Collection of Waste Timber from Melbourne Businesses

August 1998

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FOREWORD

The Collection of Waste Timber from Melbourne Businesses Report has been prepared by Meinhardt (Vic) Pty Ltd on behalf of EcoRecycle Victoria.

The information contained within this Report is based on information provided by businesses, from selected industries, who completed a survey for this project. The correctness of the information presented is therefore dependent on the correctness of completed surveys.

The information contained within this report is current as at August 1998.

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EXECUTIVE SUMMARY

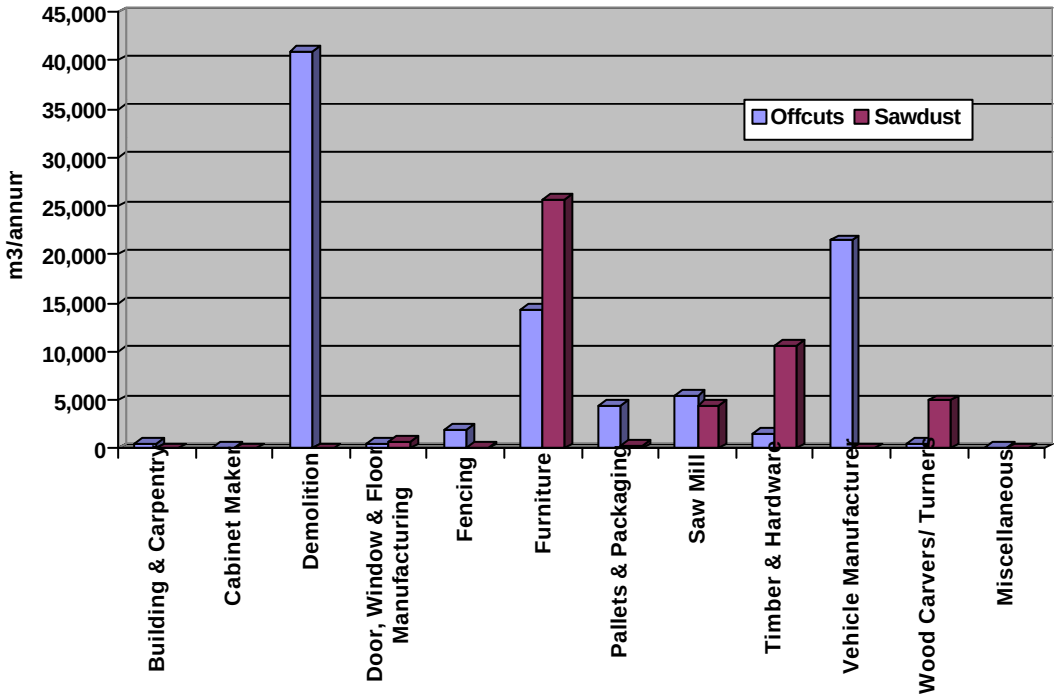
Timber is a major component of the waste stream that is generated by commercial and industrial sources in Victoria each year. A significant proportion of this waste stream is deposited directly to landfill. However in many cases the waste timber generated is of sufficient quantity to enable reuse or further reprocessing. A demand for clean, waste timber from commercial and industrial businesses, for either reuse, reprocessing or mulching and composting has been identified.

A written survey was sent to businesses with the aim being to determine the volume and type of waste timber generated across Melbourne. Industries that were thought to be major sources of waste timber include building, demolition, furniture, pallet and packaging manufacture, and timber and hardware suppliers. Nearly 400 surveys were sent. However only 126 surveys were completed and returned. Businesses that completed the survey range in size from one employee to over 100. These businesses are located throughout metropolitan Melbourne.

Current arrangements for the collection of waste timber for disposal and recycling vary between industries, and between individual businesses within each business type. All businesses surveyed place timber in the general waste stream for disposal. Other wastes disposed of vary but include plastic packaging, cardboard and metal strapping. Methods of waste disposal include self-haul and use of waste collection contractors. The percentage of businesses that currently recycle waste timber depends on the type of industry. Participation in waste timber recycling ranges from 25% to 100%. Waste timber recycling procedures include separate collection of waste timber for reuse and recycling, and use by the general public.

A total of 92,300 m^3 of offcuts, including waste pallets, and 47,300 m^3 of sawdust is generated across Melbourne each year by those industries that participated in the waste timber survey. The volume of offcuts and sawdust generated by each industry is contained in Figure E1. This includes waste timber that is currently recycled. The demolition, furniture and vehicle manufacturing industries are major sources of waste timber offcuts, and the furniture and timber and hardware industries major sources of sawdust.

FIGURE E1- TOTAL WASTE TIMBER GENERATION – OFFCUTS AND SAWDUST



A total of 72,500 m^3 of hardwood, 43,700 m^3 of softwood and 11,300 m^3 of waste timber pallets are generated each year by those businesses participating in the survey. This is 93% of all waste timber generated in metropolitan Melbourne. An average of 23%, or 32,600 m^3 per annum, of waste timber is currently recycled by those businesses surveyed. Most waste timber generated by those businesses surveyed is untreated.

The level of interest in waste timber recycling varies between industry types but is up to 100% for some industries. The level of interest in waste timber recycling depends on a number of factors including the total volume of waste timber generated and current practices for disposal and/or recycling of waste timber.

Table E1 summarises waste timber collection system options and collection requirements that each option best satisfies.

