is presented in Table 3.2 and Figure 3.1 below. The secondary composition, which includes all 22 categories, is given in Appendix 4.

**Table 3.2 – Primary composition of general waste – November 5-11 2007**

Primary category	Proportion of total (margins of error for 95% confidence level)	Tonnes per week
Paper	8.1% ( $\pm 3.8\%$ )	11 T/week
Plastics	9.1% ( $\pm 3.7\%$ )	13 T/week
Putrescibles	39.2% ( $\pm 16.8\%$ )	55 T/week
Ferrous metals	6.3% ( $\pm 2.3\%$ )	9 T/week
Non-ferrous metals	1.0% ( $\pm 0.3\%$ )	1 T/week
Glass	4.3% ( $\pm 1.5\%$ )	6 T/week
Textiles	5.7% ( $\pm 2.8\%$ )	8 T/week
Nappies and sanitary	0.6% ( $\pm 0.3\%$ )	1 T/week
Rubble	12.4% ( $\pm 14.0\%$ )	17 T/week
Timber	10.9% ( $\pm 3.7\%$ )	15 T/week
Rubber	0.9% ( $\pm 0.5\%$ )	1 T/week
Potentially hazardous	1.5% ( $\pm 1.5\%$ )	2 T/week
<b>TOTAL</b>	<b>100.0%</b>	<b>141 T/week</b>



**Figure 3.1 – Primary composition of general waste – November 5-11 2007**

Putrescible material is the largest single component of the general waste stream, comprising nearly 40% of the total. Three-quarters of the putrescible material was greenwaste. Timber and rubble comprised similar proportions of the general waste, about 12%. All other materials comprised less than 10% of the total.

### 3.2.3 Primary composition of general waste - by activity source

The primary composition of the four activity sources of general waste are shown in Table 3.3 below. The secondary compositions and margins of error are given in Appendix 5.

**Table 3.3 – Primary composition of general waste –  
by activity source – November 5-11 2007**

Primary category	C&D	ICI	Landscaping	Residential
Paper	4.8%	15.5%	0.1%	8.6%
Plastics	6.4%	16.4%	0.4%	11.5%
Putrescibles	4.5%	16.4%	68.4%	30.3%
Ferrous metals	9.2%	8.3%	0.1%	13.9%
Non-ferrous metals	2.0%	1.6%	0.0%	1.3%
Glass	4.0%	8.0%	0.0%	4.9%
Textiles	9.3%	9.7%	0.0%	7.7%
Nappies and sanitary	0.0%	0.8%	0.0%	1.3%
Rubble	21.2%	3.0%	29.6%	4.2%
Timber	34.2%	15.9%	1.3%	14.1%
Rubber	2.6%	1.4%	0.0%	1.2%
Potentially hazardous	1.7%	3.1%	0.0%	1.1%

C&D waste was composed largely of timber and rubble. The C&D waste contained higher proportions of other materials, such as ferrous metals and plastics, than is generally the case. ICI waste was relatively heterogeneous, with no single material comprising more than 17% of the total. A large proportion of ICI waste is packaging. Landscaping waste was primarily greenwaste, 68%, with rubble comprising about 30%. The largest component of residential waste was putrescible material, 30%, of which over half was greenwaste. The greenwaste occurred in mixed loads that contained enough other materials so as not to be classed as primarily from landscaping activity.

### 3.2.4 General waste – by vehicle type

For each vehicle load of waste disposed of on the tipping floor, the vehicle type was recorded. Table 3.4 on the following page shows the percentage of loads transported by each of the vehicle types, the percentage of total weight carried by each vehicle type, and the tonnes per week. A description of the different types of trucks used for transporting waste and a discussion of the potential for recovery of materials is included in Appendix 11.

**Table 3.4 – General waste – by vehicle type – November 5-11 2007**

Vehicle type	% of loads	% of weight	Tonnes/week
Cars	22%	2%	3 T/week
Front-loader trucks	2%	16%	22 T/week
Gantry trucks	8%	20%	29 T/week
Other trucks	12%	28%	39 T/week
Trailers	57%	34%	48 T/week
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>141 T/week</b>

No Huka trucks disposed of waste during the survey period. Only a single compactor truck, other than those carrying domestic kerbside collections, used the facility. Over 20% of the loads disposed of were carried by cars, but car loads accounted for only 2% of the total weight. Many of these car loads comprised a small number of domestic rubbish bags. While front-loader trucks accounted for only 2% of vehicle loads, these loads accounted for 16% of the total weight. Trailers represented 57% of all vehicle loads, and these loads accounted for 34% of the total weight.

### 3.2.5 Primary composition of general waste– by vehicle type

The primary composition of loads carried by the five main types of vehicles that disposed of waste are shown in Table 3.5 below. The secondary compositions are shown in Appendix 6.

**Table 3.5 – Primary composition of general waste – by vehicle type – Nov 5-11 2007**

Primary category	Car	Front-loader truck	Gantry truck	Other truck	Trailer
Paper	7.1%	20.1%	11.7%	4.2%	4.9%
Plastics	8.5%	17.9%	10.7%	6.7%	7.7%
Putrescibles	66.0%	12.0%	17.1%	49.5%	45.2%
Ferrous metals	1.5%	7.3%	7.8%	3.3%	8.6%
Non-ferrous metals	0.5%	1.5%	1.1%	0.7%	1.1%
Glass	5.4%	5.3%	8.5%	3.5%	2.6%
Textiles	0.9%	12.9%	7.6%	2.4%	5.2%
Nappies and sanitary	3.3%	0.2%	0.6%	0.6%	0.5%
Rubble	0.5%	3.7%	14.3%	26.1%	6.6%
Timber	4.9%	14.7%	19.0%	2.5%	13.4%
Rubber	0.4%	2.5%	0.9%	0.1%	1.0%
Potentially hazardous	1.1%	1.9%	0.8%	0.3%	3.1%

### 3.3 Overall waste

#### 3.3.1 Source of overall waste

Data on six separate waste streams is combined to produce information on the “overall” waste flow being discharged at Tokoroa Landfill. The six waste streams are:

- general waste
- kerbside collections of refuse (both Council and private)
- sewage sludge (designated a “special” waste)
- greenwaste disposed of at separate drop-off point (included in “cover material”)
- waste from Putaruru transfer station
- bark from CHH Kinleith mill and other materials designated as cover material.

