

Zero Waste South Australia



Government of South Australia

Zero Waste SA

Recycling Activity in South Australia 2005-06

Final report

Review of recycling activity in South Australia

29 June 2007

Report no: 2



Zero Waste South Australia



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Recycling Activity in South Australia 2005-06 Final report

Review of recycling activity in South Australia

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Executive Summary

In 2005–06 2.40 million tonnes of materials, ranging from asphalt to textiles, was diverted from landfill to recycling, in South Australia. This was down from the 2.62 million tonnes recycled in 2004-05, but still significantly above the 2003–04 result of 2.04 million tonnes.

Table E-1 Annual South Australian landfill diversion and overall waste recycling

	2003–04	2004–05	2005–06	Change
Diversion from landfill (tonnes)	2 041 776	2 623 368	2 395 582	-8.7%
Waste to landfill (tonnes)	1 161 327	1 065 044	1 051 687	-1.3%
Total waste generation (tonnes)	3 203 103	3 688 412	3 447 269	- 241 141
SA diversion rate (%)	63.7%	71.1%	69.5%	-2.3%
South Australian population	1 534 000	1 542 000	1 550 042	0.5%
Per capita diversion (kg/person)	1 331	1 701	1 545	-9.2%
Per capita landfill (kg/person)	757	691	678	-1.8%
Per capita total waste (kg/person)	2 088	2 392	2 224	-7.0%

A unknown proportion of the apparent decrease in recycling from 2004–05 to 2005–06 is due to the modification of the reprocessor survey to specifically identify and exclude any recyclate material generated interstate or overseas which is then imported for reprocessing in South Australia. In 2005–06 there was 81 152 tonnes of these recyclate materials imported into South Australia for reprocessing, or 3.3% of total local reprocessing. These materials were mostly fly ash, steel and glass.

Reprocessing quantities of concrete, steel, timber, flyash and garden organics were the highest, by weight.

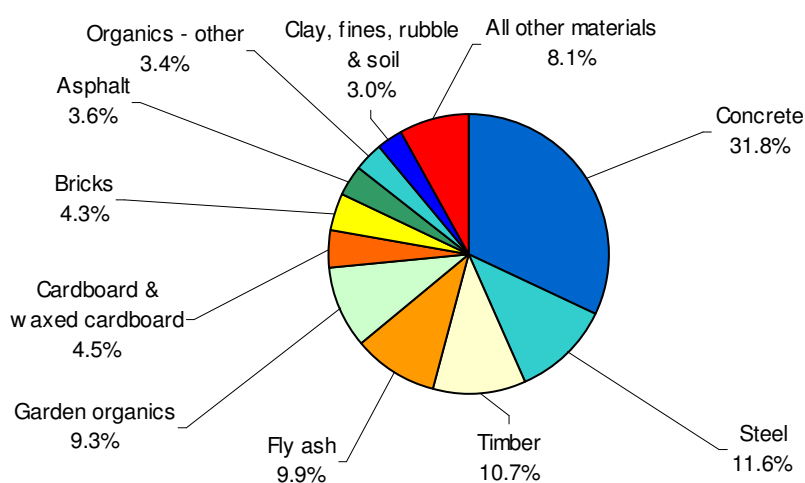


Figure E-1 Composition of recovered materials (by weight), SA 2005–06

Presented in Figure E-2 is a comparison of per capita recycling activity nationally.

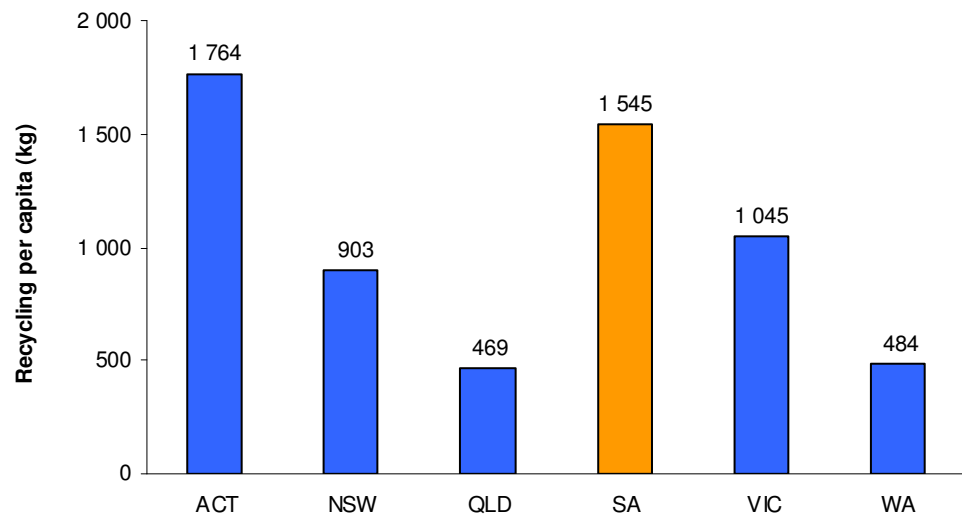


Figure E-2 Comparison of per capita recycling activity, by State

All data is the latest available for each of the States. The ACT and South Australia data is for 2005–06. Queensland, Victoria and Western Australia data is for 2004–05. NSW data is for 2002–03.

A survey of total recycling activity was coordinated in late 2006 and into January of 2007 by Hyder Consulting. The survey covered all materials recovered for reprocessing in South Australia, as well as exported materials. Any materials imported into the state for reprocessing were excluded.

Eighty local (South Australian based) and interstate reprocessing destinations were identified, as well as exports overseas.

Recycling data was obtained from the following sources:

- 1** Reprocessors
 - site visits of the key reprocessing sites in the Adelaide metropolitan area
 - telephone/e-mail surveys of recycling companies
- 2** Data collated from pre-existing annual surveys, undertaken by the following national organisations:
 - Ash Development Association of Australia (ADAA)
 - Compost Australia
 - Plastics and Chemicals Industries Association (PACIA)
 - Publishers National Environment Bureau (PNEB)
- 3** Australian Customs Service export data.

Data from all known reprocessing destinations of material generated in South Australia has been compiled into this report (excluding one interstate destination of scrap metal), and as such the reported recovery data is believed to be highly comprehensive. However, some smaller South Australian based material reprocessors or interstate destinations may have been overlooked, in which case the reported recovery quantities would be slightly conservative.

Data on reprocessed materials was sought for the 2005–06 financial year on the quantity (by weight), and origin and destination of reprocessed materials. The full reprocessor questionnaire is provided in Appendix A.

Sector origins have been split into the following categories:

- household/municipal
- commercial and industrial (C&I)
- construction and demolition (C&D).

Table E-2 Sector origins of SA sourced reprocessed materials, SA 2005–06

Sector origin	Quantity	
	(tonnes)	(%)
Municipal	388 938	16.2%
C&I	872 073	36.4%
C&D	1 134 571	47.4%
Total	2 395 582	100.0%

The breakdown of the destination of reprocessed materials is provided in the table below.

Table E-3 Destination of SA sourced reprocessed materials, SA 2005–06

Reprocessing destination	Number of destinations	Reprocessed material destination	
		(tonnes)	(%)
South Australia	56	1 959 418	81.8%
Interstate	24	111 378	4.6%
Export	N/A	324 786	13.6%
Total	80	2 395 582	100.0%

Table E-4 Reprocessed material quantities, SA 2003–04 to 2005–06

	Material	Material category	Total recovery 2003–04	Total recovery 2004–05	Total recovery 2005–06
			(tonnes)	(tonnes)	(tonnes)
1	Asphalt	Masonry materials	100 000	92 000	85 900
2	Bricks	Masonry materials	165 000	85 700	102 475
3	Concrete	Masonry materials	877 000	899 492	762 134
4	Soil, fines waste, clay & clean fill	Masonry materials	162 400	132 400	70 989
5	Steel	Metals	264 200	247 840	278 028
6	Aluminium	Metals	19 000	20 443	22 171
7	Non-ferrous metals (ex. Al)	Metals	13 000	16 639	19 470
8	Food organics	Organics	0	10 540	6 005
9	Garden organics	Organics	130 100	188 610	222 499
10	Timber	Organics	116 700	300 980	255 728
11	Organics - other	Organics	0	89 790	81 625
12	Cardboard & waxed cardboard	Paper & cardboard	91 000	72 117	106 943
13	Liquid paperboard (LPB)	Paper & cardboard	0	971	1 239
14	Magazines	Paper & cardboard	0	4 650	5 918
15	Newsprint	Paper & cardboard	31 398	35 917	40 607
16	Phonebooks	Paper & cardboard	1 303	1 685	2 042
17	Printing & writing papers	Paper & cardboard	12 300	12 593	18 803
18	Polyethylene terephthalate (PET)	Plastics	0	5 544	4 753
19	High density polyethylene (HDPE)	Plastics	0	2 728	3 036
20	Polyvinyl chloride (PVC)	Plastics	0	329	365
21	Low density polyethylene (LDPE)	Plastics	0	4 063	5 043
22	Polypropylene (PP)	Plastics	0	1 272	1 252
23	Polystyrene (PS)	Plastics	0	613	332
24	Other plastics	Plastics	8 607	792	1 107
25	Glass	Glass	45 600	49 500	50 067
26	Fly ash	Other materials	0	335 000	236 343
27	Foundry sands	Other materials	0	9 006	6 755
28	Leather & textiles	Other materials	4 080	1 564	2 419
29	Tyres & other rubber	Other materials	88	590	1 535
Total			2041 776	2623 368	2 395 582

While not assessed in detail as part of this study, it is recognised that the direct reuse of many products occurs, where a reprocessing step is not undertaken. This reuse activity can be very significant. Where possible throughout this report, any reuse activity has been identified in general terms, but not quantified.

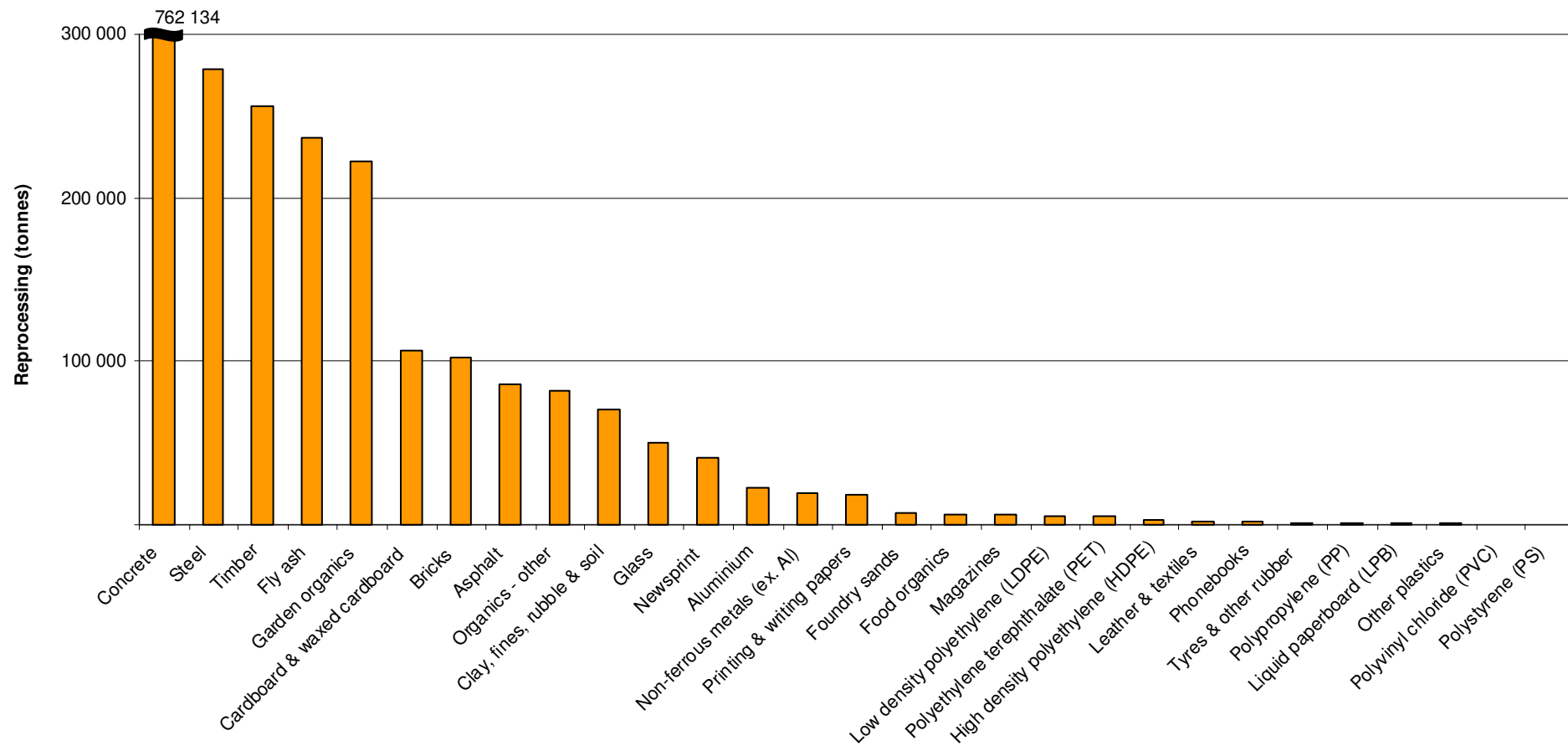


Figure E-3 Reprocessing by material (by weight), SA 2005-06

1 Masonry materials

1.1 Recovery & reprocessing location

The masonry materials recovery data presented in this report has been provided by reprocessors. One significant reprocessor declined to provide 2005–06 data (they also declined in 2004–05, however 2003–04 data for the company was available and this data was adopted). As a result of this overall masonry material recycling is likely to be understated.