TABLE E1 – WASTE TIMBER COLLECTION SYSTEMS

Collection System	Collection Requirement Best Suited To	Example Industry Sources
Self haul to local transfer station or landfill	Businesses generating small volumes Businesses who currently self haul general waste to transfer stations or landfill	Builders & Carpenters Cabinetmakers
Self haul to central composting or processing facility	Businesses generating large volumes Businesses who own trucks and bins and haul general waste to landfill	Demolition Saw Mill
Collection of waste timber by recycling contractor	Businesses generating large volumes over a period of time Businesses currently using external contractors for general waste collection	Furniture Cabinetmakers Fencing Saw Mill
Direct waste exchange between generator and timber processor	Businesses located within economical travel distances of timber processors	Vehicle Manufacturing Furniture
Utilisation of commercial and industrial sorting facilities	Businesses who generate a high proportion of other recyclable material	Demolition Furniture

Most sources of waste timber identified in this project are located within five kilometres of a transfer station, landfill or regional composting facility. The transfer stations and landfills all have recycling drop-off facilities. This suggests that the RWMGs may have some role in the collection of waste timber through the provision of waste timber recycling facilities.

Any system developed for the collection of waste timber needs to be established such that segregation of waste timber occurs, ie offcuts and sawdust are separated, and treated and untreated timber are separated. This is best done at the source of waste timber generation.

There are many applications in which the use of waste timber may be suitable. As a result competition for the supply of collected waste timber may occur. Guaranteeing both the quantity and quality of collected waste timber will assist in maintaining a demand for the supply of waste timber. An interest in utilising waste timber needs to be established and maintained such that supply is matched by a demand for the product. An interest in utilising waste timber may be achieved through the following:

- Advertising the availability of waste timber for reuse;
- Educating businesses of the benefits of recycling waste timber on site and using waste timber in product manufacture.

Costs associated with a system to collect waste timber (ie collection, sorting and transport) should be incurred by those who utilise the collection service provided and those who utilise the collected product. These costs can be recovered in two ways. The first is income from disposal and/or collection charges. The second is from the sale of the waste timber to reprocessing or composting businesses.

Demolition businesses, saw mills and vehicle manufacturers present the greatest potential source of waste timber given the large volumes produced by each individual business. Furniture and timber and hardware businesses are also a large source of waste timber due to the large number of these businesses. Hence demolition, furniture, saw mill, timber and hardware, and vehicle manufacturing industries should be targeted for collection of waste timber from Melbourne businesses.

GLOSSARY

FIAA	Furnishing Industry Association of Australia (Vic/Tas) Inc
MDF	Medium Density Fibreboard
MGB	Mobile Garbage Bin
RWMG	Regional Waste Management Group
Treated Timber	Timber that has been treated with Copper Chromium Arsenate

1. INTRODUCTION

EcoRecycle Victoria has commissioned this project in response to a demand for clean, waste timber from commercial and industrial businesses in Melbourne, for either reuse, reprocessing or mulching and composting. The aim of this project is to identify sources of waste timber from across Melbourne, determine the types and volume of waste timber generated, and collection requirements of each source.

Timber is a major component of the waste stream that is generated by commercial and industrial sources in Victoria each year. A significant proportion of this waste stream is deposited directly to landfill without further processing. However in many cases the waste timber generated is of sufficient quantity to enable reuse or further reprocessing. Where this is not possible the organic nature of waste timber makes it a prime source of material for composting and mulching operations.

Financial implications and cost recovery are also investigated as part of this project. This also forms the first stage of the development of a system for the collection of waste timber from Melbourne businesses.

2. INDUSTRY SURVEY

2.1 SURVEY

A written survey was sent to businesses with the aim being to determine the volume and type of waste timber generated across Melbourne. The waste timber survey is contained in Appendix A.

The survey asked each business to provide the following details:

- Business details;
- Nature of business;
- Number of employees;
- Amount of waste timber generated per annum including
  - timber offcuts, sawdust and packaging;
  - hardwood, softwood, particleboard, and other timber
- Amount of waste timber that is untreated;
- Amount of waste timber that is segregated for a separate collection;
- Amount of waste timber that is recycled;
- Interest in investigating further opportunities to recycle waste timber;
- Type of waste timber collected in waste and recycling streams;
- Other materials collected in waste and recycling streams;
- Collection bin capacity;
- Collection frequency;
- Details of current waste timber recycling procedures being undertaken and;
- Any other comments.

2.2 INDUSTRIES SURVEYED

Those industry types considered likely to produce large volumes of waste timber were determined. Businesses from each industry type were contacted by telephone and asked if they would participate in the survey. It was anticipated that by first contacting businesses by telephone an initial level of interest could be gauged for each industry contacted.

Industry associations were also approached to help publicise the survey with their members and encourage involvement. Industry associations contacted included the following:

- Australian Industry Group (formerly Australian Chamber of Manufacturers and Metal Trades Industry Association).
- Demolition Contractors Association;
- Furnishing Industry Association of Australia (Vic/Tas) Inc;
- Master Builders Association;

The focus of this project was on Melbourne due to the high concentration of industries likely to generate waste timber. The expected destination of waste timber, including timber reprocessors and composting operations, is also within metropolitan Melbourne. Hence only those businesses within economic transport distance of Melbourne were surveyed.

Table 2.1 summarises the number of businesses contacted for the survey and the number agreeing to participate for each category.

TABLE 2.1 - BUSINESSES AGREEING TO PARTICIPATE IN SURVEY

Industry Category	Business Contacted by telephone (number)	Businesses agreeing to participate	
		(number)	(%)
Boat, yacht and caravan builder	27	8	30
Building, carpentry and construction	105	78	74
Cabinetmakers	13	13	100
Demolition	45	27	60
Door, window and floor manufacturers	31	22	71
Fencing	22	20	91
Frames and trusses	27	9	33
Furniture	160	87	54
Kitchen and joinery	18	10	55
Pallets & Packaging Manufacturing	18	15	87
Playground equipment	13	5	38
Plywood and veneers	11	5	45
Prefabricated buildings	4	4	100
Saw mill	2	2	100
Shadehouses and patios	10	3	30
Timber and hardware	59	48	81
Vehicle manufacturers	2	2	100
Wardrobe manufacturer	17	9	53
Wood Turners & Carvers	19	13	68
Miscellaneous	12	12	100
TOTAL	**615**	**392**	**64**

Details of waste timber generated by domestic furniture manufacturers were previously obtained for a survey completed on behalf of the Furnishing Industry Association of Australia (Vic/Tas) Inc. (FIAA). Data from the FIAA survey has been incorporated into this report.