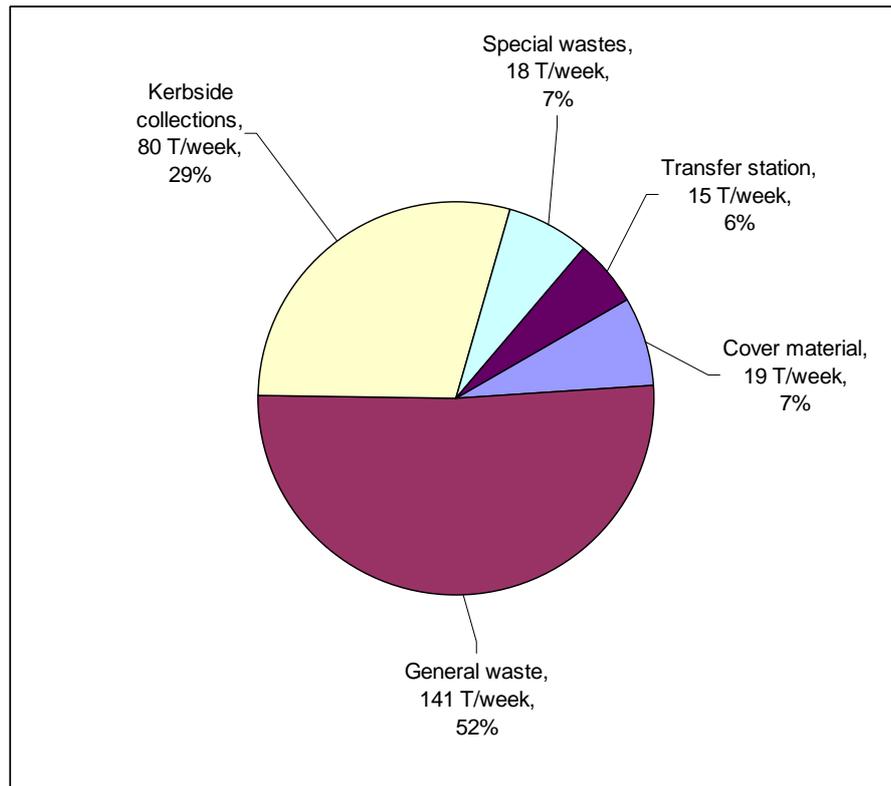
The breakdown of the sources of waste comprising the “overall” waste stream presented in Table 3.6 below and Figure 3.2 on the next page should be considered representative of an “average” week, and not specifically representative of the survey period. Two materials – sewage sludge and bark from CHH Kinleith mill – are regularly disposed of in large quantities at the landfill, but not on a weekly basis. Average weekly quantities for these materials are used for the calculations in the table. Derivation of the average weekly quantities is explained in Section 3.1.

**Table 3.6 – Material types to landfill – average weekly flow**

<b>Material type</b>	<b>% of weight</b>	<b>Tonnes/week</b>
Cover material	7%	19 T/week
General waste	52%	141 T/week
Kerbside collections	29%	80 T/week
Special waste	7%	18 T/week
Transfer station	6%	15 T/week
<b>TOTAL</b>	<b>100%</b>	<b>273 T/week</b>

An average of 273 tonnes of material are discharged weekly at Tokoroa Landfill. Just over half of the material is general waste. The second largest component is kerbside collections, both Council and private, which comprised 29% of the total. The other three material types comprise similar proportions of the total, about 7%.

Of the kerbside collections, the Council collection, contracted to Excell Corp, comprised 55% of the total. Private waste operators collected 45% of all kerbside collections.



**Figure 3.2 – Material types to landfill – average weekly flow**

### 3.3.2 Primary composition of overall waste

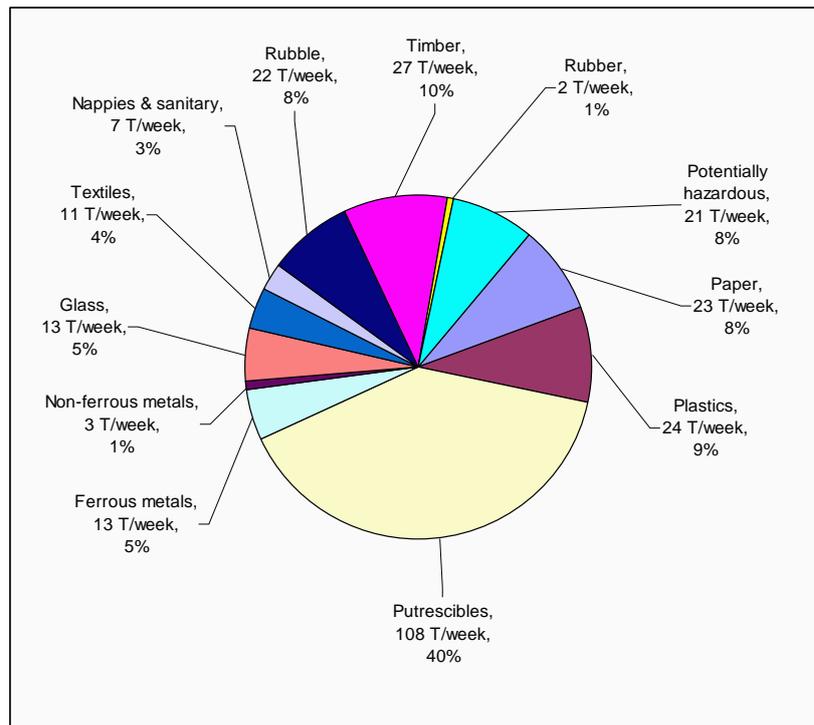
The composition of the overall waste stream was calculated by combining the composition of the different material types based on the proportions given in Table 3.6. An assumed composition for the kerbside collection has been used. The assumed composition, based on previous sort-and-weigh audits of kerbside collections by Waste Not Consulting, is given in Appendix 7.

The cover material is comprised of bark from CHH Kinleith mill (classed as “Timber – Multimaterial/other), greenwaste discharged at separate drop-off point (classed as “Putrescibles – Greenwaste”), and material classed as “cover” at the weighbridge (classified by the surveyor as “Rubble – Multimaterial/other). Sewage sludge (the special waste) is classified as “Potentially hazardous”. The composition of the waste from Putaruru transfer station is assumed to be the same as the general waste being discharged at Tokoroa Landfill.

The primary composition of the overall waste stream is given in Table 3.7 and Figure 3.3 on the next page. The secondary composition is given in Appendix 8.

**Table 3.7 – Primary composition of overall waste – average weekly flow 2007**

Primary category	Proportion of total	Tonnes per week
Paper	8.4%	23 T/week
Plastics	8.8%	24 T/week
Putrescibles	39.8%	108 T/week
Ferrous metals	4.6%	13 T/week
Non-ferrous metals	0.9%	3 T/week
Glass	4.8%	13 T/week
Textiles	4.0%	11 T/week
Nappies and sanitary	2.7%	7 T/week
Rubble	7.9%	22 T/week
Timber	9.7%	27 T/week
Rubber	0.6%	2 T/week
Potentially hazardous	7.7%	21 T/week
<b>TOTAL</b>	<b>100.0%</b>	<b>273 T/week</b>



**Figure 3.3 – Primary composition of overall waste – average weekly flow**

Putrescible material comprised the largest primary classification of the overall waste stream, representing 40% of the total. Over half the putrescible material was greenwaste. All other materials comprised less than 10% of the total.