Masonry materials recovery in SA and location of reprocessing, during 2005–06, is presented in Table 1-5. Masonry materials recovery was 1 021 497 tonnes. This material was recovered through commercial collections, direct drop-offs and at transfer stations (e.g. skips and bins).

Table 1-5 Masonry materials recovery, SA 2005–06

Material	Net recovery ¹ (tonnes)	Reprocessing location		
		SA	Interstate	Export
Asphalt	85 900	100.0%	0.0%	0.0%
Bricks	102 475	100.0%	0.0%	0.0%
Concrete	762 134	100.0%	0.0%	0.0%
Clay, fines, rubble & soil ²	70 989	100.0%	0.0%	0.0%
Total	1 021 497	100.0%	0.0%	0.0%

1. Net recovery excludes reprocessing losses.
2. The "Clay, fines, rubble & soil" material category only relates to material that has been diverted from landfill, and is consistent with reporting categories used in NSW, Victoria and WA.

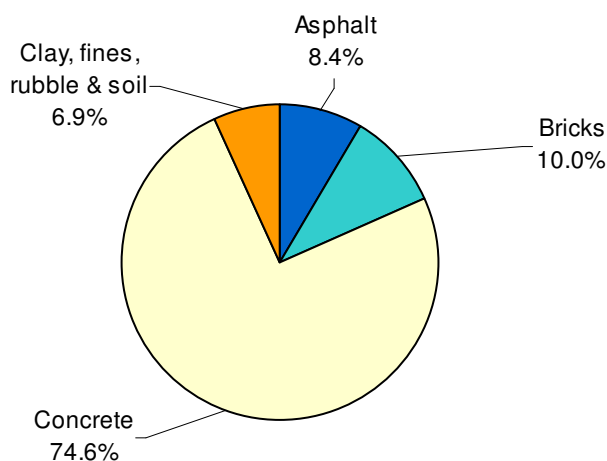


Figure 1-4 Composition of recovered masonry materials (by weight), SA 2005–06

The breakdown of masonry materials recovery by source sector and material type is presented in Table 1-6.

Table 1-6 Masonry materials recovery – by source sector, SA 2005–06

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Asphalt	0	0	85 900	85 900
Bricks	9 975	3 325	89 175	102 475
Concrete	0	0	762 134	762 134
Clay, fines, rubble & soil	0	0	70 989	70 989
Total	9 975	3 325	1 008 197	1 021 497

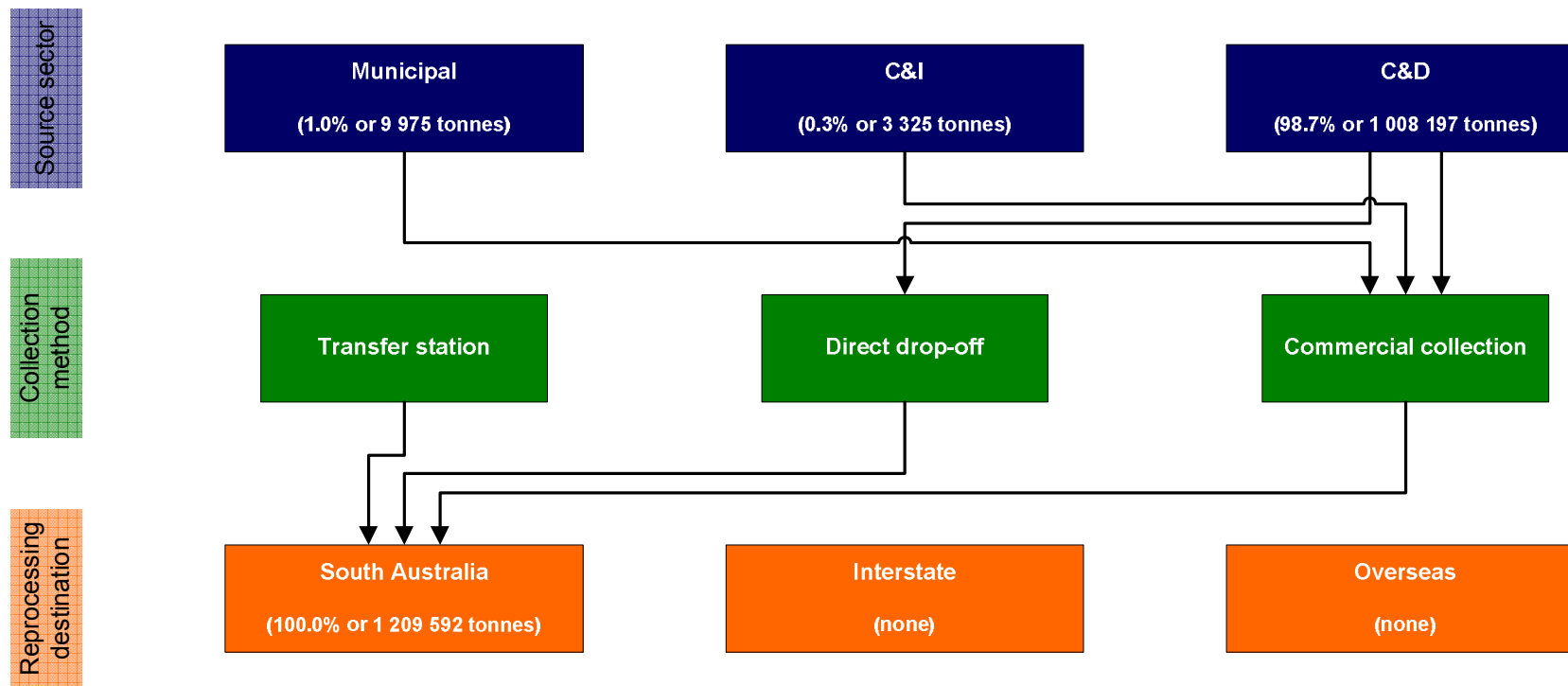


Figure 1-5 Flow of masonry materials reprocessing, SA 2005-06

1.2 Source & end products

1.2.1 Source products

Presented in Table 1-7 are the masonry materials source products.

Table 1-7 Masonry materials source products, SA 2005–06

Material	Source products
Asphalt	Roads, footpaths, car parks and kerbing
Bricks	Mainly walls and other general C&D activity
Concrete	Slabs, footings, kerbing, channel and wall
Clay, fines, rubble & soil	General C&D

1.2.2 End products

Presented in Table 1-8 are the masonry materials end products.

Table 1-8 Masonry materials end products, SA 2005–06

Material	End products
Asphalt	Road base
Bricks	Primarily crushed for road base and drainage, however some are also cleaned for reuse
Concrete	Road base and drainage
Clay, fines, rubble & soil	Road base, batters/bunds and compost (bulking agents)

1.3 Recycling activity trends, barriers & reuse

1.3.1 Trends

Presented in Figure 1-6 is annual masonry materials recycling data for SA for the period of 2003–04 to 2005–06.

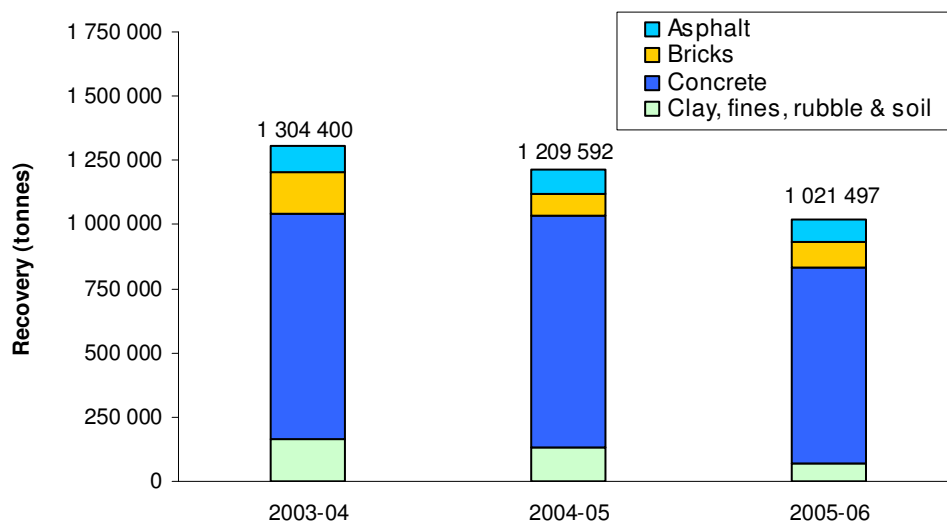


Figure 1-6 Annual masonry materials recovery, SA 2005–06

It is possible that some of the reduction in masonry materials recycling is due to one significant C&D reprocessor who declined to respond to the survey for the 2005–06 year. 2004–05 survey response data was substituted for this company, as such the masonry materials recovery data may be conservative for 2005–06.

In addition a generally lower demand, or short-term variability in the volume of construction projects, may also have contributed to the decrease in the quantities of masonry materials reprocessed during 2005–06.

Table 1-9 Annual masonry materials recovery, SA 2003–04 to 2005-06

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)
Asphalt	100 000	92 000	85 900
Bricks	165 000	85 700	102 475
Concrete	877 000	899 492	762 134
Clay, fines, rubble & soil	162 400	132 400	70 989
Total	1304 400	1209 592	1 021 497

1.3.2 Barriers

The following were identified by the masonry reprocessing industry as the some of the barriers to increasing recovery rates:

- the reprocessing of masonry materials is an economically marginal exercise, with few incentives or grants
- limitations to access to some materials for recycling
- recycled materials are obtaining only a smaller share of potential market outlets.

1.3.3 Reuse

There is a significant amount of brick cleaning for reuse, some of which has been captured within the 102 475 tonnes reported as being reprocessed. The full scale of brick reuse is unknown.

2 Metals

2.1 Recovery & reprocessing location

The metals recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

Metals recovery in SA and location of reprocessing, during 2005–06, is presented in Table 2-10. Metals recovery was 319 669 tonnes. This material was recovered through commercial collections, direct drop-offs and household recycling collections.

The recovery of electrical and electronic equipment in SA is accounted for in the steel, non-ferrous metals and glass material categories. The only identified reprocessing of electronic equipment was of cathode ray tube (CRT) monitors which contain glass, lead, steel, copper and aluminium.

Table 2-10 Metals recovery, SA 2005–06

Material	Net recovery ¹ (tonnes)	Reprocessing location		
		SA	Interstate	Export
Steel ²	278 028	23.8%	3.7%	72.5%
Aluminium	22 171	1.0%	31.7%	67.3%
Non-ferrous metals (ex. Al) ³	19 470	4.3%	43.5%	52.2%
Total	319 669	21.1%	8.1%	70.9%

1. Net recovery excludes reprocessing losses
 2. Includes steel can packaging – refer to Section 8 (Packaging Summary) for more details
 3. Primarily lead and copper

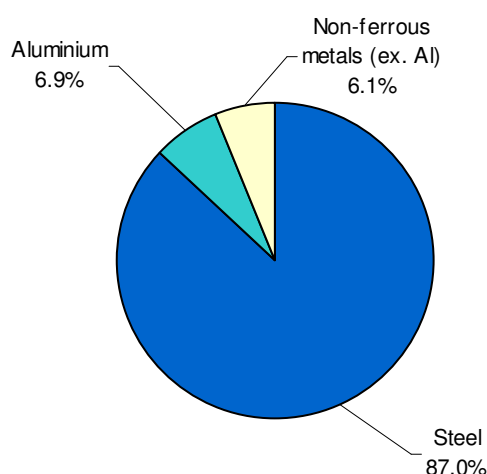


Figure 2-7 Composition of recovered Metals (by weight), SA 2005–06

The breakdown of metals recovery by source sector and material type is presented in Figure 2-8 and Table 2-11.