The level of interest and willingness to participate in the project varied considerably between the industry types. This may be due to a number of factors including the following:

- Total volume of waste timber produced;
- Who is responsible for taking waste to landfill, ie. business owner or external waste management contractor;
- Nature of business, ie. large versus small;
- Current practices for disposal, reuse or recycling of waste timber

Table 2.2 summarises the number of businesses who completed and returned the waste timber survey. This data is shown for each industry category contacted as a number and percentage of those businesses that agreed to participate in the survey.

TABLE 2.2 - SURVEY RESPONSES

Industry Category	Businesses who completed and returned survey	
	(number)	(%)
Building and carpentry	15	19
Cabinetmakers	5	38
Demolition	4	15
Door, window and floor manufacturers	4	18
Fencing	9	45
Furniture [1.]	62	15
Pallets & Packaging Manufacturing	4	27
Saw Mill	1	50
Timber and hardware	13	27
Vehicle manufacturers	2	100
Wood Turners & Carvers	5	38
Miscellaneous	4	33
TOTAL	**126**	**32**

Note: 1. This includes 49 businesses surveyed on behalf of the FIAA.

3. SURVEY RESULTS

3.1 INDUSTRIES GENERATING WASTE TIMBER

3.1.1 Overview

A number of industry types generate waste timber across Melbourne. The survey data shows that the type and volume of waste timber generated depends, to varying degrees, on the source or type of business generating the waste timber.

The industries that participated in the survey are described in terms of typical business size, ie the number of staff employed, and location. The location of businesses is given in terms of the Regional Waste Management Group (RWMG) that they are located in. There are four RWMGs in metropolitan Melbourne: Eastern Regional Waste Management Group (Least Waste), Northern Regional Waste Management Group, South Eastern Regional Waste Management Group, and Western Regional Waste Management Group.

Current practices for the disposal and recycling of waste timber are also described. It should be noted that this, and all other analysis contained in this report, is based on only the returned surveys, not total industry data.

3.1.2 Building and Carpentry

Building, construction and carpentry businesses that participated in the survey are small, with up to eight employees and an average of four. Nearly half of the building and carpentry businesses were located in the South Eastern Region.

Those builders and carpenters who participated in the survey typically place pine, framework and hardwood offcuts and some demolished timber in the general waste stream. Other materials collected in the same bin include soil, bricks, concrete, tiles, plaster, steel, packaging, plastic and cardboard. Bins used for collection of this waste range in capacity from 2.5 m^3 to 20 m^3. The frequency of collection varies from once per month to once per week.

Waste timber recycling is undertaken by approximately 40% of businesses surveyed. Other businesses have investigated opportunities to reduce the amount of waste landfilled in the past. Waste timber recycled by builders and carpenters includes demolished timber, rafters, beams, old flooring, pine and other offcuts. The building and carpentry business operators rather than external contractors typically recycle these materials. Materials are denailed and remachined or taken to second hand yards for reuse. Approximately 20% of businesses surveyed give waste timber away to their employees and the general public for use as firewood. Reuse of waste timber material on site is common.

3.1.3 Cabinetmakers

Cabinetmaking businesses that completed the waste timber survey are small with an average of four employees. The cabinetmakers surveyed are located across Melbourne with at least one in each RWMG. Cabinetmaking businesses surveyed include manufacturers of kitchen fittings.

Cabinetmakers typically dispose of hardwood and particleboard offcuts and sawdust along with plastic packaging, cardboard and tins. The preferred receptacles for waste collection are 3 m^3 bins. However, one business places all waste timber, and other general waste, in 240 L mobile garbage bins (MGBs). The frequency of collection ranges from once per fortnight to four times per week.

Only two cabinetmakers surveyed recycle waste timber. Timber offcuts are burnt for firewood and sawdust used for compost by one business. A composting operator takes the sawdust off site. The other business that recycles waste timber donates timber offcuts to schools and kindergartens for reuse. Only very small volumes of waste timber are recycled.

3.1.4 Demolition

Survey respondents in the demolition industry are located across Melbourne with one in each RWMG. These businesses employ up to thirteen staff, with an average of seven.

Waste hardwood and pine is collected from demolished buildings along with concrete, plaster, bricks, tiles, trees and shrubs. Bins with a capacity of 20-30 m^3 are used. Bins and trucks used to collect and transport waste are owned by the demolition businesses who were surveyed. The frequency of bin removal varies depending on the amount of waste collected, this may be up to three times per week.

Waste timber is recycled by 50% of the demolition businesses surveyed. Waste timber currently recycled includes hardwood, oregon and pine. One business de-nails and resells waste timber, recycling up to 2,400 m^3 per annum. Another business collects waste timber in 3.5 m^3 bins for recycling. A third demolition business is considering separating waste timber to sell as firewood to reduce landfill disposal costs.

3.1.5 Door, Window and Floor Manufacturing

Door, window and floor manufacturers who participated in the survey tend to be larger with up to 65 staff employed and an average of 28. Two of the four businesses are located in the Northern Region, the other two are located in the Least Waste and South Eastern Regions.