## 4 Discussion and analysis

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### 4.1 Weekly and annual tonnage to landfill

To check that the overall waste flows for the period November 5-11 2007 (i.e. those analysed for this study) were not anomalous, weighbridge records for two other weekly periods were also analysed. The results of the analysis are shown in Table 4.1 below. The waste flows have been analysed based on weighbridge codes. For loads that were not weighed, average weights for that vehicle and load type were used.

**Table 4.1 – Weekly tonnage of waste to landfill**

Tonnes per week	Feb 12-18 07	June 11-17 07	Nov 5-11 07
Council kerbside collection <sup>(1)</sup>	41.2	41.0	43.6
General waste	147.9	107.3	127.3
Greenwaste <sup>(2)</sup>	51.7	41.6	58.6
Transfer station <sup>(3)</sup>	0.0	22.9	15.1
<b>Total</b>	<b>241</b>	<b>213</b>	<b>245</b>

<sup>(1)</sup> Weighbridge waste type “Kerbside collection”

<sup>(2)</sup> Weighbridge waste type “Green waste kg.” and others similar

<sup>(3)</sup> Weighbridge waste type “No charge landfill bin”

The weekly tonnage for the survey period of November 5-11 is similar to those for the other two weeks. The absence of any waste from the Putaruru transfer station in the February records is presumably due to this being prior to the closing of the Putaruru landfill and the establishment of the transfer station. The lower tonnage for the June week is common, as mid-winter is generally the period for lowest waste generation.

The annual tonnage of all materials being discharged at Tokoroa Landfill is calculated as follows:

Average weekly waste to landfill (from Table 4.1)	233 tonnes
Average annual waste to landfill	12,103 tonnes
Annual sewage sludge to landfill (see Section 3.1)	1000 tonnes
Annual bark from CHH Kinleith (see Section 3.1)	468 tonnes
<b>Total annual materials to landfill</b>	<b>13,571 tonnes</b>

The figure of 13,571 tonnes to landfill should not be taken as a precise estimate, based as it is on a relatively small amount of information.

Council regularly commissions volumetric surveys of Tokoroa Landfill, to determine the volume of material discharges. From data supplied by Council, the volume of material in the landfill has been increasing by approximately 19,000 cubic metres per annum over the last two years. Using the tonnage estimate of 13,571 tonnes per annum, this equates to a compacted refuse density of 0.7 tonnes per cubic metre. This is in line with international research on the subject. <sup>2</sup>

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<sup>2</sup> USEPA (1995) Decision Maker’s Guide to Solid Waste Management, Volume II,

## 4.2 Per capita waste generation

The 2006 census estimates the usually resident population for South Waikato District as 22,641. It would be reasonable to assume that all waste generated by this population is ultimately disposed of at Tokoroa Landfill (other than minor amounts disposed of at Matamata transfer station and Taupo landfill). By annualising the data from Table 3.6, the per capita waste generation rates in the table below have been calculated. It is assumed that kerbside collections are not available to all residents, in particular those in isolated rural locations, so a population figure of 20,000 has been used for the “kerbside collections” calculations.

**Table 4.2 – Per capita waste generation**

Per capita waste disposal rates	T/week	T/annum	Kg/capita/annum
<b>Kerbside collections</b>	80 T/week	4154 T/annum	208 kg
<b>General and transfer station waste</b>	156 T/week	8090 T/annum	357 kg
<b>Overall (excluding cover materials and special waste)</b>	236 T/week	12,244 T/annum	541 kg
<b>Overall (including cover materials and special waste)</b>	273 T/week	14,187 T/annum <sup>(1)</sup>	627 kg

<sup>(1)</sup> This figure differs to the annual tonnage given in Section 4.1 as it is based on the annualised results from the survey week rather than the average of three weeks used in Section 4.1.

The figure of 208 kg/capita/annum for kerbside collections includes both Council and private collections from both residential and commercial properties. This figure is in line with other local authority areas studied by Waste Not where private wheelie bin collections constitute a substantial share of the kerbside collection market.

As the quantities of special wastes, cover material, and cleanfill disposed of to landfill vary markedly between districts and can represent a substantial proportion of waste, the total waste to landfill does not necessarily represent a useful figure for comparison of “waste generation”. In Table 4.3 below, these waste streams have been removed from the analysis for a range of other local authority areas.

**Table 4.3 – Overall waste to landfill – by local authority area**

Overall waste (excluding cover materials and special waste)	2006 population	Waste generated - tonnes	Tonnes per capita per annum
<b>Hauraki District 2006</b>	17,190	7646	0.445
<b>Kapiti Coast District 2005</b>	46,000	20,362 <sup>(1)</sup>	0.443 <sup>(1)</sup>
<b>Lower and Upper Hutt 2005</b>	135,000	99,530 <sup>(1)</sup>	0.737 <sup>(1)</sup>
<b>Matamata-Piako District 2006</b>	30,500	15,952	0.523
<b>Porirua City 2005</b>	47,700	31,830 <sup>(1)</sup>	0.667 <sup>(1)</sup>
<b>Rodney District 2006</b>	89,200	34,788	0.390
<b>Rotorua 2007</b>	70,400	52,126	0.740
<b>South Waikato District 2007</b>	22,641	12,244	0.541
<b>Wellington City 2005</b>	183,500	125,138 <sup>(1)</sup>	0.682 <sup>(1)</sup>

<sup>(1)</sup> Waste Not Consulting (2006) *Wellington “waste catchment” trial*, prepared for MfE, unpublished

The calculated disposal rate for South Waikato District of 0.541 tonnes/capita/annum is comparable to other local authority areas with similar economic bases. The South Waikato

District disposal rate is very similar to that in the adjoining Matamata-Piako District. The data in the table show that disposal rates are generally lower in predominantly rural areas and areas with lower levels of commercial and industrial activity. The highest disposal rates are for the industrialised urban areas, such as in the Wellington region, and Rotorua, which has a high degree of tourism activity.

### 4.3 Targets in the NZ Waste Strategy

The NZ Waste Strategy 2002 includes targets relating to the measurement and diversion of organic wastes and construction and demolition wastes. The relevant targets in the Strategy are presented in Appendix 9. The interpretations of the terms in the Strategy that have been used for the following analyses are discussed in Appendix 10.

The overall waste stream discharged at Tokoroa Landfill has been quantified in Section 3.3. This information is used as the basis for the analysis in Table 4.4 below.