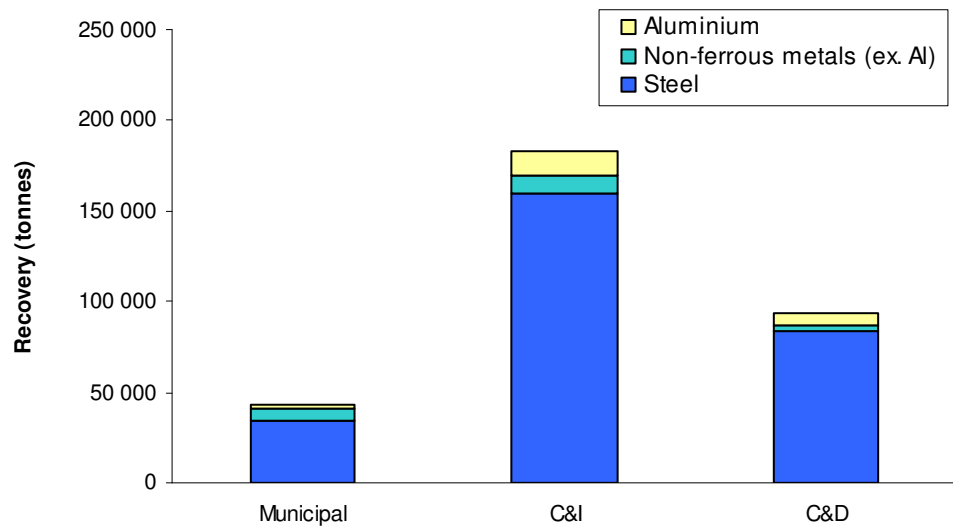


Figure 2-8 Metals recovery – by source sector, SA 2005–06

Table 2-11 Metals recovery – by source sector, SA 2005–06

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Steel	34 684	159 954	83 390	278 028
Aluminium	2 392	13 866	5 913	22 171
Non-ferrous metals (ex. Al)	6 178	9 496	3 796	19 470
Total	43 253	183 316	93 099	319 669

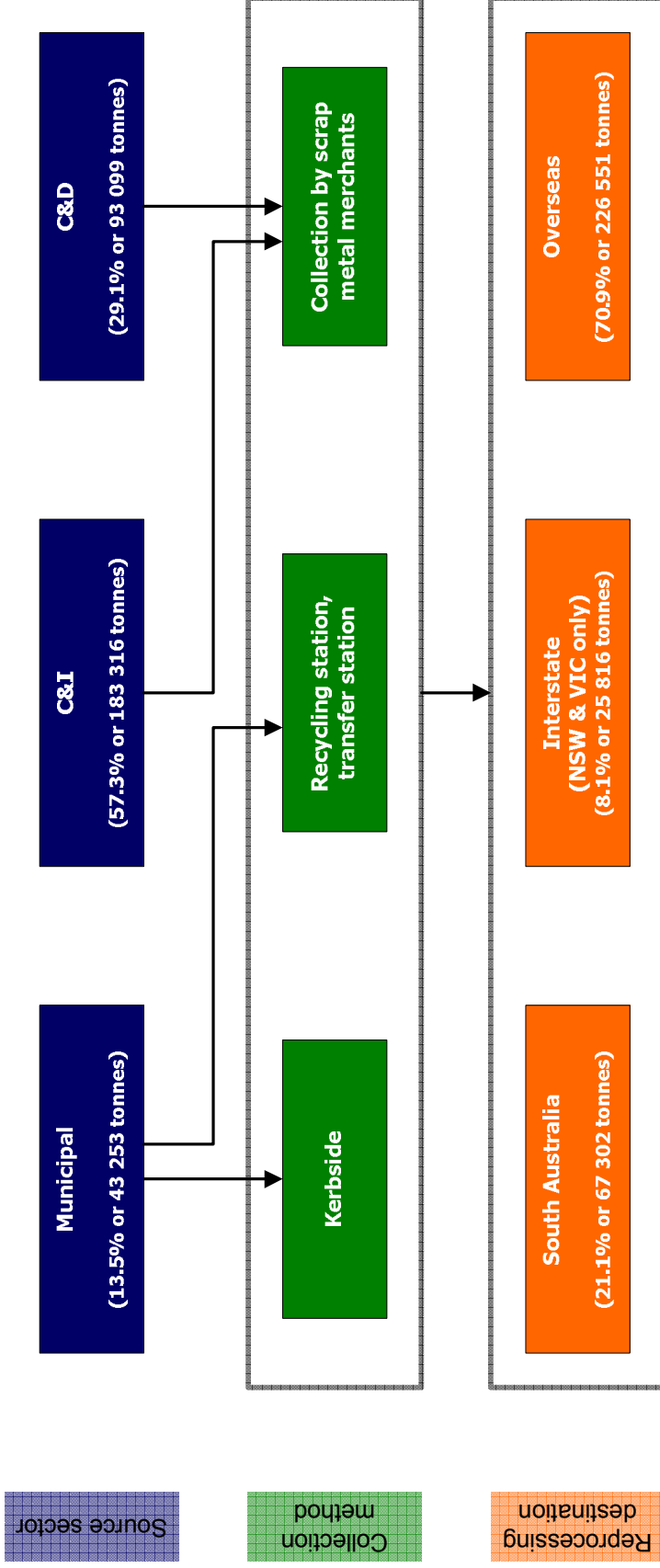


Figure 2-9 Flow of Metals recovered for reprocessing, SA 2005-06

2.2 Source & end products

2.2.1 Source products

Presented in Table 2-12 are the metals source products.

Table 2-12 Metals source products, SA 2005–06

Material	Source products
Steel	Automotive (car bodies), general heavy steel and structural, appliances, iron roofing, steel packaging
Aluminium	Windows & doors, auto engines, assorted industrial scrap and production scrap, aluminium cans, electrical cable, and some electrical & electronic waste
Non-ferrous metals (ex. Al)	Copper pipe, automotive batteries and cable auto, general industrial and production scrap, electrical cable, and some electrical & electronic waste

2.2.2 End products

Presented in Table 2-13 are the metals end products.

Table 2-13 Metals end products, SA 2005–06

Material	End products
Steel	Many end-products, including car parts, general rod and sheet, and mining equipment, most to export
Aluminium	Valves & extrusions, automotive parts, building industry and aluminium cans, most to export
Non-ferrous metals (ex. Al)	Many end-products, including batteries and valves & extrusions, most to export

2.3 Recycling activity trends, barriers & reuse

2.3.1 Trends

Presented in Figure 2-10 is annual metals recycling data for SA for the period 2003–04 to 2005–06.

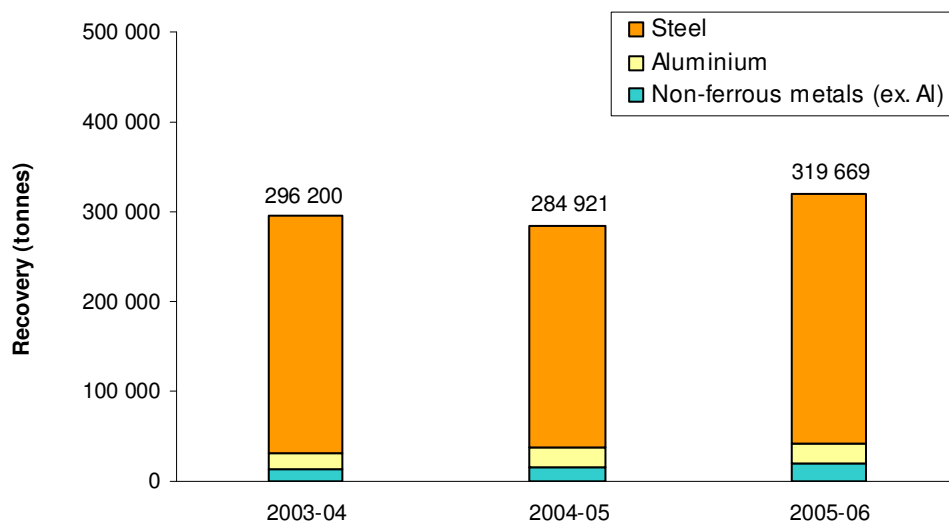


Figure 2-10 Annual metals recovery, SA 2003–04 to 2005–06

Table 2-14 Annual metals recovery, SA 2003–04 to 2005–06

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)
Steel	264 200	247 840	278 028
Aluminium	19 000	20 443	22 171
Non-ferrous metals (ex. Al)	13 000	16 639	19 470
Total	296 200	284 921	319 669

According to industry sources the price received for steel scrap was generally good during 2005–06, and that aggressive sourcing of material has resulted in the strong increase over the 2004–05 result.

2.3.2 Reuse

There was little direct reuse of metals identified, the exception was the refurbishment and reuse of computers.

3 Organics

3.1 Recovery & reprocessing location

The organics recovery data presented in this report has been provided by Compost Australia. Compost Australia undertakes an annual *Organics Industry Survey* of organics reprocessors across New South Wales, SA, Victoria and Western Australia. The data generated by the Compost Australia exercise for the 2005–06 financial year has been used in this report. In addition, timber recovery into waste to energy processes has been provided separately by the C&D industry.

Organics recovery in SA and the location of reprocessing, during 2005–06, is presented in Table 3-14. The major organic material recovered was 255 728 tonnes of timber, of which 70.2% was bark from the forestry industry. The next most significant organic recovery stream was garden organics from municipal sources.

Table 3-15 Organics recovery, SA 2005–06

Material	Net recovery	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Food organics	6 005	100.0%	0.0%	0.0%
Garden organics	222 499	100.0%	0.0%	0.0%
Timber	255 728	100.0%	0.0%	0.0%
Organics – other	81 625	100.0%	0.0%	0.0%
Total	565 857	100.0%	0.0%	0.0%

Net recovery excludes reprocessing losses

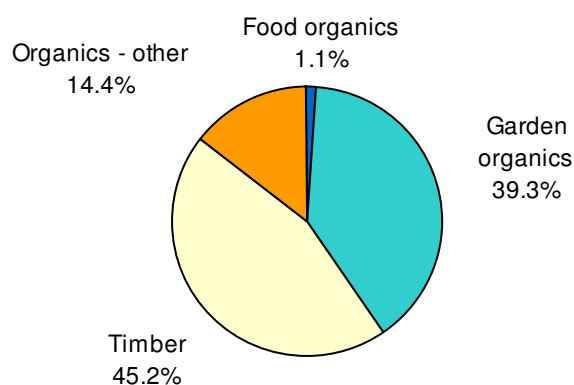


Figure 3-11 Composition of recovered organics (by weight), SA 2005–06

Garden organics are recovered through kerbside collection systems in many Adelaide municipalities, and from drop off sites at transfer stations and most is delivered directly to composting facilities. Only composted garden organics are considered to have been recycled in this survey, and as such the data for organic material that has been shredded by mobile shredders and used directly in parks and gardens has not been included in this survey.

Waste timber is generated in a number of forms. Structural timber is recovered from both residential and commercial demolition projects. Pallets, fencing and furniture are also sources of timber waste. There is also timber off-cuts and sawdust generated from manufacturing processes and building construction sites.

The organics (other) category is primary composed of paper pulp/sludge waste (61.3%), general agricultural organics (22.5%), and animal bedding (9.3%), small quantities of animal mortalities and paunch are also included. The breakdown of organics recovery by source sector and material type is presented in Figure 3-12 and Table 3-16.