Door, window and floor manufacturers who were surveyed for this project typically deposit particleboard and medium density fibreboard (MDF) offcuts and shavings into the waste stream. Other materials collected in the same bin include general waste, such as plastic, cardboard, strapping, other packaging materials and office waste. Bins used for collection range in capacity from 4.5 m^3 to 7.5 m^3. The frequency of collection varies from twice a week to daily. The largest business in this industry surveyed (65 employees) has its waste collected daily reflecting a higher waste generation due to its larger size.

Waste timber is recycled by half the door, window and floor manufacturers surveyed. Timber offcuts and sawdust are recycled and some timber offcuts are separated for firewood. One business has an arrangement with a waste management contractor for the collection of sawdust. Sawdust, and some offcuts, are placed in a 3.5 m^3 and collected daily.

3.1.6 Fencing

The fencing businesses surveyed employ between two and 25 employees, with an average of nine. Of the businesses surveyed 45% are located in the Least Waste Region. The remaining businesses are located in the Northern and South Eastern Regions.

Waste collection contractors servicing the fencing businesses surveyed collect small offcuts, sawdust and old fencing material. Other waste collected with waste timber includes plastic and metal strapping, wrapping and other general waste. Bins used for collecting this waste vary from 240L MGBs to 10 m^3 bins. The

frequency of waste collection is generally once per week. Nearly 45% of businesses surveyed take all waste to their local transfer station or landfill.

Waste timber is recycled by 55% of the fencing businesses surveyed. Old fences and posts and other timber offcuts are recycled. The fencing business operator rather than external contractors typically recycle these materials. Waste timber is typically sold to the general public for firewood, and to other customers for reuse, refurbishment into non-returnable pallets and mulching. One fencing business surveyed mulches 800 m^3 of waste timber per year and is charged for the service provided by the recycling contractor.

3.1.7 Furniture

The size of furniture manufacturing businesses varies considerably, from one to 900 with an average of 42, according to those surveyed. There is a slightly higher concentration of furniture manufacturers in the Least Waste and Northern Regions, 33% and 27% respectively (approximately 50% of furniture makers in the Least Waste Regional Group are located in or around Bayswater). The remaining businesses are spread relatively evenly between the South Eastern and Western Regions.

Furniture manufacturers typically dispose of pine, particleboard and MDF offcuts and sawdust into the waste stream. Other materials placed in the same bin include plastic packaging, strapping, glass, fabric, foam, paper and other general waste. Most furniture manufacturers surveyed engage external waste management contractors for the collection of waste. Bins used to collect waste range in size from 240L MGBs to 30 m^3 skips. Bins with a capacity of 3m to 6m are used by 40% of businesses that participated in the survey. Businesses using bins larger than 10 m^3 are generally larger businesses reflecting a higher waste timber generation. The frequency of bin collection ranges from daily to monthly.

Waste timber is recycled by 39% of furniture manufacturers who participated in the survey. Materials recycled include both hardwood and softwood offcuts and sawdust. Sawdust is reused by the general public and garden suppliers for use in compost, horse stables and is briquetted. Timber offcuts are used for firewood, at schools and kindergartens, and by toy manufacturers. A number of waste management contractors collect sawdust from some furniture businesses. A furniture business surveyed is currently installing a dust extraction unit and another has installed a briquette machine for recycling of waste sawdust. However most recycling occurs through informal arrangements with members of the public.

3.1.8 Pallets and Packaging

The pallet and packaging manufacturing businesses surveyed are larger with an average of 35 employees (however only two of the four businesses provided this detail when completing the survey). Two of the four pallet and packaging businesses are located in the South Eastern Region, the other two are located in the Least Waste and Western Regions.

Timber offcuts and shavings are deposited in the waste stream by pallet and packaging businesses that completed the survey. Other waste also placed in the waste stream includes plastic, wire strapping and other general waste. Bins used range in capacity from 3 m^3 to 30 m^3 (with an average capacity of 19 m^3). A number of external waste management contractors are used for collection of waste from these businesses. The frequency of collection ranges from once per fortnight to three times per week. Businesses generating the highest volumes of waste timber use the larger bins and have a more frequent collection.

Waste timber is recycled by 50% of the pallet and packaging manufacturers surveyed. Sawdust, pine and hardwood offcuts are typically recycled. One business surveyed collects sawdust in 20 m^3 bins for fortnightly collection and mulches timber offcuts. Each year 3,000 m^3 of waste timber is recycled by this business. Another business resells old boxes to the general public.

3.1.9 Saw Mill

One saw mill completed the survey for this project and is located in metropolitan Melbourne, in the South Eastern Region. A total of 21 staff are employed.

No information was provided by the saw mill surveyed in regards to its current waste disposal arrangements.

Sawdust and timber offcuts (both green and dry) are recycled by the saw mill business surveyed. Sawdust is separated into 60 m^3 bins and collected daily by a wood shaving merchant. Timber offcuts and green timber are placed in a 50 m^3 bin and collected daily by another wood recycler for chipping and sale. Some dry offcuts are sold as firewood. Most waste timber produced is recycled.

3.1.10 Timber and Hardware

The timber and hardware businesses surveyed are located in each of the RWMGs, with approximately 40% in the South Eastern region. Those timber and hardware businesses surveyed employ up to 60 staff, with an average of 14.

Waste pine offcuts and sawdust, and lesser volumes of jarrah and merbau, are collected from timber and hardware businesses who completed the survey. Other waste collected includes plastic packaging, steel strapping and general and office waste. Bins used for collection of waste range in capacity from 1 m^3 to 23 m^3, with an average of 5 m^3. The frequency of bin collection ranges from daily to monthly.

Of the timber and hardware businesses surveyed 54% recycle waste timber. Materials recycled include pine and jarrah sawdust, and timber offcuts. The business rather than external contractors generally undertake recycling activities. One business does engage external recycling contractors to collect shavings and sawdust. Other businesses utilise waste timber for firewood, garden mulch and another gives waste sawdust to motor mechanics for reuse in their garages.