**Table 4.4 – South Waikato District – NZ Waste Strategy targets**

<b>Target 2.1 – “Organic waste”</b>
<b>Quantity of “organic “waste” to landfill – 108 T/week</b> This is the weekly tonnage of “Putrescibles” in the overall waste stream from Table 3.7
<b>Target 2.2 – “Garden waste”</b>
<b>Quantity of “garden waste” to landfill – 66 T/week</b> This is the weekly tonnage of “Greenwaste” in the overall waste stream from Appendix 8.
<b>Target 2.3 – “Other organic waste streams (such as kitchen wastes)”</b>
Quantities in residual waste to landfill: <b>Kitchen waste – 36 T/week</b> <b>Greenwaste – 66 T/week</b> <b>Putrescible Multimaterial/other – 7 T/week</b>  These are the weekly tonnages of the secondary categories of “Putrescibles” in the overall waste stream from Appendix 8.
<b>Target 2.5 – “Commercial organic wastes”</b>
ICI waste to landfill – 60 T/week (from Table 3.1) Putrescibles as percentage of ICI waste to landfill – 16% (from Table 3.3) <b>Quantity of “commercial organic wastes” to landfill – 10 T/week</b>
<b>Targets 4.1 and 4.2 – “Construction and demolition waste”</b>
<b>Quantity of “construction and demolition waste” to landfill – 7 T/week</b> This is the weekly tonnage of waste generated by “Construction and demolition” activity from Table 3.1

### 4.4 Recommendations

Through the survey at Tokoroa Landfill and the analysis of the weighbridge records, a reasonably accurate estimate has been made of the composition and quantity of waste being

disposed of. at the facility. The study has produced baseline data relevant to the targets in the New Zealand Waste Strategy and in terms of per capita refuse generation.

To enable Council to accurately measure its progress towards the targets in its Waste Management Plan, and to assist Council with planning its waste minimisation strategy, it is recommended that surveys compatible with the survey in this report be undertaken at regular intervals. Unless major changes to the waste management systems are planned, annual surveys should not be necessary, and surveys undertaken every 2-3 years would be adequate.

To improve the available data on the overall tonnages of materials being discharged at the landfill, it is recommended that vehicle loads of cover materials, such as that from the CHH Kinleith mill, be weighed and recorded.

## Appendix 1 – Waste management services in South Waikato District

<b>SOUTH WAIKATO DISTRICT COUNCIL-CONTROLLED WASTE STREAMS</b>	
<b>Waste collections</b>	
<b>Residential kerbside</b>	<ul style="list-style-type: none"> <li>Contracted to Excell Corp</li> <li>Weekly user-pays bag collection in Arapuni, Putaruru, Tirau, and Tokoroa</li> <li>Disposed of at Tokoroa landfill</li> </ul>
<b>Commercial kerbside</b>	<ul style="list-style-type: none"> <li>Contracted to Excell Corp</li> <li>Weekly user-pays bag collection in Arapuni, Putaruru, Tirau, and Tokoroa</li> <li>Carried out Tuesday, Wednesday, and Thursday</li> <li>Disposed of at Tokoroa landfill</li> </ul>
<b>Litter bins</b>	<ul style="list-style-type: none"> <li>Contracted to Excell Corp</li> <li>Disposed of at Tokoroa landfill</li> </ul>
<b>Illegal dumping</b>	<ul style="list-style-type: none"> <li>Collected by Council Staff or Excell Corp.</li> <li>Disposed of at Tokoroa landfill</li> </ul>
<b>Recycling collections</b>	
<b>Kerbside collection of recyclable containers and paper</b>	<ul style="list-style-type: none"> <li>Contracted to South Waikato Achievement Centre</li> <li>Collected from both residential and commercial premises</li> <li>Fortnightly residential collection in Putaruru, Tokoroa, Tirau, and Arapuni</li> </ul>
<b>Drop-off points</b>	<ul style="list-style-type: none"> <li>Public recycling depots at Tokoroa landfill, South Waikato Achievement Centre on Thompson Street, at Waotu, Dunham Park on State Highway 1 Tokoroa, Putaruru Landfill, in Arapuni at the Pioneer Crescent Reserve and at the Atiamuri Hall</li> </ul>
<b>Putaruru disposal facility</b>	
<b>General waste</b>	<ul style="list-style-type: none"> <li>Landfill closed, acting as transfer station only</li> <li>Waste collected in 9 m<sup>3</sup> skips</li> <li>Disposed of at Tokoroa Landfill</li> <li>Separate greenwaste drop-off point. Material mixed with sewage sludge prior to disposal at Tokoroa Landfill</li> </ul>
<b>Tokoroa landfill</b>	
<b>General waste</b>	<ul style="list-style-type: none"> <li>Open from 9am to 4 pm</li> <li>All vehicles dispose at same tip face</li> <li>All vehicles weighed in</li> </ul>
<b>Greenwaste</b>	<ul style="list-style-type: none"> <li>Separate drop-off point. Collected material stockpiled, mulched and used as cover or, when required, mixed with sewage sludge prior to landfill disposal</li> </ul>
<b>Cover material</b>	<ul style="list-style-type: none"> <li>Bark from CHH Kinleith mill received at no charge, stockpiled, and used for cover material as required</li> </ul>
<b>Hardfill</b>	<ul style="list-style-type: none"> <li>No separate drop-off point</li> </ul>
<b>Hazardous materials</b>	<ul style="list-style-type: none"> <li>Not accepted.</li> </ul>

<b>Scrap metal</b>	<ul style="list-style-type: none"> <li>Car bodies, whiteware, small quantities metal accepted at separate drop-off point</li> </ul>
<b>Recyclable containers</b>	<ul style="list-style-type: none"> <li>Separate drop-off point at Landfill entry.</li> </ul>
<b>Paper/ cardboard</b>	<ul style="list-style-type: none"> <li>Separate drop-off point at Landfill entry.</li> </ul>
<b>Other recoverable materials/ reusable goods</b>	<ul style="list-style-type: none"> <li>None.</li> </ul>
<b>Special wastes</b>	
<b>Biosolids</b>	<ul style="list-style-type: none"> <li>Four wastewater treatment plants in District. Sludge disposed of at Tokoroa Landfill.</li> </ul>
<b>Sewage milliscreenings</b>	<ul style="list-style-type: none"> <li>Four wastewater treatment plants in District. Milliscreenings disposed of at the Tokoroa Landfill.</li> </ul>
<b>Sludges</b>	<ul style="list-style-type: none"> <li>Delivered regularly by MJ Cobham, mixed with mulched greenwaste, and used for cover material.</li> </ul>
<b>Road sweepings</b>	<ul style="list-style-type: none"> <li>Currently stockpiled at Excell depot in Tirau.</li> </ul>
<b>PRIVATELY-CONTROLLED WASTE STREAMS</b>	
<b>Waste collections</b>	
<b>Domestic/ commercial kerbside</b>	<ul style="list-style-type: none"> <li>Kerbside collection by Pete's Bins.</li> </ul>
<b>Residential</b>	<ul style="list-style-type: none"> <li>Wheelie bin and gantry skip service from Pete's Bins.</li> </ul>
<b>Industrial/ commercial/ institutional</b>	<ul style="list-style-type: none"> <li>Kerbside collection by Pete's Bins.</li> <li>Regular collection by Waste Management NZ.</li> </ul>
<b>Large-scale waste generators</b>	
	<ul style="list-style-type: none"> <li>ABB Group's Kinleith Mill recycles through Wastepro. Residual refuse goes to CHH's own landfill on Smythe Rd.</li> </ul>