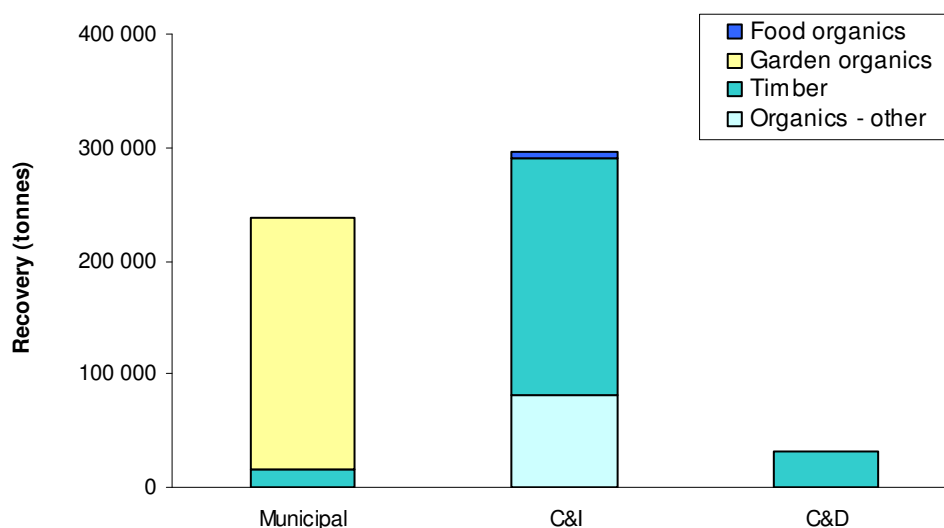


Figure 3-12 Organics recovery – by source sector, SA 2005–06

Table 3-16 Organics recovery – by source sector, SA 2005–06

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Food organics	0	6 005	0	6 005
Garden organics	222 499	0	0	222 499
Timber	15 750	208 478	31 500	255 728
Organics – other	0	81 625	0	81 625
Total	238 249	296 108	31 500	565 857

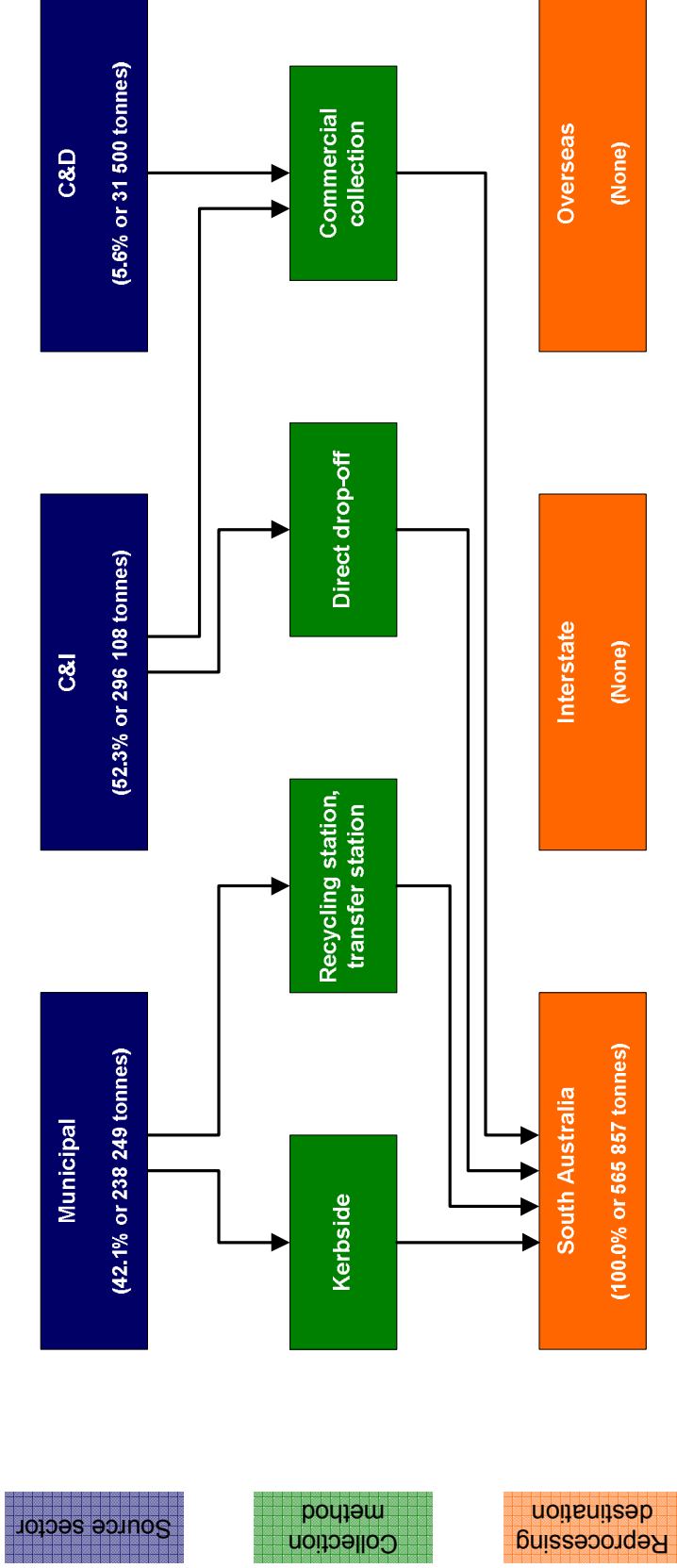


Figure 3-13 Flow of organics recovered for reprocessing, SA 2005-06

3.2 Source & end products

3.2.1 Source products

Presented in Table 3-17 are the organic material source products.

Table 3-17 Organics source products, SA 2005–06

Material	Source products
Food organics	Commercial food wastes
Garden organics	Municipal garden organics
Timber	Barks, sawdust, wood/timber packaging, general wood/timber
Organics – other	Paper pulp/sludge, misc. agricultural organics, animal bedding, paunch, animal mortalities, other - misc.

3.2.2 End products

Presented in Table 3-18 are the organic material end products.

Table 3-18 Organics end products, SA 2005–06

Material	End products
Food organics	Primarily composted soil conditioners, potting mixes and mulches
Garden organics	Primarily composted soil conditioners, potting mixes and mulches
Timber	Engineering fills, and composted soil conditioners, potting mixes and mulches (approximately 80%)
	Fuel for cement manufacture – energy recovery (approximately 25%)
Organics – other	Primarily composted soil conditioners, potting mixes and mulches

3.3 Recycling activity trends, barriers & reuse

3.3.1 Trends

Presented in Figure 3-14 is annual organics recycling data for SA for the period of 2003–04 through to 2005–06. Due to significant changes in the data collection methodology from 2004–05 caution should be taken in comparing 2003–04 data with that of later years. For example, in 2004–05 meat waste data was excluded from reprocessing, and more categories of organics reprocessing were defined, to be more consistent with interstate and national definitions. In addition, the use of timber as a fuel in cement manufacture, began in 2004–05, utilising significant quantities of timber that were previously disposed to landfill.

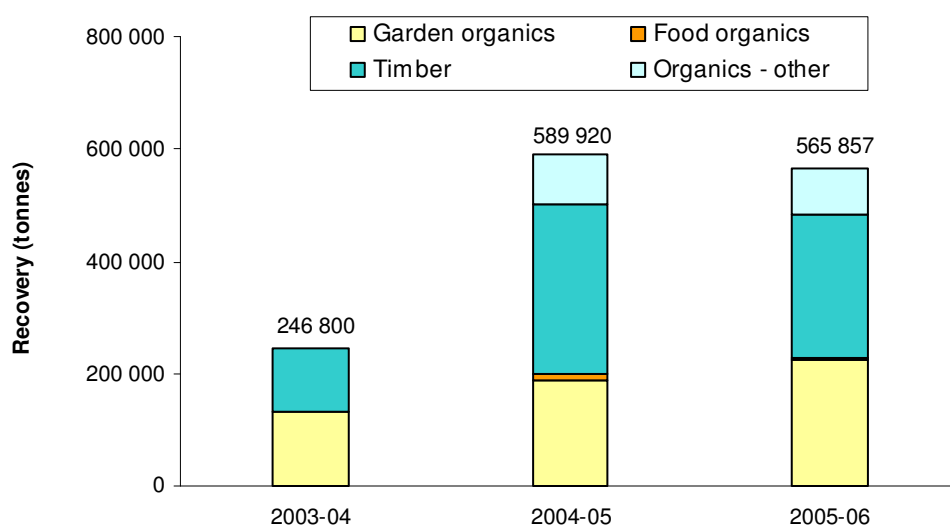


Figure 3-14 Annual organics recovery, SA 2003–04 to 2005–06

Table 3-19 Annual organics recovery, SA 2003–04 to 2005–06

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)
Food organics	0	10 540	6 005
Garden organics	130 100	188 610	222 499
Timber	116 700	300 980	255 728
Organics – other	0	89 790	81 625
Total	246 800	589 920	565 857

3.3.2 Reuse

The primary sources of timber waste are the timber industry and the demolition industry. All identified waste from the timber industry underwent some kind of reprocessing step, usually into a composted product, no direct reuse was counted. Some timber waste from the demolition industry is likely to be recovered for reuse by the recycled timber industry, or directly by other groups (e.g. builders and other trades people), however the scale of this reuse activity, and the destination of the reused timber, is not known.

4 Paper & cardboard

4.1 Recovery & reprocessing location

The paper & cardboard recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

Paper & cardboard recovery in SA and the location of reprocessing during 2005–06, is presented in Table 4-20. Paper & cardboard recovery was 175 552 tonnes. This material was recovered through both commercial and household recycling collections.

Table 4-20 Paper & cardboard recovery, SA 2005–06

Material	Net recovery ¹ (tonnes)	Reprocessing location		
		SA	Interstate	Export
Cardboard & waxed cardboard ²	106 943	0.0%	57.8%	42.2%
Liquid paperboard (LPB) ²	1 239	0.0%	0.0%	100.0%
Magazines ³	5 918	0.0%	54.0%	46.0%
Newsprint ⁴	40 607	12.8%	21.3%	66.0%
Phonebooks	2 042	0.0%	0.0%	100.0%
Printing & writing papers	18 803	0.0%	20.7%	79.3%
Total	175 552	3.0%	44.2%	52.9%

1. Net recovery excludes reprocessing losses
2. 100% cardboard & LPB packaging – refer to Section 8 (Packaging Summary) for more details
3. Exported magazine material is unknown, any magazine export is captured in newsprint export
4. Newsprint recovery data provided by the Publishers National Environment Bureau (PNEB), data is for the 2005 calendar year

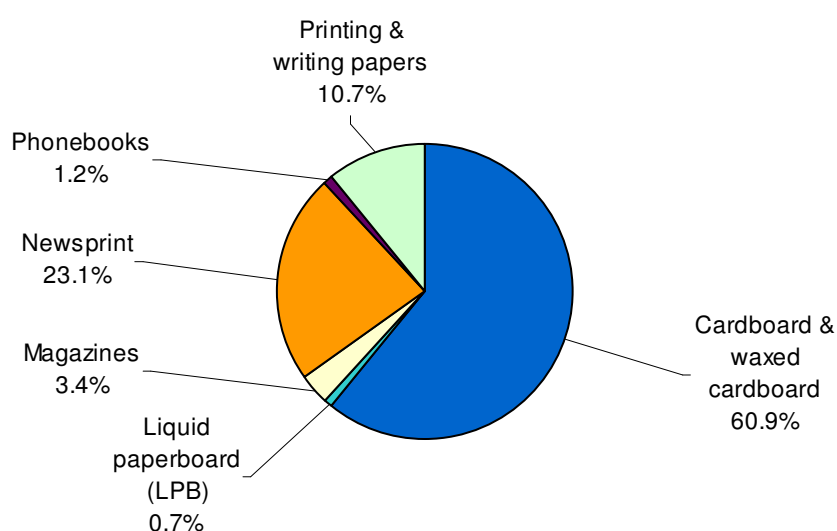


Figure 4-15 Composition of recovered paper & cardboard (by weight), SA 2005–06

The breakdown of paper & cardboard recovery by source sector and material type is presented in Figure 4-16 and Table 4-21.

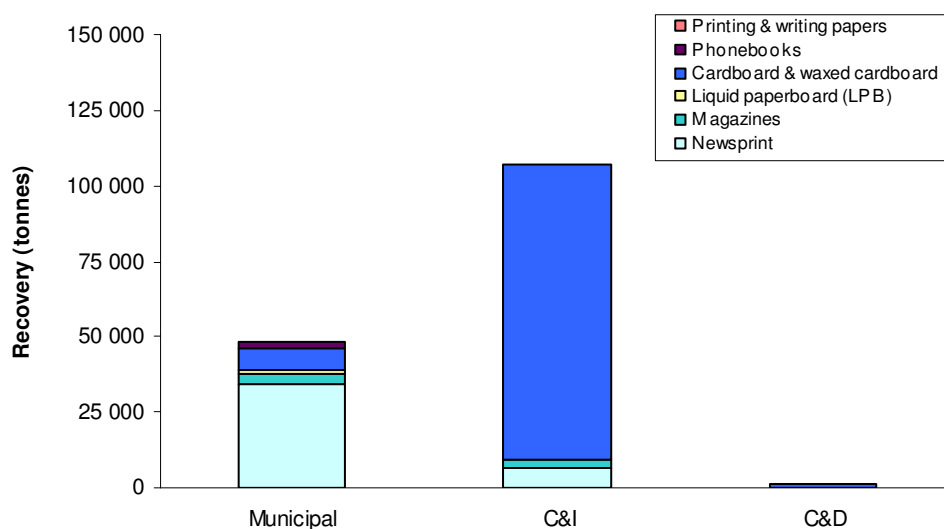


Figure 4-16 Paper & cardboard recovery – by source sector, SA 2005–06

Table 4-21 Paper & cardboard recovery – by source sector, SA 2005–06

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Cardboard & waxed card.	7 557	97 913	1 473	106 943
Liquid paperboard (LPB)	1 239	0	0	1 239
Magazines	3 363	2 555	0	5 918
Newsprint	34 188	6 419	0	40 607
Phonebooks	1 838	204	0	2 042
Printing & writing papers	0	18 803	0	18 803
Total	48 185	125 894	1 473	175 552

4.2 Source & end products

4.2.1 Source products

Presented in Table 4-22 are the paper & cardboard source products.