3.1.11 Vehicle Manufacturers

Two vehicle manufacturers participated in the survey. One vehicle manufacturer is located in the South Eastern Region and the other in the Western Region. They employ 60 and 2,400 staff respectively.

No information was provided by the vehicle manufacturers surveyed in regards to their current waste disposal arrangements.

Both vehicle manufacturers surveyed recycle waste timber pallets and packaging crates. A timber recycling business is engaged by both businesses to shred this material. One business recycles 800 tonnes per year of used timber pallets. Employees at the other business reuse packaging crates.

3.1.12 Wood Carvers and Turners

Wood carving businesses that completed the survey range in size from two employees to 38 employees with an average of 13 staff. The wood carving

businesses that completed and returned the survey are located in the Least Waste and South Eastern Regions only.

Waste offcuts and sawdust are placed in the waste stream by wood carvers and turners with packaging and other general waste. Bins used for the collection of this waste range in capacity from 1.5 m^3 to 4.5 m^3. Bins are collected once or twice per week.

Most wood carvers and turners surveyed, ie 83%, recycle waste timber. Sawdust is collected by a number of recycling businesses from wood carvers and turners. Bins used for collection of sawdust range in capacity from 14 m^3 to 25 m^3. Timber offcuts are typically used by the general public and business employers for firewood and mulch.

3.1.13 Miscellaneous

A number of miscellaneous businesses have been identified in the waste timber survey and include manufacturers of signs, shade houses and playground equipment. These businesses are small, with an average of four employees and are located across Melbourne in each of the RWMGs, except the Western Region.

These businesses deposit a wide range of waste timber into bins with a capacity of 1 m^3 to 3 m^3. Paper, cardboard and other general waste is typically collected with the waste timber.

Waste timber is recycled by half the miscellaneous businesses surveyed. Plywood and softwood offcuts and sawdust are recycled. Timber offcuts are given away to schools and kindergartens for reuse and sawdust is composted. Waste timber is generally separated in bins with a capacity of 1 m^3 and emptied monthly to weekly depending on the rate of waste timber generation.

3.2 LOCATION

3.2.1 General

Analysis of the survey results show that there are many sources of waste timber across Melbourne. Figure 3.1 shows the
spatial distribution of waste timber generation across Melbourne, and RWMG boundaries.

Figure 3.1 Melways with dots

Figure 3.1 shows that waste timber is generated across all of metropolitan Melbourne. There is a concentration of waste timber generation in Bayswater and Dandenong that is due to a large manufacturing base in these areas. Waste timber is generated in each of the four Regional Waste Management Groups (RWMGs). The number of sources of waste timber in each RWMG is shown in Table 3.1.

TABLE 3.1 - DISTRIBUTION OF WASTE TIMBER GENERATION ACROSS REGIONAL WASTE MANAGEMENT GROUPS

RWMG	Sources of Waste Timber	
	Number	%
Least Waste	37	29
Northern Regional Waste Management Group	29	23
South Eastern Regional Waste Management Group	38	30
Western Regional Waste Management Group	22	18

3.2.2 Waste Timber Generated Outside of Melbourne

Five businesses that were surveyed are not located in Melbourne. Although this project is an investigation of waste timber generation in Melbourne these businesses may be major sources of waste timber and are therefore worthy of comment.

Four of these businesses were surveyed as part of the FIAA project. One is located in Castlemaine, one in New South Wales (and will therefore not be considered further) and two in Geelong. The fifth business is a timber and hardware supplier/saw milling business located in Myrtleford.

The furniture businesses employ up to 17 staff each and the saw mill 400 staff.

4. ANALYSIS

4.1 WASTE TIMBER GENERATION

Table 4.1 shows the percentage of industries surveyed generating different types of waste timber and the average waste timber generation per business, for each industry. The average waste timber generation refers to the average volume produced by businesses generating that particular waste, not an average across all businesses.

It should be noted that the information contained in Table 4.1 does not take into account the volume of material that is currently recycled, and does not differentiate between waste timber that is treated and untreated.

TABLE 4.1- SEGREGATED TIMBER TYPES

Business		Hardwood		Softwood		Particleboard		Other			Packaging	
		Businesses generating waste timber (%)	Average waste timber generation (m^3)	Businesses generating waste timber (%)	Average waste timber generation (m^3)	Businesses generating waste timber (%)	Average waste timber generation (m^3)	Businesses generating waste timber (%)	Average waste timber generation (m^3)		Businesses generating waste timber (%)	Average waste timber generation (m^3)
Building & Carpentry	*Offcuts*	66	32	66	21	47	10	7	5	*Pallets*	7	3
	Sawdust	33	1	27	2	27	1	7	1	*Other*	0	0
Cabinetmaker	*Offcuts*	60	2	40	2	60	30	20	40	*Pallets*	0	0
	Sawdust	20	2	20	1	80	8	0	0	*Other*	0	0
Demolition	*Offcuts*	100	6,925	75	4,433	0	0	0	0	*Pallets*	0	0
	Sawdust	0	0	0	0	0	0	0	0	*Other*	0	0
Door, Window & Floor Manu.	*Offcuts*	50	185	50	65	0	0	0	0	*Pallets*	0	0
	Sawdust	25	350	50	250	0	0	0	0	*Other*	0	0
Fencing	*Offcuts*	44	263	22	14	0	0	11	1,000	*Pallets*	0	0
	Sawdust	11	60	22	43	0	0	0	0	*Other*	22	2
Furniture	*Offcuts*	19	169	26	447	18	385	6	129	*Pallets*	8	72
	Sawdust	19	498	29	780	29	210	5	368	*Other*	0	0
Miscellaneous	*Offcuts*	50	38	50	13	25	20	0	0	*Pallets*	25	5
	Sawdust	25	4	50	12	25	20	0	0	*Other*	0	0
Pallets & Packaging	*Offcuts*	50	785	50	1,240	0	0	0	0	*Pallets*	25	900
	Sawdust	75	133	25	10	0	0	0	0	*Other*	25	30
Saw Mill	*Offcuts*	100	5,500	0	0	0	0	0	0	*Pallets*	0	0
	Sawdust	100	4,400	0	0	0	0	0	0	*Other*	0	0
Timber & Hardware	*Offcuts*	23	22	38	280	8	20	0	0	*Pallets*	15	51
	Sawdust	23	3,513	31	35	0	0	0	0	*Other*	8	20
Vehicle Manufacturers	*Offcuts*	50	10,000	0	0	0	0	50	1,000	*Pallets*	100	5,180
	Sawdust	0	0	0	0	0	0	0	0	*Other*	50	124
Wood Turners & Carvers	*Offcuts*	50	26	50	133	0	0	0	0	*Pallets*	17	100
	Sawdust	33	1,002	50	100	0	0	0	0	*Other*	0	0