## Appendix 2 – Tokoroa Landfill charges <sup>3</sup>

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### Notes:

1. All landfill fees are based on full loads and the governing criteria of \$90.00/tonne. (\$100/tonne proposed for 07/08)
2. Tyres are not included in the prescribed fees and are separately charged. All tyres larger than 16" x 750 accepted at Tokoroa landfill only.
3. No liquid hazardous waste permitted and non-soluble solid wastes permitted – only by special arrangement.
4. Charges are per entry, eg, a vehicle towing a trailer, both containing refuse, incurs a total charge.
5. All commercial and industrial waste to Tokoroa landfill only.
6. Purchase of refuse bags – see "Refuse Bags Purchase".

### **Recyclables**

Sorted to recycling depots at landfill entrances without entry to landfill – no greenwaste – cans, bottles, plastics, newsprint and kraft paper only - No charge

### **Greenwaste**

Tokoroa and Putaruru landfills – loads of clean greenwaste to greenwaste mulching area.  
Maximum wood size 100 mm diameter  
Half normal fees

### **Clean Cover Material**

Approved by arrangement with authorised staff and for disposal where instructed  
Half normal fees where approved

### **Disposal of Refuse Bags**

Unofficial refuse bags – 60 litre capacity maximum only \$1.70/bag (\$2.00/bag proposed for 07/08)  
Official refuse bags – 60 litre capacity maximum only – if bag and contents deposited intact in bin at entrance to landfill - Free

### **Commercial Operators**

- not exceeding 150 tonnes/month \$90.00/tonne (\$100/tonne proposed for 07/08)  
- exceeding 150 tonnes/month 15% discount on total monthly account  
Use of weighbridge to weigh a vehicle (no rubbish deposited) \$17.00

### **Car Bodies**

Due to work needed to strip/store vehicles until recycling car body compressor arrives, current operations contract reverts ownership of car bodies to the contractor  
Stripped – no number plate \$25.00 (Free proposed for 07/08)  
Not stripped \$50.00 (\$25.00 proposed for 07/08)

### **Out of District Refuse**

No out of District refuse accepted without consent of Group Manager Asset Management \$180.00/tonne or twice fee for vehicles  
(\$200.00/tonne or twice fee for vehicles proposed for 07/08)

### **Tyres**

Up to 16" by 750 (Tokoroa and Putaruru landfills) \$2.00/tyre (\$3.00/tyre proposed for 07/08)  
16" x 900 (Tokoroa only) \$5.00/tyre (\$6.00/tyre proposed for 07/08)  
All 24" (Tokoroa only) \$10.00/tyre (\$12.00/tyre proposed for 07/08)  
36" and over (Tokoroa only) \$20.00/tyre

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<sup>3</sup> [http://www.swktodc.govt.nz/pdf/DAP\\_2007-08/06\\_fees\\_charges.pdf](http://www.swktodc.govt.nz/pdf/DAP_2007-08/06_fees_charges.pdf)

## Appendix 3 – Visual survey waste classifications

Primary category	Secondary category	Description
<b>Paper</b>	Recyclable	Newspapers, cardboard junk mail, magazines, office paper, etc.
	Multimaterial/other	Multimaterials, liquid containers such as Tetrapak and gable tops, contaminated paper, waxed papers
<b>Plastics</b>	Recyclable	HDPE and PET (#2 and 1) drink containers
	Multimaterial/other	Other types of plastic and primarily plastic multimaterials
<b>Putrescibles</b>	Kitchen/food	Food and food preparation waste
	Greenwaste	Vegetation, branches, stumps
	Multimaterial/other	Organic matter such as meat processing waste, dead animals
<b>Ferrous metal</b>	Primarily ferrous	Items made primarily of steel
	Multimaterial/other	Ferrous items containing a sizable proportion of other materials
<b>Non-ferrous metal</b>	Primarily non-ferrous	Items made primarily of non-ferrous metal
<b>Glass</b>	Recyclable	Bottles and jars
	Multimaterial/other	Other items made primarily of glass, includes pane, TVs, and computer monitors
<b>Textiles</b>	Clothing/textile	Items made primarily of cloth or textiles
	Multimaterial/other	Items containing some textile and other materials, such as carpets, shoes, backpacks, suitcases
<b>Nappies &amp; sanitary</b>	None	Sanitary paper, such as nappies, paper towels, feminine hygiene products
<b>Rubble</b>	Concrete	
	Other	Other materials such as soil, fibreglass, ceramics, rubble, rocks, plasterboard
<b>Timber</b>	Unpainted & untreated	Unpainted and untreated lengths of timber
	Fabricated	Fabricated items, such as furniture and multimaterial items made primarily of wood
	Multimaterial/other	Sawdust, construction and demolition debris
<b>Rubber</b>	None	All items made primarily of rubber such as tyres, latex foam mattresses
<b>Potentially hazardous</b>	None	Material with potentially toxic or ecotoxic properties or having properties requiring special disposal techniques.