Table 4-22 Paper & cardboard source products, SA 2005–06

Material	Source products
Cardboard & waxed cardboard	Mostly corrugated cardboard used for the packaging of industrial and consumer goods
Liquid paperboard (LPB)	LPB packaging, both CDL and non-CDL. CDL LPB packaging includes flavoured milk beverages and fruit juice flavoured beverages. non-CDL packaging includes milk and fruit juice packaging
Magazines	Pre-consumer waste and post-consumer magazine material in mixed paper to export
Newsprint	Both pre and post-consumer newsprint, and some magazine material. Also includes some magazines & TV guides which are printed on newsprint or improved newsprint
Phonebooks	Phone books
Printing & writing papers	Office paper and a small amount of packaging paper from office sources

4.2.2 End products

Presented in Table 4-23 are the paper & cardboard end products.

Table 4-23 Paper & cardboard end products, SA 2005–06

Material	End products
Cardboard & waxed cardboard	Packaging
Liquid paperboard (LPB)	Packaging and writing paper
Magazines	Newsprint and packaging
Newsprint	Multiple end products including: packaging, cat litter, newsprint, insulation, building products and dust suppression. Reuse is also widespread.
Phonebooks	Packaging and newsprint
Printing & writing papers	Packaging, writing paper

4.3 Recycling activity trends, barriers & reuse

4.3.1 Trends

Presented in Figure 4-18 is annual paper & cardboard recycling data for SA for the period of 2003–04 through to 2005–06.

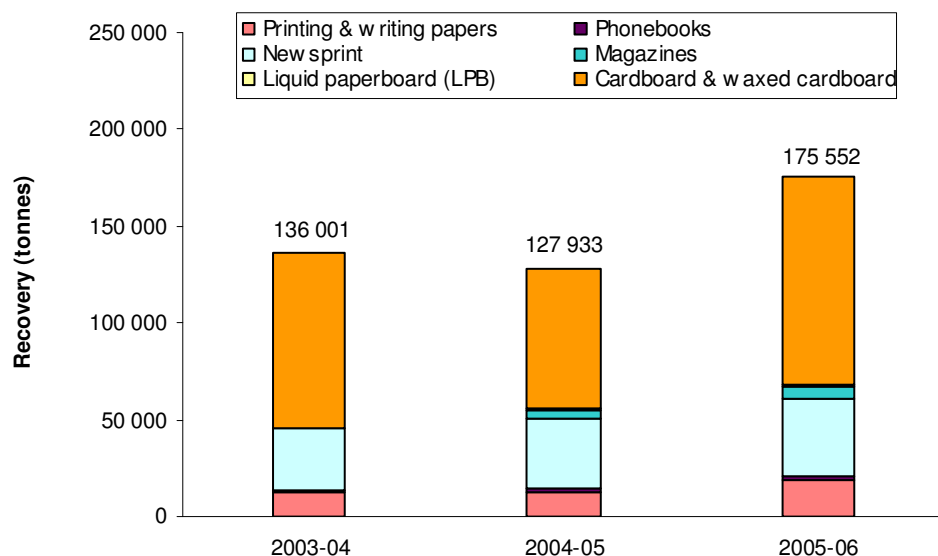


Figure 4-18 Annual paper & cardboard recovery, SA 2003–04 to 2005–06

Newspaper recycling rates in SA have risen significantly over the past five years, reaching 71.5% in 2005, which continues to be comparable with the highest rates around Australia and other developed countries. The very strong increase in the recycling data in 2005–06 is mostly attributable to large increases in export quantities, particularly in mixed paper and cardboard grades.

Table 4-24 Annual paper & cardboard recovery, SA 2003–04 to 2005–06

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)
Cardboard & waxed cardboard	91 000	72 117	106 943
Liquid paperboard (LPB)	0	971	1 239
Magazines	0	4 650	5 918
Newsprint	31 398	35 917	40 607
Phonebooks	1 303	1 685	2 042
Printing & writing papers	12 300	12 593	18 803
Total	136 001	127 933	175 552

4.3.2 Barriers

The efficient collection of printing and writing paper outside households and Adelaide's CBD remains a challenge.

In general, local recycling activity is consistent, except for increasingly strong competition from exporters and the boxboard industry.

The paper mill in Shoalhaven (NSW) that received most LPB in Australia, closed its LPB reprocessing facility in March 2006, resulting in the export of most LPB.

4.3.3 Reuse

Newspaper reuse activities include; fire-lighting, use as drop-sheets and animal bedding.

Phonebook reuse activities include; propping up computer monitors, second directory in home office or study, fire-lighting and packing breakables.

It is also acknowledged that there is a large amount of activity in the reuse of books.

5 Plastics

5.1 Recovery & reprocessing location

The plastics recovery data presented in this report has been sourced from the annual Plastics and Chemicals Industries Association (PACIA) survey of plastics reprocessors. The PACIA exercise is undertaken on a calendar year basis, and the data published here is for the 2005 calendar year.

Plastics recovery in SA and location of reprocessing, during 2005, is presented in Table 5-24. Plastics recovery was 15 887 tonnes. Recovery was through commercial (C&I) collections and municipal recycling collections. Very little was recovered from C&D activities.

Table 5-25 Plastics recovery, SA 2005

Material	Net recovery ¹ (tonnes)	Reprocessing location		
		SA	Interstate	Export
Polyethylene terephthalate (PET)	4 753	0.2%	80.1%	19.7%
High density polyethylene (HDPE)	3 036	63.2%	5.0%	31.8%
Polyvinyl chloride (PVC)	365	24.7%	62.8%	12.5%
Low density polyethylene (LDPE)	5 043	60.7%	31.4%	7.9%
Polypropylene (PP)	1 252	67.5%	6.4%	26.1%
Polystyrene (PS)	332	49.7%	5.7%	44.6%
Other plastics	1 107	52.9%	47.1%	0.0%
Total	15 887	42.0%	40.2%	17.7%

1. Net recovery excludes reprocessing losses, but includes plastic packaging – refer to Section 8 (Packaging Summary) for more details

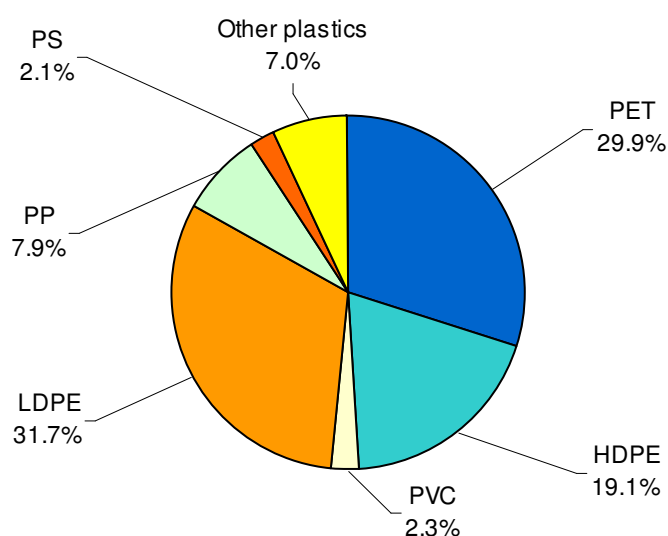


Figure 5-19 Composition of recovered plastics (by weight), SA 2005

The breakdown of plastics recovery by source sector and material type is presented in Figure 5-20 and Table 5-26.

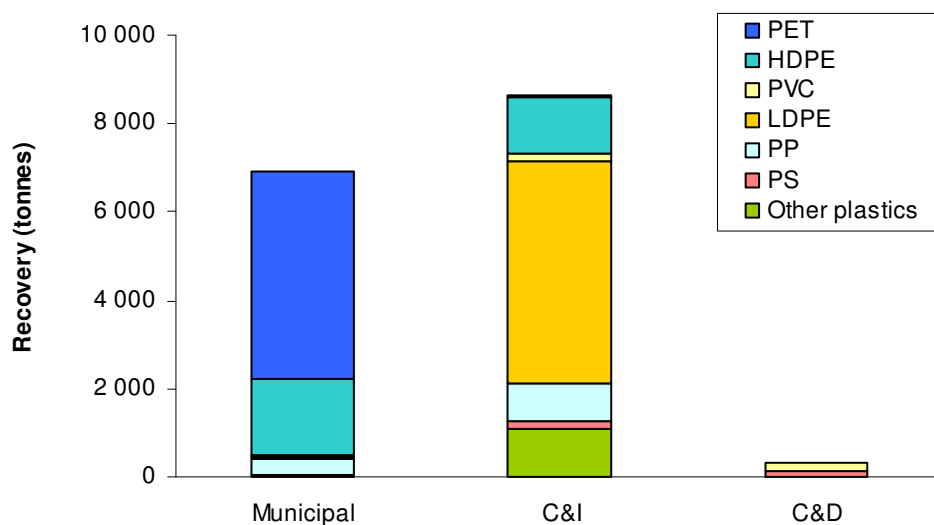


Figure 5-20 Plastics recovery – by source sector, SA 2005

Table 5-26 Plastics recovery – by source sector, SA 2005

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Polyethylene terephthalate (PET)	4 696	57	0	4 753
High density polyethylene (HDPE)	1 755	1 280	0	3 036
Polyvinyl chloride (PVC)	46	157	162	365
Low density polyethylene (LDPE)	25	5 018	0	5 043
Polypropylene (PP)	357	895	0	1 252
Polystyrene (PS)	52	140	140	332
Other plastics	0	1 107	0	1 107
Total	6 931	8 655	302	15 887

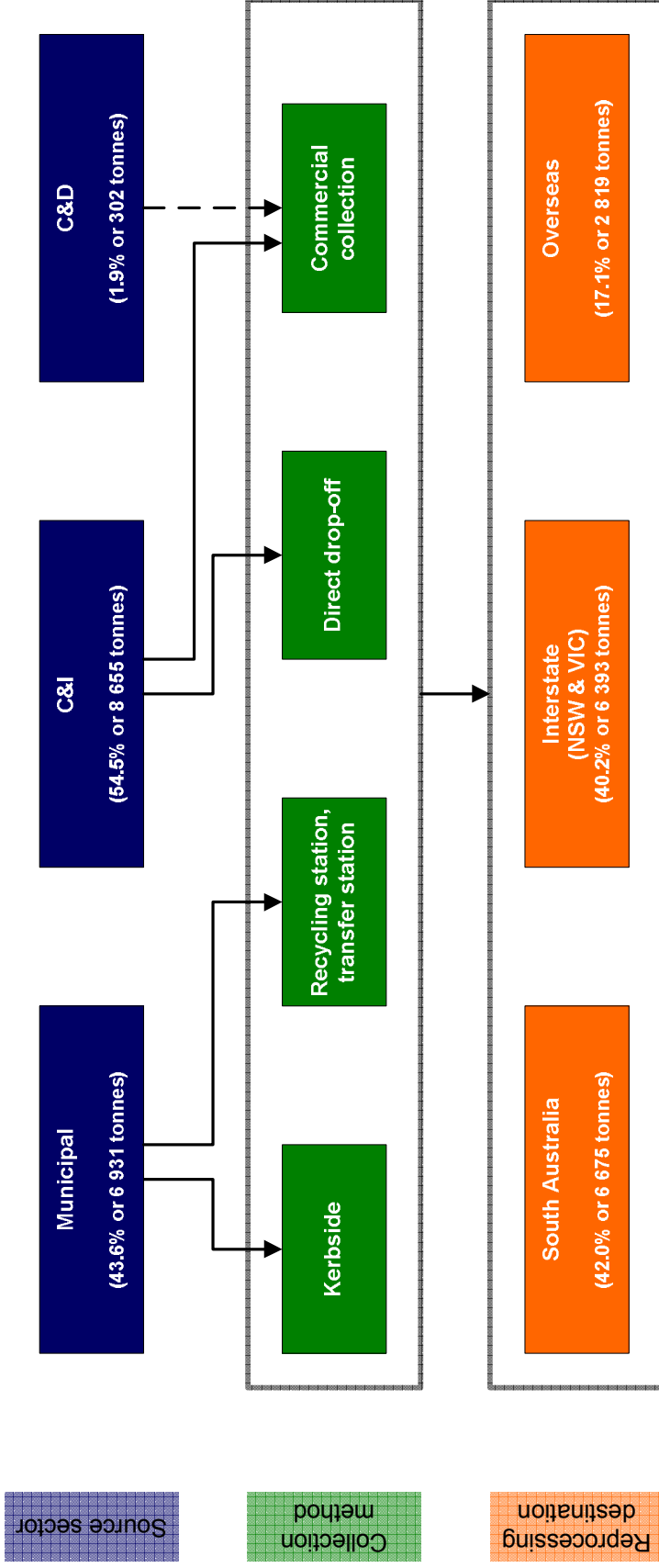


Figure 5-21 Flow of plastics reprocessing, SA 2005

5.2 Source & end products

5.2.1 Source products

Presented in Table 5-27 are plastics source products.