4.2 WASTE TIMBER GENERATION AND RECYCLING

Different industries surveyed produced different volumes and types of waste timber, as summarised in Table 4.1. The proportion of waste timber that is segregated for a separate collection and recycled also varies. Tables 4.2 to 4.13 summarise the percentage of the total volume of waste timber generated, by each business and for each type of timber, that is segregated for a separate collection and recycled.

It should be noted that the percentage of waste timber separated and percentage recycled is not necessarily the same, according to the survey results. It does follow that waste timber segregated for a separate collection, eg placed in "waste timber" bin, would be recycled, and vice versa. Clearly there was some confusion on the part of those businesses surveyed when answering these questions.

- **Building and Carpentry**

Hardwood and softwood offcuts are generated by 66% of the building and carpentry businesses surveyed. Each business generates an average volume of 32 m^3 and 21 m^3 per annum respectively. Smaller volumes of particleboard, other timber and packaging are also produced. The majority (97%) of total waste timber generated by builders and carpenters is timber offcuts, including some timber from the demolition of existing buildings.

Table 4.2 shows that only a small percentage of the total waste timber generated by builders and carpenters is separated and recycled.

TABLE 4.2 - WASTE TIMBER GENERATION – BUILDING AND CARPENTRY

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	7	7
	Sawdust	35	33
Softwood	Offcuts	5	6
	Sawdust	50	47
Particleboard	Offcuts	1	1
	Sawdust	16	0
Other	Offcuts	100	0
	Sawdust	0	0
Packaging	Pallets	0	0
	Packaging	0	0

- **Cabinetmaker**

Hardwood and softwood offcuts are generated by 60% and 40%, respectively, of the cabinetmaking businesses surveyed. However, they typically generate less than 3 m^3 per annum of each of these materials. Particleboard offcuts are generated by 60% of cabinetmakers surveyed, each generating an average of 30 m^3. Timber offcuts comprise 80% of the total volume of waste timber generated by these businesses.

Table 4.3 summarises the percentage of waste timber separated for recycling. Generally less than one third of waste timber is separated and recycled.

TABLE 4.3 - WASTE TIMBER GENERATION – CABINETMAKERS

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	11	78
	Sawdust	20	20
Softwood	Offcuts	6	100
	Sawdust	20	20
Particleboard	Offcuts	0	0
	Sawdust	0	0
Other	Offcuts	0	0
	Sawdust	0	0

- **Demolition**

The survey shows that demolition businesses only generate timber offcuts. All businesses surveyed generate hardwood offcuts and 75% generate softwood offcuts. Each business surveyed produces an average of 6,925 m^3 of hardwood and 4,433 m^3 of softwood per annum.

Table 4.4 shows that less than 20% of waste timber generated by the demolition industry is recycled.

TABLE 4.4 - WASTE TIMBER GENERATION – DEMOLITION

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	1	10
	Sawdust	0	0
Softwood	Offcuts	2	20
	Sawdust	0	0

- **Door, Window and Floor Manufacturing**

Sawdust consists of 63% of the total volume of waste timber generated by the door, window and floor manufacturers who were surveyed. Hardwood sawdust is generated by 25% of manufacturers with an average of 350 m^3 per annum. Timber offcuts are generated by 50% of businesses with an average of 180 m^3 of hardwood and 65 m^3 of softwood.

Table 4.5 summarises the percentage of waste timber that is separated and recycled.

TABLE 4.5 - WASTE TIMBER GENERATION – DOOR, WINDOW AND FLOOR MANUFACTURING

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	0	29
	Sawdust	0	0
Softwood	Offcuts	0	83
	Sawdust	0	0

Despite the fact that sawdust is the main timber waste produced by the door, window and floor manufacturers surveyed, none of it is recycled.

- **Fencing**

Most waste timber generated by fencing businesses surveyed is hardwood or old fences mostly in the form of timber offcuts at 93% of the total volume. Nearly half (44%) of the businesses surveyed generate hardwood offcuts with each generating an average of 263 m^3 per annum, and 22% of businesses generating waste softwood averaging 14 m^3 of offcuts, and 43 m^3 of sawdust each year.

Table 4.6 details the percentage of waste timber that is separated and recycled.

TABLE 4.6 - WASTE TIMBER GENERATION – FENCING

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	19	76
	Sawdust	0	0
Softwood	Offcuts	11	11
	Sawdust	0	0
Other	Offcuts	0	20
	Sawdust	0	0
Packaging	Pallets	0	0
	Packaging	0	100

- **Furniture**

Waste timber in the form of offcuts and sawdust from hardwood, softwood and particleboard is the most common waste timber generated by the furniture manufacturers who were surveyed. Each business producing these wastes generates up to 780 m^3 per annum of these materials. More than half (64%) of the total waste timber generated by furniture businesses is in the form of sawdust. Hardwood and particleboard each comprise 20% of the total volume of waste timber generated and softwood comprises 55%.