## Appendix 4 – General waste – November 5-11 2007

General waste - November 5-11 2007		Proportion of total (margins of error for 95% confidence level)	Tonnes per week
<b>Paper</b>	Recyclable	5.8% (±2.9%)	8 T/week
	Multimaterial/other	2.3% (±1.2%)	3 T/week
	<b>Subtotal</b>	<b>8.1% (±3.8%)</b>	<b>11 T/week</b>
<b>Plastics</b>	Recyclable	0.9% (±0.4%)	1 T/week
	Multimaterial/other	8.2% (±3.4%)	11 T/week
	<b>Subtotal</b>	<b>9.1% (±3.7%)</b>	<b>13 T/week</b>
<b>Putrescibles</b>	Kitchen waste	3.9% (±2.3%)	5 T/week
	Greenwaste	31.8% (±16.0%)	45 T/week
	Multimaterial/other	3.3% (±1.8%)	5 T/week
	<b>Subtotal</b>	<b>39.2% (±16.8%)</b>	<b>55 T/week</b>
<b>Ferrous metals</b>	Primarily ferrous	2.2% (±0.7%)	3 T/week
	Multimaterial/other	4.1% (±2.1%)	6 T/week
	<b>Subtotal</b>	<b>6.3% (±2.3%)</b>	<b>9 T/week</b>
<b>Non-ferrous metals</b>		<b>1.0% (±0.3%)</b>	<b>1 T/week</b>
<b>Glass</b>	Recyclable	1.9% (±0.9%)	3 T/week
	Multimaterial/other	2.4% (±1.1%)	3 T/week
	<b>Subtotal</b>	<b>4.3% (±1.5%)</b>	<b>6 T/week</b>
<b>Textiles</b>	Clothing/textiles	1.1% (±0.5%)	2 T/week
	Multimaterial/other	4.6% (±2.5%)	7 T/week
	<b>Subtotal</b>	<b>5.7% (±2.8%)</b>	<b>8 T/week</b>
<b>Nappies and sanitary</b>		<b>0.6% (±0.3%)</b>	<b>1 T/week</b>
<b>Rubble</b>	Concrete	0.7% (±0.5%)	1 T/week
	Other	11.7% (±13.9%)	16 T/week
	<b>Subtotal</b>	<b>12.4% (±14.0%)</b>	<b>17 T/week</b>
<b>Timber</b>	Unpainted & untreated	2.0% (±1.0%)	3 T/week
	Fabricated	4.0% (±1.5%)	6 T/week
	Multimaterial/other	5.0% (±1.9%)	7 T/week
	<b>Subtotal</b>	<b>10.9% (±3.7%)</b>	<b>15 T/week</b>
<b>Rubber</b>		<b>0.9% (±0.5%)</b>	<b>1 T/week</b>
<b>Potentially hazardous</b>		<b>1.5% (±1.5%)</b>	<b>2 T/week</b>
<b>TOTAL</b>		<b>100.0%</b>	<b>141 T/week</b>

Totals/subtotals may not add due to rounding

In those instance where the margin of error is greater than the number itself, the lower limit is zero.

## Appendix 5 – General waste – by activity source – November 5-11 2007

General waste - by activity source November 5-11 2007		C&D	ICI	Landscaping	Residential
Paper	Recyclable	3.6%	10.8%	0.0%	6.8%
	Multimaterial/other	1.2%	4.6%	0.1%	1.9%
	<b>Subtotal</b>	<b>4.8%</b>	<b>15.5%</b>	<b>0.1%</b>	<b>8.6%</b>
Plastics	Recyclable	0.3%	1.8%	0.0%	1.2%
	Multimaterial/other	6.2%	14.7%	0.4%	10.3%
	<b>Subtotal</b>	<b>6.4%</b>	<b>16.4%</b>	<b>0.4%</b>	<b>11.5%</b>
Putrescibles	Kitchen waste	0.1%	5.2%	0.1%	10.5%
	Greenwaste	0.0%	6.9%	65.9%	16.4%
	Multimaterial/other	4.4%	4.3%	2.4%	3.4%
	<b>Subtotal</b>	<b>4.5%</b>	<b>16.4%</b>	<b>68.4%</b>	<b>30.3%</b>
Ferrous metals	Primarily ferrous	4.5%	2.6%	0.1%	5.0%
	Multimaterial/other	4.7%	5.7%	0.0%	8.9%
	<b>Subtotal</b>	<b>9.2%</b>	<b>8.3%</b>	<b>0.1%</b>	<b>13.9%</b>
<b>Non ferrous metals</b>		<b>2.0%</b>	<b>1.6%</b>	<b>0.0%</b>	<b>1.3%</b>
Glass	Recyclable	0.2%	3.5%	0.0%	2.8%
	Multimaterial/other	3.8%	4.5%	0.0%	2.1%
	<b>Subtotal</b>	<b>4.0%</b>	<b>8.0%</b>	<b>0.0%</b>	<b>4.9%</b>
Textiles	Clothing/textiles	1.0%	1.9%	0.0%	1.5%
	Multimaterial/other	8.2%	7.8%	0.0%	6.2%
	<b>Subtotal</b>	<b>9.3%</b>	<b>9.7%</b>	<b>0.0%</b>	<b>7.7%</b>
<b>Nappies and sanitary</b>		<b>0.0%</b>	<b>0.8%</b>	<b>0.0%</b>	<b>1.3%</b>
Rubble	Concrete	6.4%	0.3%	0.5%	0.7%
	Other	14.9%	2.7%	29.2%	3.6%
	<b>Subtotal</b>	<b>21.2%</b>	<b>3.0%</b>	<b>29.6%</b>	<b>4.2%</b>
Timber	Unpainted & untreated	9.0%	2.4%	0.9%	1.8%
	Fabricated	7.1%	6.1%	0.0%	6.7%
	Multimaterial/other	18.1%	7.3%	0.5%	5.5%
	<b>Subtotal</b>	<b>34.2%</b>	<b>15.9%</b>	<b>1.3%</b>	<b>14.1%</b>
<b>Rubber</b>		<b>2.6%</b>	<b>1.4%</b>	<b>0.0%</b>	<b>1.2%</b>
<b>Potentially hazardous</b>		<b>1.7%</b>	<b>3.1%</b>	<b>0.0%</b>	<b>1.1%</b>
<b>TOTAL</b>		<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Totals/subtotals may not add due to rounding