Table 5-27 Plastics source products, SA 2005

Material	Source products
Polyethylene terephthalate (PET)	Soft drink bottles
High density polyethylene (HDPE)	Milk bottles, manufacturing scrap, other packaging bottles, mobile garbage bins, drums, pipes, crates and pallets
Polyvinyl chloride (PVC)	Manufacturing scrap
Low density polyethylene (LDPE)	Flexible film used as distribution packaging, packaging bottles, manufacturing scrap
Polypropylene (PP)	Manufacturing scrap, rigid packaging applications, pallet strapping, automotive parts
Polystyrene (PS)	Manufacturing scrap, pipe supports, EPS freight packaging, rigid food packaging
Other plastics	Manufacturing scrap, domestic durables

5.2.2 End products

Presented in Table 5-27 are plastics end products.

Table 5-28 Plastics end products, SA 2005

Material	End products
Polyethylene terephthalate (PET)	Soft drink bottles and other packaging applications, fibre applications such as geotextiles, mixed polymer timber replacement products
High density polyethylene (HDPE)	Pallets, agricultural pipe, bins and crates, mixed polymer timber replacement products
Polyvinyl chloride (PVC)	Floor coverings, pipe and hoses fitting, garden hoses
Low density polyethylene (LDPE)	Builders film and damp-course linings, garbage bags, retail carry bags, mixed polymer timber replacement products, irrigation piping, garden furniture
Polypropylene (PP)	Crates and boxes, plant pots, building materials, mixed polymer timber replacement products
Polystyrene (PS)	Waffle pods, produce boxes, building materials, concrete reinforcement stools (bar stools), mixed polymer timber replacement products
Other plastics	Various

5.3 Recycling activity trends, market conditions & reuse

5.3.1 Trends

Growth occurred in plastics recycling across SA during 2005. Presented in Figure 5-22 is annual plastics recycling data for SA for the period of 2003 to 2005. No data is available for reprocessing by polymer type during 2003.

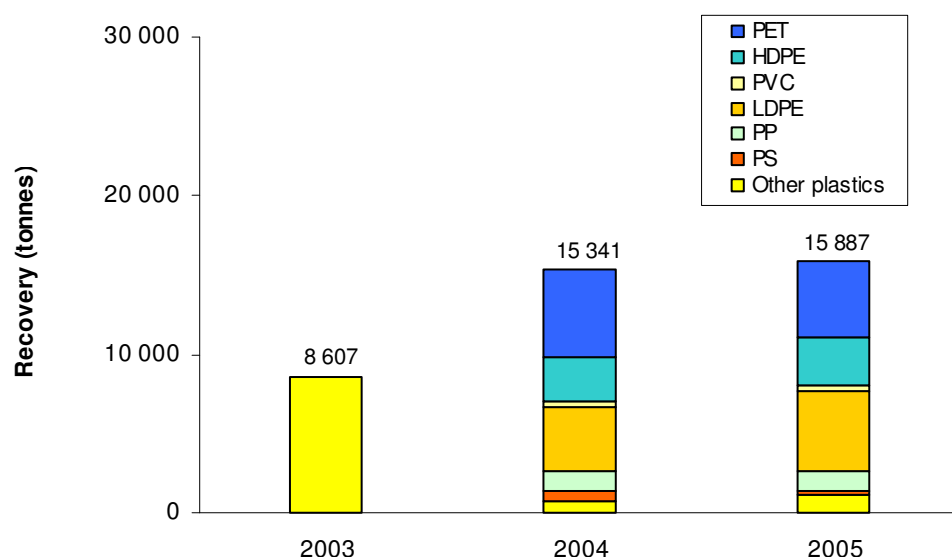


Figure 5-22 Annual plastics recovery, SA 2003 to 2005

Table 5-29 Annual plastics recovery, SA 2003 to 2005

Material	2003 recovery (tonnes)	2004 recovery (tonnes)	2005 recovery (tonnes)
Polyethylene terephthalate (PET)	0	5 544	4 753
High density polyethylene (HDPE)	0	2 728	3 036
Polyvinyl chloride (PVC)	0	329	365
Low density polyethylene (LDPE)	0	4 063	5 043
Polypropylene (PP)	0	1 272	1 252
Polystyrene (PS)	0	613	332
Other plastics	8 607	792	1 107
Total	8 607	15 341	15 887

5.3.2 Market conditions

Table 5-30 Recycling market conditions, SA 2005

Material	Industry comments
Polyethylene terephthalate (PET)	Market is highly competitive, especially with regards to overseas competition for recyclate, with cost high relative to quality of supply. Continuing issues with cross contamination with other polymers.
High density polyethylene (HDPE)	Exporting of post-consumer material continues to drive Australian prices up. Continuing issues with cross contamination with other polymers.
Polyvinyl chloride (PVC)	Strong export demand and competition continues. Continuing issues with cross contamination with other polymers. Shrinking manufacturing base in Australia is reducing availability of high quality pre-consumer scrap.
Low density polyethylene (LDPE)	Strong export demand and competition continues. Continuing issues with contamination, primarily from non-polymer sources such as product residues and labels.
Polypropylene (PP)	Tightening supply of right grades and good quality recyclate. Continuing issues with cross contamination with other polymers. Bumper bars and poly pipe in reasonable supply.
Polystyrene (PS)	Recyclate is difficult to come by, exports are driving the domestic price up. Continuing issues with contamination, the source of which was not identified.

5.3.3 Reuse

There is a high level of reuse of plastic freight packaging in the forms of crates, drums and pallets. Beyond this there was no significant reuse of waste plastics identified as taking place in SA during 2005.

6 Glass

6.1 Recovery & reprocessing location

Glass recovery in SA and location of reprocessing, during 2005–06, is presented in Table 6-30. Total glass recovery was 50 067 tonnes.

Table 6-31 Glass recovery, SA 2005–06

Material	Net recovery ¹	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Glass	50 067	99.5%	0.3%	0.2%
1. Net recovery excludes reprocessing losses, but includes glass packaging – refer to Section 8 (Packaging Summary) for more details				

The breakdown of glass recovery by source sector is presented in Figure 6-23.

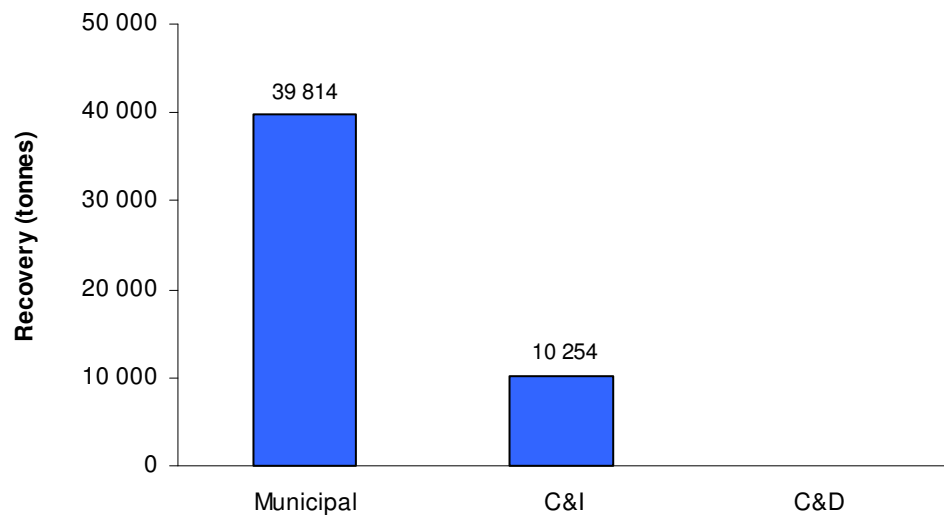


Figure 6-23 Glass recovery – by source sector, SA 2005–06

6.2 Source & end products

6.2.1 Source products

Presented in Table 6-32 are the glass source products.

Table 6-32 Glass source products, SA 2005–06

Material	Source products
Glass	Packaging – beer/wine/food, and some from CRT monitors

6.2.2 End products

Presented in Table 6-33 are the glass end products.

Table 6-33 Glass end products, SA 2005–06

Material	End products
Glass	Bottle manufacture, and some into reflective road beads

6.3 Recycling activity trends, barriers & reuse

6.3.1 Trends

Presented in Figure 6-24 is the annual glass recycling data for SA for the period of 2003–04 to 2005–06.

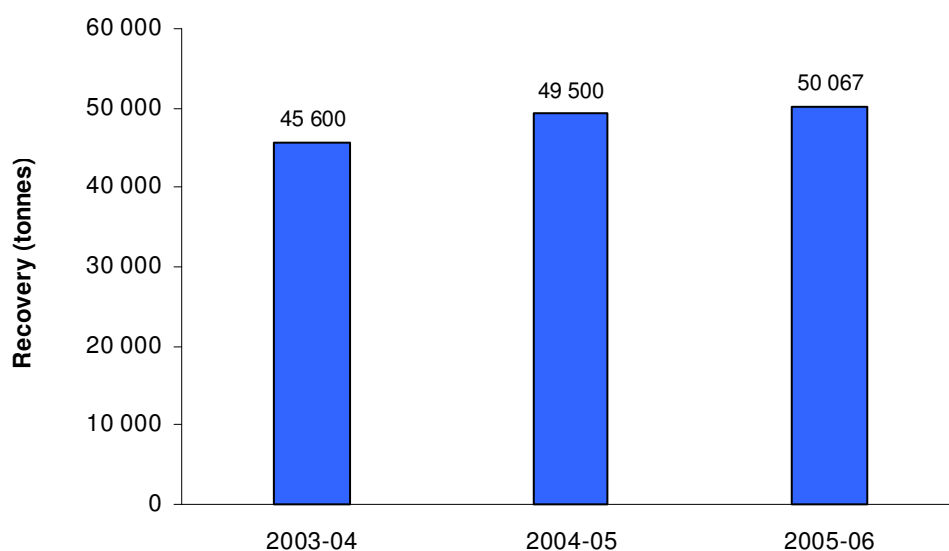


Figure 6-24 Annual glass recovery, SA 2003–04 to 2005–06

6.3.2 Barriers

Presented in Table 6-34 are the general barriers to glass market development, as reported by industry.

Table 6-34 Glass market barriers, SA 2005–06

Material	Market barriers
Glass	No significant market barriers, glass continues to have adequate market outlets and effectively all recyclate is recycled. In particular there are robust SA markets for green and clear glass.

6.3.3 Reuse

There was no direct reuse of glass identified as taking place in SA during 2005–06.

7 Other materials

7.1 Recovery & reprocessing location

The *other materials* recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

Other materials recovery in SA, and location of reprocessing, are presented in Table 7-35. Total other materials recovery was 247 052 tonnes.

Table 7-35 Other materials recovery, SA 2005–06

Material	Net recovery ¹ (tonnes)	Reprocessing location		
		SA	Interstate	Export
Fly ash ²	236 343	100.0%	0.0%	0.0%
Foundry sands ³	6 755	100.0%	0.0%	0.0%
Leather & textiles	2 419	0.0%	0.0%	100.0%
Tyres & other rubber	1 535	0.0%	93.1%	6.9%
Total	247 052	98.4%	0.6%	1.0%

1. Net recovery excludes reprocessing losses
 2. SA fly ash data provided by the Ash Development Association of Australia (ADAA)
 3. SA foundry sands data provided by the Centre for Organic & Resource Enterprises (CORE)

The breakdown of other materials recovery by source sector and material type is presented in Figure 7-25 and Table 7-36.