Table 4.7 summarises the percentage of waste timber that is separated and recycled.

TABLE 4.7 - WASTE TIMBER GENERATION – FURNITURE

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	4	0
	Sawdust	0	12
Softwood	Offcuts	<1	2
	Sawdust	<1	0
Particleboard	Offcuts	0	<1
	Sawdust	0	<1
Other	Offcuts	0	0
	Sawdust	0	0
Packaging	Pallets	3	3
	Packaging	0	0

- **Pallets and Packaging**

Half the pallet and packaging businesses surveyed generate hardwood and softwood waste offcuts with each generating an average of 785 m^3 and 1,240 m^3 respectively. Waste hardwood and softwood sawdust is generated by 75% and 25% of businesses surveyed, respectively, generating less than 150 m^3 per annum each. Timber offcuts comprise 92% of the total volume of waste timber generated. Waste pallets and other timber packaging is generated by 25% of these businesses with each generating an average of 900 m^3 of waste pallets per year.

Table 4.8 shows that 92% of softwood offcuts are recycled, this is significant as softwood offcuts represent 51% of waste timber generated by pallet and packaging manufacturers.

TABLE 4.8 - WASTE TIMBER GENERATION – PALLETS AND PACKAGING

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	36	36
	Sawdust	0	60
Softwood	Offcuts	92	92
	Sawdust	0	0
Packaging	Pallets	0	100
	Packaging	0	100

- **Sawmill**

The sawmill surveyed generates 5,500 m^3 of hardwood offcuts and 4,400 m^3 of hardwood sawdust. Over 97% of this is recycled, see Table 4.9.

TABLE 4.9 - WASTE TIMBER GENERATION – SAWMILL

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	0	98
	Sawdust	0	97

- **Timber and Hardware**

Waste hardwood is generated by 23% of timber and hardware businesses that were surveyed for this project, with an average of 22 m^3 of timber offcuts and 3,513 m^3 of sawdust produced by these businesses. Up to 38% of businesses produce waste softwood generating an average of 280 m^3 of offcuts and 35 m^3 of sawdust. Some waste particleboard and pallets are also produced. Sawdust comprises 87% o the total volume of waste timber produced by timber and hardware businesses.

Table 4.10 summarises the percentage of waste timber generated that is separated and recycled.

TABLE 4.10 - WASTE TIMBER GENERATION – TIMBER AND HARDWARE

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	0	15
	Sawdust	0	3
Softwood	Offcuts	0	9
	Sawdust	0	25
Particleboard	Offcuts	0	0
	Sawdust	0	0
Packaging	Pallets	0	100
	Packaging	0	0

- **Vehicle Manufacturers**

Hardwood offcuts and used pallets comprise 95% of the total volume of waste timber generated by the vehicle manufacturers surveyed. One business generates 10,000 m^3 of hardwood offcuts and 5,000 m^3 of pallets per annum. Table 4.11 shows that 50% of hardwood offcuts are recycled and 57% of pallets are recycled.

TABLE 4.11 - WASTE TIMBER GENERATION – VEHICLE MANUFACTURERS

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	100	50
	Sawdust	0	0
Other	Offcuts	100	0
	Sawdust	0	0
Packaging	Pallets	0	57
	Packaging	0	100

- **Wood Turners and Carvers**

Half the wood carvers and turners surveyed generate hardwood and softwood offcuts and softwood sawdust, generating an average of 26 m^3, 133 m^3 and 100 m^3 respectively. A third of these businesses generate hardwood offcuts, producing an average of 1,002 m^3 each. The majority, ie. 90% of the total waste timber generated by this industry is in the form of sawdust and 61% is softwood. Wood carvers and turners also generate some waste pallets.

Table 4.12 shows the percentage of waste timber that is separated for recycling.

TABLE 4.13 - WASTE TIMBER GENERATION – WOOD CARVERS AND TURNERS

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	97	9
	Sawdust	99	<1
Other	Offcuts	24	30
	Sawdust	83	91
Packaging	Pallets	95	95
	Packaging	0	0

- **Miscellaneous**

Miscellaneous businesses surveyed (shadehouse, sign and playground manufacturing) generate waste hardwood, softwood and particleboard offcuts and sawdust, and packaging. These materials are generated by up to 50% of these businesses. The average volume of material generated is small with 4 m^3 to 38 m^3 produced by each business.

Table 4.13 shows that most waste timber is not separated and recycled.

TABLE 4.13 - WASTE TIMBER GENERATION – MISCELLANEOUS

Waste Timber		Segregated for Separate Collection %	Recycled %
Hardwood	Offcuts	20	0
	Sawdust	0	100
Softwood	Offcuts	10	0
	Sawdust	8	0
Particleboard	Offcuts	0	0
	Sawdust	0	0
Packaging	Pallets	0	0
	Packaging	0	0

Figures 4.1, 4.2 and 4.2a show that total volume of waste timber that is recycled by businesses surveyed for this project.