## Appendix 6 – General waste – by vehicle type – November 5-11 2007

General waste - by vehicle type November 5-11 2007		Car	Front- loader truck	Gantry truck	Other truck	Trailer
<b>Paper</b>	Recyclable	5.9%	15.8%	9.2%	1.3%	3.7%
	Multimaterial/other	1.2%	4.4%	2.5%	2.9%	1.2%
	<b>Subtotal</b>	<b>7.1%</b>	<b>20.1%</b>	<b>11.7%</b>	<b>4.2%</b>	<b>4.9%</b>
<b>Plastics</b>	Recyclable	0.8%	2.2%	1.5%	0.3%	0.7%
	Multimaterial/other	7.6%	15.7%	9.1%	6.4%	7.0%
	<b>Subtotal</b>	<b>8.5%</b>	<b>17.9%</b>	<b>10.7%</b>	<b>6.7%</b>	<b>7.7%</b>
<b>Putrescibles</b>	Kitchen waste	13.5%	4.8%	4.6%	1.5%	5.4%
	Greenwaste	51.9%	2.4%	8.1%	43.9%	37.8%
	Multimaterial/other	0.7%	4.8%	4.3%	4.0%	2.1%
	<b>Subtotal</b>	<b>66.0%</b>	<b>12.0%</b>	<b>17.1%</b>	<b>49.5%</b>	<b>45.2%</b>
<b>Ferrous metals</b>	Primarily ferrous	0.7%	1.5%	3.0%	1.2%	3.2%
	Multimaterial/other	0.8%	5.9%	4.8%	2.1%	5.4%
	<b>Subtotal</b>	<b>1.5%</b>	<b>7.3%</b>	<b>7.8%</b>	<b>3.3%</b>	<b>8.6%</b>
<b>Non-ferrous metals</b>		<b>0.5%</b>	<b>1.5%</b>	<b>1.1%</b>	<b>0.7%</b>	<b>1.1%</b>
<b>Glass</b>	Recyclable	5.0%	1.0%	5.2%	1.3%	1.0%
	Multimaterial/other	0.5%	4.4%	3.3%	2.2%	1.6%
	<b>Subtotal</b>	<b>5.4%</b>	<b>5.3%</b>	<b>8.5%</b>	<b>3.5%</b>	<b>2.6%</b>
<b>Textiles</b>	Clothing/textiles	0.5%	1.5%	2.5%	0.4%	0.9%
	Multimaterial/other	0.4%	11.4%	5.2%	2.0%	4.4%
	<b>Subtotal</b>	<b>0.9%</b>	<b>12.9%</b>	<b>7.6%</b>	<b>2.4%</b>	<b>5.2%</b>
<b>Nappies and sanitary</b>		<b>3.3%</b>	<b>0.2%</b>	<b>0.6%</b>	<b>0.6%</b>	<b>0.5%</b>
<b>Rubble</b>	Concrete	0.0%	0.0%	1.4%	0.0%	1.3%
	Other	0.5%	3.7%	12.9%	26.1%	5.3%
	<b>Subtotal</b>	<b>0.5%</b>	<b>3.7%</b>	<b>14.3%</b>	<b>26.1%</b>	<b>6.6%</b>
<b>Timber</b>	Unpainted & untreated	0.1%	2.5%	3.5%	0.1%	3.0%
	Fabricated	4.5%	7.3%	6.2%	0.8%	4.3%
	Multimaterial/other	0.3%	4.9%	9.3%	1.6%	6.2%
	<b>Subtotal</b>	<b>4.9%</b>	<b>14.7%</b>	<b>19.0%</b>	<b>2.5%</b>	<b>13.4%</b>
<b>Rubber</b>		<b>0.4%</b>	<b>2.5%</b>	<b>0.9%</b>	<b>0.1%</b>	<b>1.0%</b>
<b>Potentially hazardous</b>		<b>1.1%</b>	<b>1.9%</b>	<b>0.8%</b>	<b>0.3%</b>	<b>3.1%</b>
<b>TOTAL</b>		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Totals/subtotals may not add due to rounding

## Appendix 7 – Assumed composition of kerbside collections

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Assumed composition of kerbside collections		Proportion of total
Paper	Recyclable	11.8%
	Multimaterial/other	1.2%
	<b>Subtotal</b>	<b>13.0%</b>
Plastics	Recyclable	1.5%
	Multimaterial/other	10.9%
	<b>Subtotal</b>	<b>12.4%</b>
Putrescibles	Kitchen waste	37.0%
	Greenwaste	9.0%
	Multimaterial/other	2.0%
	<b>Subtotal</b>	<b>48.0%</b>
Ferrous metals	Primarily ferrous	2.1%
	Multimaterial/other	1.5%
	<b>Subtotal</b>	<b>3.6%</b>
<b>Non-ferrous metals</b>		<b>1.3%</b>
Glass	Recyclable	7.5%
	Multimaterial/other	0.6%
	<b>Subtotal</b>	<b>8.1%</b>
Textiles	Clothing/textiles	1.1%
	Multimaterial/other	1.2%
	<b>Subtotal</b>	<b>2.3%</b>
<b>Nappies and sanitary</b>		<b>8.0%</b>
Rubble	Concrete	0.0%
	Other	1.5%
	<b>Subtotal</b>	<b>1.5%</b>
Timber	Unpainted & untreated	0.2%
	Fabricated	0.2%
	Multimaterial/other	0.2%
	<b>Subtotal</b>	<b>0.6%</b>
<b>Rubber</b>		<b>0.3%</b>
<b>Potentially hazardous</b>		<b>0.9%</b>
<b>TOTAL</b>		<b>100%</b>

Totals/subtotals may not add due to rounding

## Appendix 8 – Overall waste flow to landfill

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Overall waste - Average weekly flow November 5-11 2007		Proportion of total	Tonnes per week
<b>Paper</b>	Recyclable	6.8%	18 T/week
	Multimaterial/other	1.7%	5 T/week
	<b>Subtotal</b>	<b>8.4%</b>	<b>23 T/week</b>
<b>Plastics</b>	Recyclable	1.0%	3 T/week
	Multimaterial/other	7.9%	21 T/week
	<b>Subtotal</b>	<b>8.8%</b>	<b>24 T/week</b>
<b>Putrescibles</b>	Kitchen waste	13.1%	36 T/week
	Greenwaste	24.2%	66 T/week
	Multimaterial/other	2.5%	7 T/week
	<b>Subtotal</b>	<b>39.8%</b>	<b>108 T/week</b>
<b>Ferrous metals</b>	Primarily ferrous	1.9%	5 T/week
	Multimaterial/other	2.8%	8 T/week
	<b>Subtotal</b>	<b>4.6%</b>	<b>13 T/week</b>
<b>Non ferrous metals</b>		<b>0.9%</b>	<b>3 T/week</b>
<b>Glass</b>	Recyclable	3.3%	9 T/week
	Multimaterial/other	1.5%	4 T/week
	<b>Subtotal</b>	<b>4.8%</b>	<b>13 T/week</b>
<b>Textiles</b>	Clothing/textiles	1.0%	3 T/week
	Multimaterial/other	3.0%	8 T/week
	<b>Subtotal</b>	<b>4.0%</b>	<b>11 T/week</b>
<b>Nappies and sanitary</b>		<b>2.7%</b>	<b>7 T/week</b>
<b>Rubble</b>	Concrete	0.4%	1 T/week
	Other	7.6%	21 T/week
	<b>Subtotal</b>	<b>7.9%</b>	<b>22 T/week</b>
<b>Timber</b>	Unpainted & untreated	1.2%	3 T/week
	Fabricated	2.3%	6 T/week
	Multimaterial/other	6.2%	17 T/week
	<b>Subtotal</b>	<b>9.7%</b>	<b>27 T/week</b>
<b>Rubber</b>		<b>0.6%</b>	<b>2 T/week</b>
<b>Potentially hazardous</b>		<b>7.7%</b>	<b>21 T/week</b>
<b>TOTAL</b>		<b>100%</b>	<b>273 T/week</b>

Totals/subtotals may not add due to rounding

## Appendix 9 – Targets in NZ Waste Strategy

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The wording and numbering of the targets are taken from the MfE's "Targets in the New Zealand Waste Strategy: 2006 Review of Progress"<sup>4</sup>.