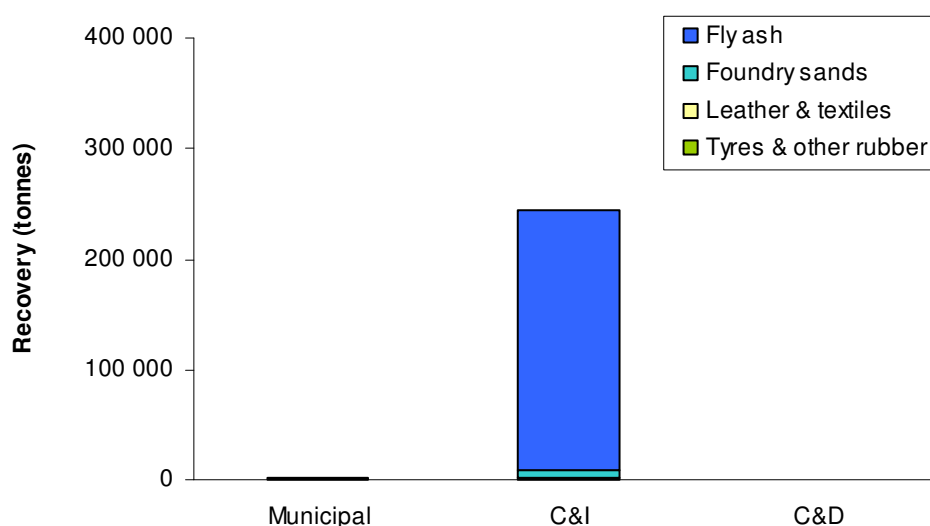


Figure 7-25 Other materials recovery – by source sector, SA 2005–06

Table 7-36 Other materials recovery – by source sector, SA 2005–06

Material	Source sector (tonnes)			
	Municipal	C&I	C&D	Total
Fly ash	0	236 343	0	236 343
Foundry sands	0	6 755	0	6 755
Leather & textiles	2 412	8	0	2 419
Tyres & other rubber	120	1 416	0	1 535
Total	2 531	244 521	0	247 052

7.2 Source & end products

7.2.1 Source products

Presented in Table 7-37 are the other materials source products.

Table 7-37 Other materials source products, SA 2005–06

Material	Source products
Fly ash	Power generation (coal ash)
Foundry sands	Foundry sands
Leather & textiles	Worn clothing
Tyres & other rubber	Truck tyres and some passenger car tyres to export

7.2.2 End products

Presented in Table 7-38 are the other materials end products.

Table 7-38 Other materials end products, SA 2005–06

Material	End products
Fly ash	Cement, concrete, and engineering fills and grouts
Foundry sands	A 10% ingredient in potting mixes, soils and other organic horticultural products as virgin sand replacement
Leather & textiles	Significant reuse of clothing overseas
Tyres & other rubber	New tyres, industrial adhesives and non-slip paints, road surfacing, brake pads, sporting and playground surfaces, insulation

7.3 Recycling activity trends, barriers & reuse

7.3.1 Trends

Presented in Figure 7-27 is annual *other materials* recycling data for SA for the period of 2004–05 to 2005–06. Data for 2003–04 is excluded as no fly ash or foundry sands data was available for that period.

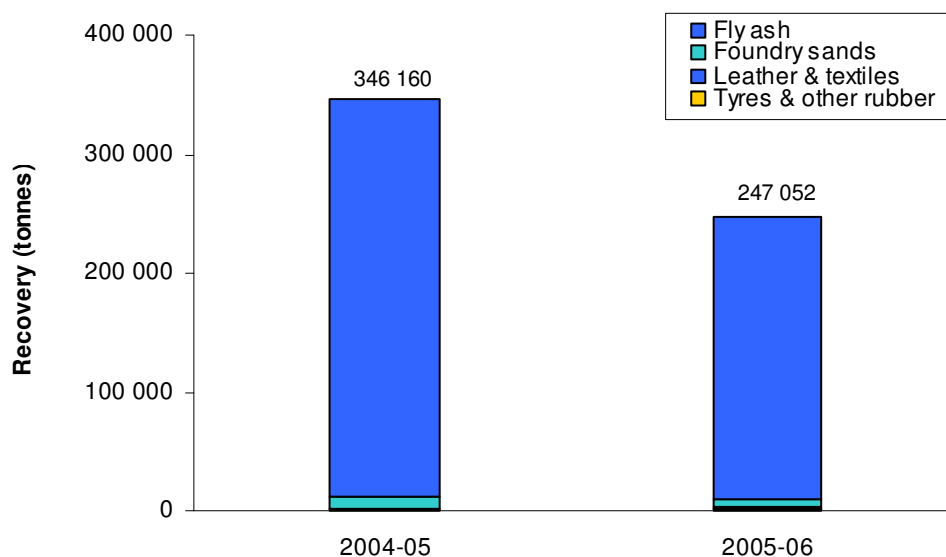


Figure 7-27 Annual other materials recovery, SA 2004–05 to 2005–06

Reuse of fly ash fell sharply in 2005–06 due to a significant reduction in local SA requirements. The fly ash industry stated that local short-term fluctuations such as this are typical year on year. Tyre recycling continued to see very strong growth.

Table 7-39 Annual other materials recovery, SA 2003–04 to 2005–06

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)
Fly ash	0	335 000	236 343
Foundry sands	0	9 006	6 755
Leather & textiles	4 080	1 564	2 419
Tyres & other rubber	88	590	1 535
Total	4 168	346 160	247 052

7.3.2 Barriers

Presented in Table 7-38 are the general barriers to other materials market development, as reported by industry.

Table 7-40 Other materials market barriers, SA 2005–06

Material	Market barriers
Fly ash	Market is inhibited by the good economic availability of alternative materials, freight costs from point of generation to point of end use, and a mismatch between production and purchase requirements. Development of the market potential requires greater capital investment, refinement of the waste stream quality, and an improved regulatory and reporting framework.
Foundry sands	No specific barriers to the market reported.
Leather & textiles	Local manufacture of rags ceased in 2003–04, however no specific barriers to the market reported.
Tyres & other rubber	Solid disposal enforcement has led to an increased recycling rate, as has the limiting of tyre retreading to once. The low value of the recyclate is however limiting the economics of recovery.

7.3.3 Reuse

Leather & textiles (clothing) is the only 'other' material that has significant direct reuse. An unknown quantity of the reported recovery for reprocessing (2 419 tonnes) would be directly reused overseas.

8 Packaging summary

The *packaging* recovery data presented in this report has been provided by a range of sources, including the SA EPA, CDL super collectors, packaging manufacturers, industry groups and reprocessors. The packaging summary provided in this section identifies packaging material that has already been quantified in the earlier material based sections of this report. As such the quantities identified in this section are not in addition to Section 2 – 7, but are an additional ‘slice’ through the data to provide specific information on packaging recovery.

Packaging recovery in SA, and location of reprocessing, are presented in Table 8-41. Total packaging recovery was 176 155 tonnes, of which 35 259 tonnes (20.0%) was recovered through the CDL system, and 140 895 tonnes (80.0%) was recovered through non-CDL routes.

Table 8-41 Packaging recovery, SA 2005–06

Material	Net recovery	CDL recovery		Non-CDL recovery ¹
	(tonnes)	(units)	(tonnes)	(tonnes)
Steel cans	3 189	N/A	0	3 189
Aluminium cans	2 249	135 441 446	1 991	258
Cardboard packaging	106 943	N/A	0	106 943
LPB cartons	1 239	26 206 967	546	693
PET packaging	4 748	95 446 225	3 602	1 146
HDPE packaging	2 245	5 431 858	121	2 125
PVC packaging	38	N/A	0	38
LL/LDPE packaging	4 883	N/A	0	4 883
Polypropylene packaging	437	N/A	0	437
Polystyrene packaging	173	N/A	0	173
Other plastics packaging	40	N/A	0	40
Glass bottles & jars	49 970	101 216 244	29 000	20 970
Total	176 155	363 742 740	35 259	140 895

1. Non-CDL recovery also includes CDL packaging recovered through non-CDL routes

The breakdown of packaging materials recovery by CDL and non-CDL, and material type, are presented in Figure 8-28 and Figure 8-29.

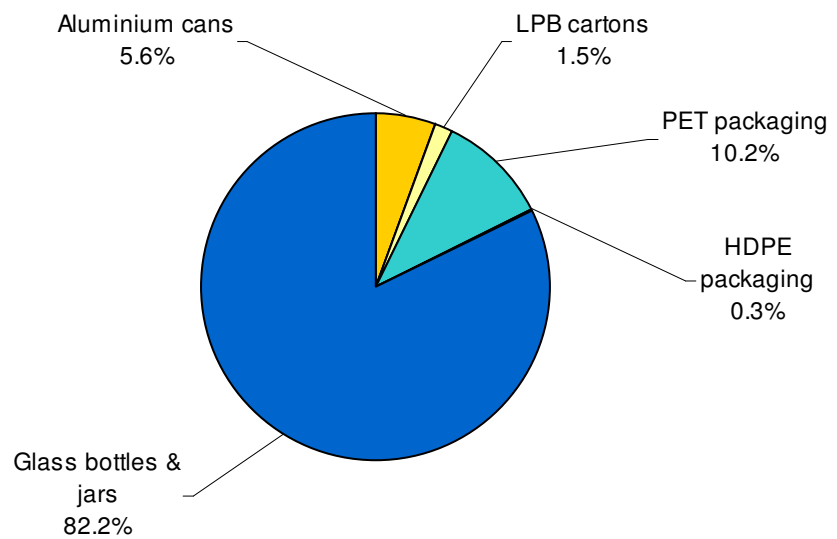


Figure 8-28 CDL packaging recovery, SA 2005-06

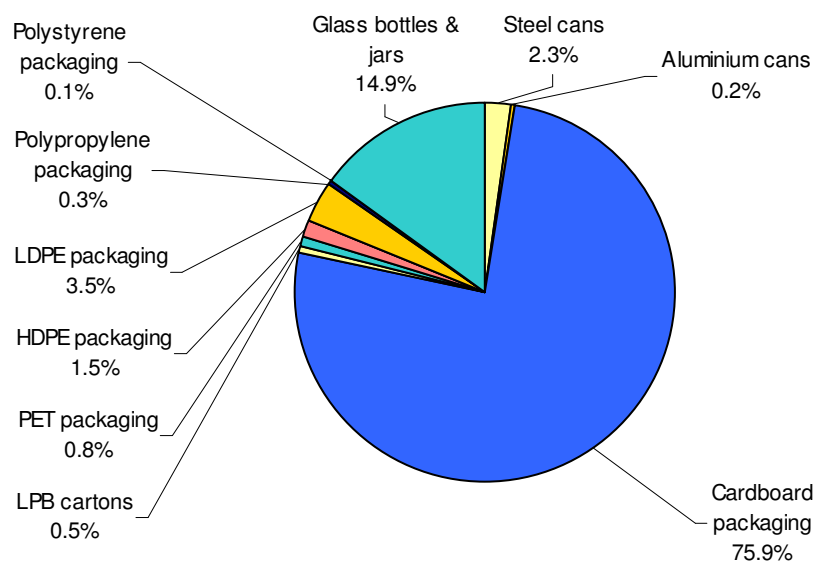


Figure 8-29 Non-CDL packaging recovery, SA 2005-06

9 Greenhouse Gas Impacts of Recycling Activity

9.1 GHG impacts introduction

Recycling is making a substantial contribution to the improvement of South Australia's environment by saving energy, conserving resources and reducing emissions of greenhouse gases (GHGs) to the atmosphere.

Recycling reduces GHG emissions primarily by decreasing the amount of energy used by industry to make products, compared with feedstocks of virgin raw materials. This is because much of the energy used in industrial processes involves burning fossil fuels such as coal, diesel and petrol. Recycled materials very often capture a proportion of the energy and resources already invested into the material, and manufacturing the second time around is thus less energy intensive than the first. Additional greenhouse gas savings are derived from reduced emissions of GHGs from landfills (e.g. methane), and by reduced harvest of trees, which can act as carbon sinks.

9.2 GHG impacts data sources

The impact of recycling on GHG emissions in SA has been estimated in this section by applying the findings of the quantities of SA recycling to data from a Victorian study *Life Cycle Impact Data for Resource Recovery from Commercial & Industrial and Construction and Demolition Waste (2005)*. No updates for this 2005 Victorian data are available.

The Victorian study was based upon Life Cycle Assessment (LCA) modelling undertaken by the Centre for Design at RMIT University in Melbourne. The study compared the environmental savings and impacts of recycling instead of landfilling the main C&I and C&D waste materials recovered in Victoria.

There is generally a high level of commonality of the recycling and energy generation processes in South Australia to those in Victoria. So while the findings presented here are based upon Victorian results, and care should be taken in their application, they should be reasonably indicative of the actual impacts, particularly in aggregate. However, factors such as distances travelled to reprocessing facility, and energy sources used for recycling, will have an impact on the actual results from state to state.

9.3 GHG impacts results

By substituting secondary-use materials for virgin materials in 2005–06, South Australia's recycling efforts prevented the equivalent of approximately 1.24 million tonnes of CO₂ entering the atmosphere, up from 1.16 million in 2004–05. This is equivalent to about 21% of the annual CO₂ emissions from the entire South Australian transport sector (2002 transport sector figures), and equates to taking 287 500 passenger cars off the road.

While overall recycling was down in 2005–06 from 2004–05, the strong increase in recycling of metals (steel and non-ferrous metals) resulted in an increase in avoided CO₂ equivalent emissions of 6.9%.

Figure 9-30 presents the recycling savings by material category, in terms of CO₂ equivalent savings, which resulted from recycling activity in SA during 2005-06.

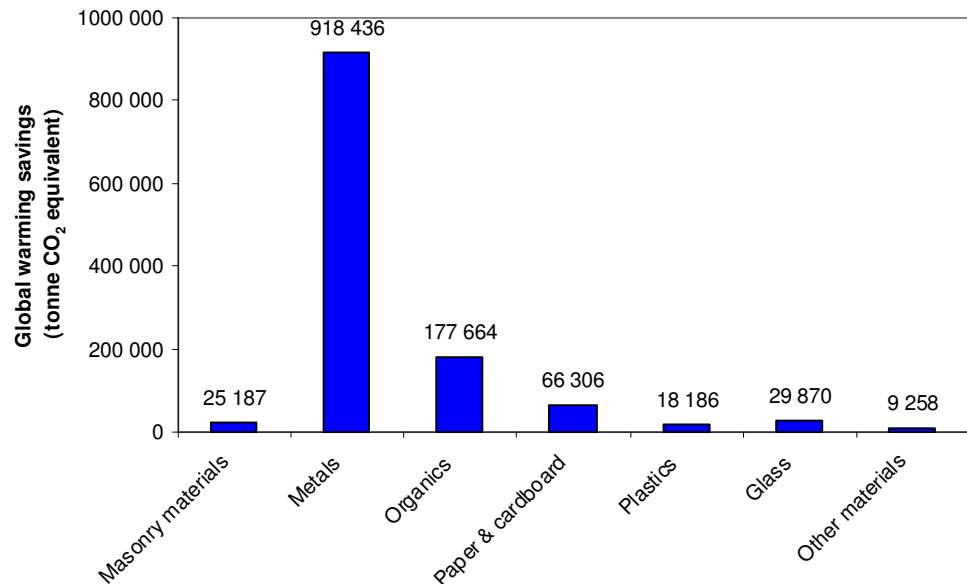


Figure 9-30 Avoided GHG emissions – by material category, SA 2005–06

The Life Cycle Assessment (LCA) modelling showed a GHG emission saving for all materials, when comparing recycling with landfill. The greatest savings in South Australia result from the recycling of steel and aluminium. The metals are also generally recycled back into a product with minimal loss, and have a high density and are therefore efficient to transport.

Table 9-42 presents the recycling savings by material, in terms of CO₂ equivalent savings, which resulted from recycling activity in SA during 2005-06.

Table 9-42 Total GHG savings and equivalencies for all materials, SA 2005–06

Material	Total benefit of recycling (tonne CO ₂ eq.)	Equivalent trees planted required for carbon absorption	Equivalent cars off the road
Asphalt	1 366	2 042	315
Bricks	953	1 425	220
Concrete	22 102	33 037	5 104
Clay, fines, rubble & soil	767	1 146	177
Steel	464 585	694 447	107 294
Aluminium	387 753	579 600	89 550
Non-ferrous metals (ex. Al)	66 099	98 803	15 265
Food organics	3 110	4 649	718
Garden organics	51 286	76 661	11 844
Timber	84 007	125 570	19 401
Organics - other	39 262	58 687	9 067
Cardboard & waxed cardboard	32 532	48 628	7 513
Liquid paperboard (LPB)	794	1 187	183
Magazines	2 747	4 107	634
Newsprint	18 850	28 176	4 353
Phonebooks	496	741	115
Printing & writing papers	10 887	16 274	2 514
Polyethylene terephthalate (PET)	4 959	7 412	1 145
High density polyethylene (HDPE)	3 201	4 784	739
Polyvinyl chloride (PVC)	687	1 026	159
Low density polyethylene (LDPE) ¹	5 317	7 948	1 228
Polypropylene (PP)	2 059	3 078	475
Polystyrene (PS) ²	453	678	105
Other plastics	1 511	2 259	349
Glass	29 870	873	6 898
Fly ash ³	6 854	10 245	1 583
Foundry sands ⁴	584	873	135
Leather & textiles ⁵	-	-	-
Tyres & other rubber	1 820	2 720	420
Total	1 244 908	1 817 074	287 508

1. No specific data was available on the GHG impact of recycling LDPE, it has been assumed that the impact is similar to that of HDPE.

2. No specific data was available on the GHG impact of recycling PS, it has been assumed that the impact is similar to that of 'Other plastics'.

3. No specific data was available on the GHG impact of recycling flyash, it has been assumed that the impact is similar to that of concrete (in the Victorian report) on the basis that fly ash is used as a binder in cement and hence concrete was the most closely related category available. It is possible the CO₂ equivalent savings might be overstated, and caution should be taken in the use of this estimation.

4. No specific data was available on the GHG impact of recycling foundry sands, it has been assumed that the impact is similar to that of soil & sand (in the Victorian report) on the basis that foundry sands are used as sand for compost applications and hence soil & sand was the most closely related category available.

5. No data was available on the GHG impact of recycling leather & textiles.

10 References

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- 2 Australian Bureau of Statistics, Export data 2005–06 financial year.
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- 7 Plastics and Chemicals Industries Association, *2006 National Plastics Recycling Survey (2005 Calendar Year)*, December 2006.
- 8 Publishers National Environment Bureau, *ONP market report for Australia (2005)*.
- 9 Sustainability Victoria, *Life Cycle Impact Data for Resource Recovery from Commercial & Industrial and Construction and Demolition Waste in Victoria*, prepared by the Centre for Design at RMIT University, Melbourne, 2005.
- 10 Zero Waste SA / Nolan-ITU, *Review of Recycling Activity in South Australia*, November 2004.

11 Glossary

Clinical waste:

Waste generated by medical, nursing, dental, veterinary, pharmaceutical or other related activity which is poisonous or infectious; likely to cause injury to public health; or contains human tissue or body parts.

Commercial and industrial waste (C&I):

Comprises solid waste generated by the business sector as well as solid wastes created by state and federal government entities, schools and tertiary institutions. Unless otherwise noted, C&I waste does not include waste from the construction and demolition (C&D) sector.

Construction and demolition waste (C&D):

Includes waste from residential, civil and commercial construction and demolition activities, such as fill material (e.g. soil), asphalt, bricks and timber. C&D waste excludes construction waste from owner/occupier renovations, which are included in the municipal waste stream. Unless otherwise noted, C&D waste does not include waste from the commercial and industrial waste stream.

Garden organics:

Organics derived from garden sources e.g. grass clippings, tree prunings.

Green house gases (GHGs):

For the purposes of this report GHGs are the six gases listed in the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

High density polyethylene (HDPE):

A member of the polyethylene family of plastics and is used to make products such as milk bottles, pipes and shopping bags. HDPE may be coloured or opaque.

Intractable waste:

Waste which is a management problem by virtue of its toxicity or chemical or physical characteristics which make it difficult to dispose of or treat safely, and is not suitable for disposal in Class I, II, III and IV landfill facilities.

Kerbside collection:

Collection of household recyclable materials (separated or co-mingled) that are left at the kerbside for collection by local council collection services.

Linear low density polyethylene (LLDPE):

A member of the polyolefin family of plastics. It is a strong and flexible plastic and usually used in film for packaging, bags and for industrial products such as pressure pipe.

Low density polyethylene (LDPE):

A member of the polyolefin family of plastics. It is a flexible material and usually used as film for packaging or as bags.

Municipal waste:

Solid waste generated from domestic (household) premises and council activities such as street sweeping, litter and street tree lopping. Also includes waste dropped off at recycling centres, transfer stations and construction waste from owner/occupier renovations.

Non-ferrous metals:

Those metals that contain very little or no iron, e.g. copper, brass, bronze.

Packaging:

Plastic material used for the containment, protection, marketing or handling of product.

Polyethylene terephthalate (PET):

A clear, tough, light and shatterproof type of plastic, used to make products such as soft drink bottles, film packaging and fabrics.

Polypropylene (PP):

A member of the polyolefin family of plastics. PP is light, rigid and glossy and is used to make products such as washing machine agitators, clear film packaging, carpet fibres and housewares.

Polystyrene (PS):

A member of the styrene family of plastics. PS is easy to mould and is used to make refrigerator and washing machine components. It can be foamed to make single use packaging, such as cups, meat and produce trays.

Polyvinyl chloride (PVC):

A member of the vinyl family of plastics. PVC can be clear, flexible or rigid and is used to make products such as fruit juice bottles, credit cards, pipes and hoses.

Post-consumer material

Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Pre-consumer material:

Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Material diverted from the waste stream during a manufacturing processes for reprocessing at a different site. Excluded are waste materials that are reclaimed and reutilised within the same manufacturing processes that generated it as a matter of course to the efficient operation of the site (i.e. process scrap). Examples of this include paper mill 'broke' and plastics 'regrind'.

Recovered material:

Material that would have otherwise been disposed of as waste, but has instead been collected and recovered (reclaimed) as a material input, in lieu of a new primary material, for a recycling or manufacturing process.

Recycling:

Material that has been reprocessed from recovered (reclaimed) material by means of a manufacturing process and made into a final product or into a component for incorporation into a product.

The term *recycling* is used to cover a wide range of activities, including collection, sorting, reprocessing and manufacture into new products. It also covers the processing of by-products from manufacturing processes which may otherwise be disposed to landfill, for example bark from plantation timber (for compost), and meat waste from abattoirs (for fertiliser).

Materials recovered from both pre-consumer (manufacturing losses) and post-consumer (product end-of-life) sources are defined as being able to be diverted from landfill for recycling. However, waste materials that are reclaimed and reutilised within the same manufacturing processes that generated it as a matter of course to the efficient operation of the site (i.e. process scrap) are not defined as recycling for the purpose of this study.

Reprocessing:

Changing the physical structure and properties of a waste material that would otherwise have been sent to landfill, in order to add financial value to the processed material.

Reuse:

Reuse involves recovering value from a discarded resource in its original state without reprocessing or remanufacture.

Solid waste:

Waste materials ranging from municipal garbage to industrial waste, but excluding gaseous, liquid, hazardous, clinical and intractable wastes.

Appendix A

Reprocessor questionnaire

Table A-1 Reprocessor questionnaire

Questions	
1	What was the reprocessed quantity of the material during 2005-06 financial year?
2	What are the reprocessing losses (tonnes or %)?
3	What was the packaging / non-packaging split for the material?
4	What was the stockpile of the material in July 2004 (tonnes)?
5	What was the stockpile of the material in June 2005 (tonnes)?
6	What source sector did the material come from, split by household, C&I and C&D (tonnes and/or %)?
7	Pre/post consumer % split?
8	If known, what are the source products?
9	What is the accuracy of the data (+/- %)?
10	What is the destination of the reprocessed material, split by SA, interstate (State) and export (Country) (tonnes or %)?
11	What types of the products are the reprocessed material to be made into?
12	General comments on any changes in quantities of materials recycled from 2003-04 calendar year study.
13	Please comment on any 'reuse' activity.
14	Please include comments on recycling activity trends, market access and any inhibitors to increased activity.
15	Do you know of other players in your market?
16	ZWSA has engaged Hyder Consulting to conduct this survey for the 2006-07 financial year. We will be undertaking this survey later in the year. To assist us in preparing for this exercise please comment on the availability of 2006-07 data.