### **Target 2.1**

By December 2003 all territorial local authorities will have instituted a measurement programme to identify existing organic waste quantities and set local targets for diversion from disposal.

### **Target 2.2**

By December 2005, 60 per cent of garden waste will be diverted from landfill and beneficially used, and by December 2010 the diversion of garden waste from landfill to beneficial use will have exceeded 95 per cent.

### **Target 2.3**

By December 2007, a clear quantitative understanding of other organic waste streams (such as kitchen wastes) will have been achieved through the measurement programme established by December 2003.

### **Target 2.5**

By December 2010, the diversion of commercial organic wastes from landfill to beneficial use will have exceeded 95 per cent.

### **Target 4.1**

By December 2005, all territorial local authorities will have instituted a measurement programme to identify existing construction and demolition waste quantities and set local targets for diversion from landfills.

### **Target 4.2**

By December 2008, there will have been a reduction of construction and demolition waste to landfills of 50 per cent of December 2005 levels measured by weight.

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<sup>4</sup> <http://www.mfe.govt.nz/publications/waste/waste-strategy-review-progress-mar07/html/page5a.html>

## Appendix 10 – Interpretation of terms used in the NZ Waste Strategy

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The New Zealand Waste Strategy does not provide specific definitions for the waste streams specified in the targets listed in Appendix 9, nor does it provide appropriate means of measuring or identifying these wastes. The terms used in the Strategy have been interpreted as follows:

**“Organic waste quantities/organic waste streams (such as kitchen wastes)”** – While many different types of waste are organic in nature, such as paper, timber, and soil, the context in which “organic wastes” are discussed in the Strategy is interpreted to mean that it is referring to materials included in the SWAP primary category of “Putrescibles”. While some materials that are classified by the SWAP as “Potentially hazardous”, such as sewage sludges, are clearly organic in nature, as they are dealt with in separate targets in the Strategy it is assumed that they are not to be considered “organic” wastes.

**“Garden waste”** – In the Strategy this phrase appears to denote what is more usually referred to as “greenwaste”, and assumes that the material can be composted or put to “beneficial use”. The term “greenwaste” is commonly used to identify materials such as leaves, tree branches, vegetation, and lawn clippings that result from gardening activity. It is not clear if the Strategy intends “garden waste” to include sod, tree trunks, stumps, and roots resulting from landscaping and earthworks activity. These materials are commonly transported in loads mixed with soil and rubble and are rarely suitable for being composted. For the analysis in this report, “garden waste” is interpreted as including all materials classified as “greenwaste” during the surveys. This category is described in Appendix 3, and includes material from landscaping and earthworks activity.

**“Commercial organic waste”** – The Strategy provides no context from which to determine the meaning of this phrase. For the purpose of the analyses in this report, it is taken as meaning organic waste generated by industrial, commercial, or institutional activity, excluding landscaping, earthworks, and construction and demolition activity.

**“Construction and demolition”** – C&D waste is interpreted as meaning waste materials related to the construction or demolition of a building or structure, excluding natural materials such as clay or rock, unless they are disposed of in conjunction with man-made materials such as timber or concrete. Only fixed elements of a building or structure are considered C&D waste, while non-fixed elements are not. “Fixed” elements of a house would include plasterboard and kitchen bench units, but would not include furniture and carpets. In this report, C&D waste is taken to be only waste in vehicle loads identified as being generated primarily by construction and demolition activity. Although minor amounts of C&D waste are present in other load types, such as residential waste, these wastes are not included in the analysis.

## Appendix 11 – Types of waste disposal vehicles

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### FRONT-LOADER TRUCKS

“Front-loaders” are top-loading compactors that use forks mounted to the front of the vehicle to lift bins over the cab and tip the contents of the bin into the compactor unit at the rear. Front-loaders work primarily in urban areas, regularly servicing medium to large-scale industrial, commercial, and institutional customers. In general, a business using front-loader bins would be serviced at least weekly, but can be serviced several times a day for a business like a large supermarket. Front-loaders vary in size, and may carry loads from 4 to 10 tonnes. A single load may contain waste from ten to fifty customers.



The potential for the recovery of materials from waste transported by front-loaders is limited. The waste load is compacted by the truck, and the loads tend to be large and heterogeneous. This restricts significantly the potential for manually separating recoverable materials when the load is discharged on a tipping floor. There are usually not significant quantities of easily-separable materials other than cardboard packaging in front-loader refuse.

### GANTRY TRUCK

“Gantry trucks” are used to transport gantry bins (skip bins) from customers’ premises to a disposal facility. Gantry truck services are used by industrial, commercial, institutional, and residential customers. Some large-scale commercial waste generators use gantry bins as their regular disposal system. Residential customers and business customers both use gantry bins for one-off large-scale refuse removal. Some commercial customers, such as hotels and supermarkets, use portable, stationary refuse compactors that are transported for disposal by gantry trucks. Gantry bins are often used for special wastes, such as sludges, asbestos, and animal by-products



Typical gantry truck loads weigh from 0.5-3 tonnes. As most refuse transported in gantry bins is not compacted, there is often opportunity for manually recovering materials from gantry bins when discharged onto a tipping floor. Gantry bins often contain significant quantities of recoverable materials, such as timber and packaging and reusable items can be recovered intact from residential loads.

### HUKA TRUCK

“Huka” trucks (or “hook”trucks) transport bins that can be loaded and unloaded from the rear of the truck for transport and that can be emptied quickly like a tip truck. Huka bins are used by large-scale waste generators, either for regular waste disposal or one-off refuse removal. Huka trucks are often used for transporting 30-cubic metre bins from transfer stations to landfills. Huka bins are also used for large-scale transport of recovered materials, such as cardboard and metal. Huka bins are rarely used for residential waste disposal.



The potential for material recovery from huka bins is similar to that for gantry bins.

### **KERBSIDE COLLECTION COMPACTOR**

Side-loading and rear-loading compactors are commonly used for the kerbside collection of residential and small business refuse. They can be designed to service bagged refuse collections, wheelie bin refuse collections, or both.. Side-loading compactors can be used for bag collections or fitted with hydraulic arms for emptying wheelie bins without the driver leaving the vehicle. Rear-loading compactors can also be used for bag collections or fitted with hydraulic arms for emptying bins.



As kerbside collection vehicles collect small quantities of refuse from a large number of customers and the refuse is heavily compacted, there is little opportunity for manually recovering materials from the refuse.

### **OTHER TRUCKS**

Other truck types commonly used for the transport of waste include tip trucks, box trucks, and flat decks. Tip trucks are most commonly used for the transport of waste from landscaping, earthworks, and construction and demolition activity. Box trucks are rarely used as dedicated waste transport vehicles, but are often used for waste transport by businesses that also use them for goods pick-up and delivery. Flat decks are used for the transport of bulky waste items, or by general carriers for the disposal of stackable items, such as pallets.