FIGURE 4.1 – WASTE TIMBER RECYCLING - OFFCUTS AND SAWDUST

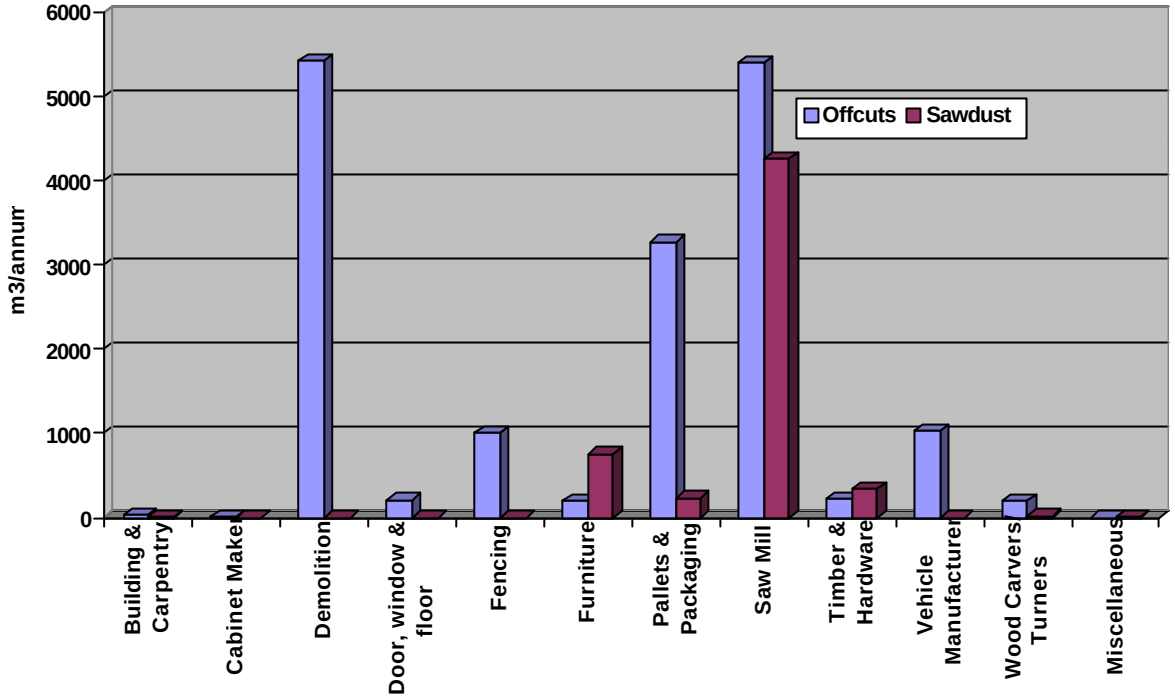


FIGURE 4.2 – WASTE TIMBER RECYCLING - WASTE TIMBER TYPES

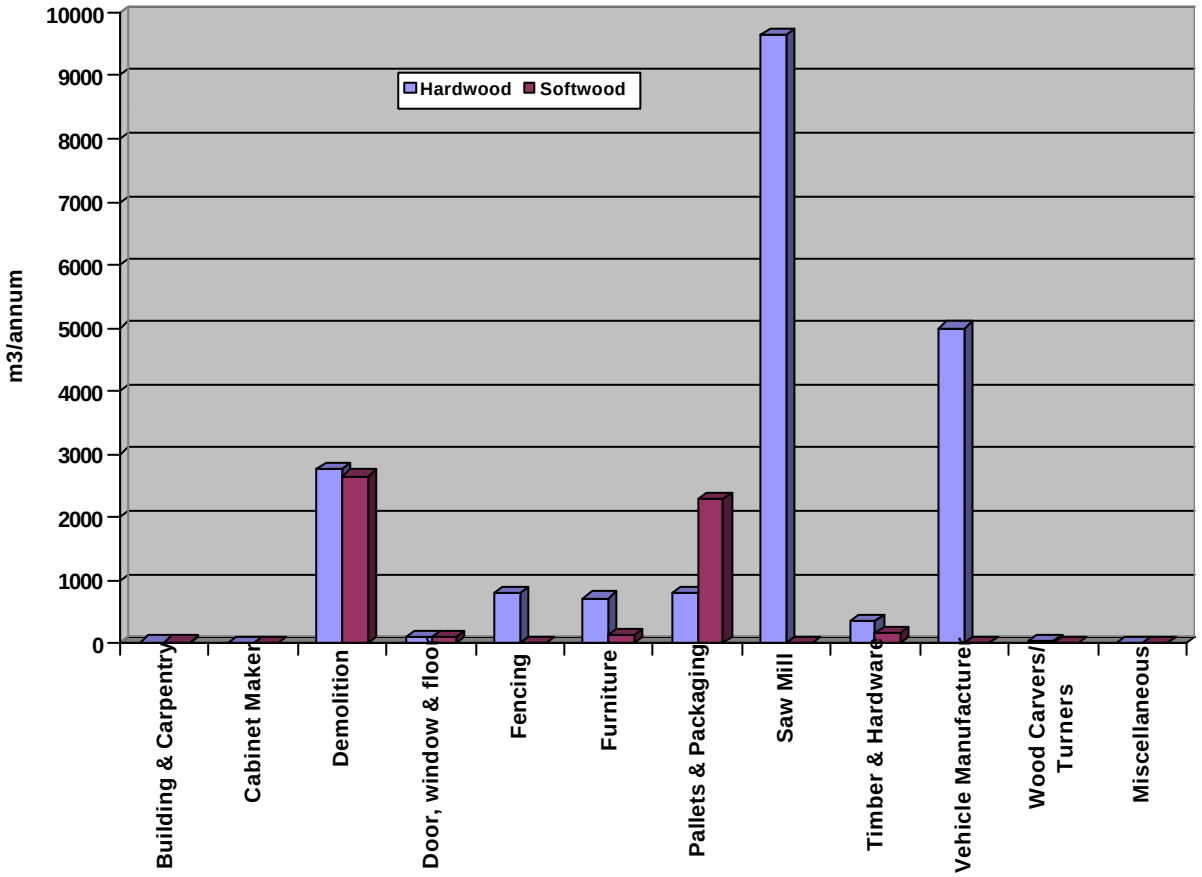


FIGURE 4.2a –WASTE TIMBER RECYCLING - WASTE TIMBER TYPES

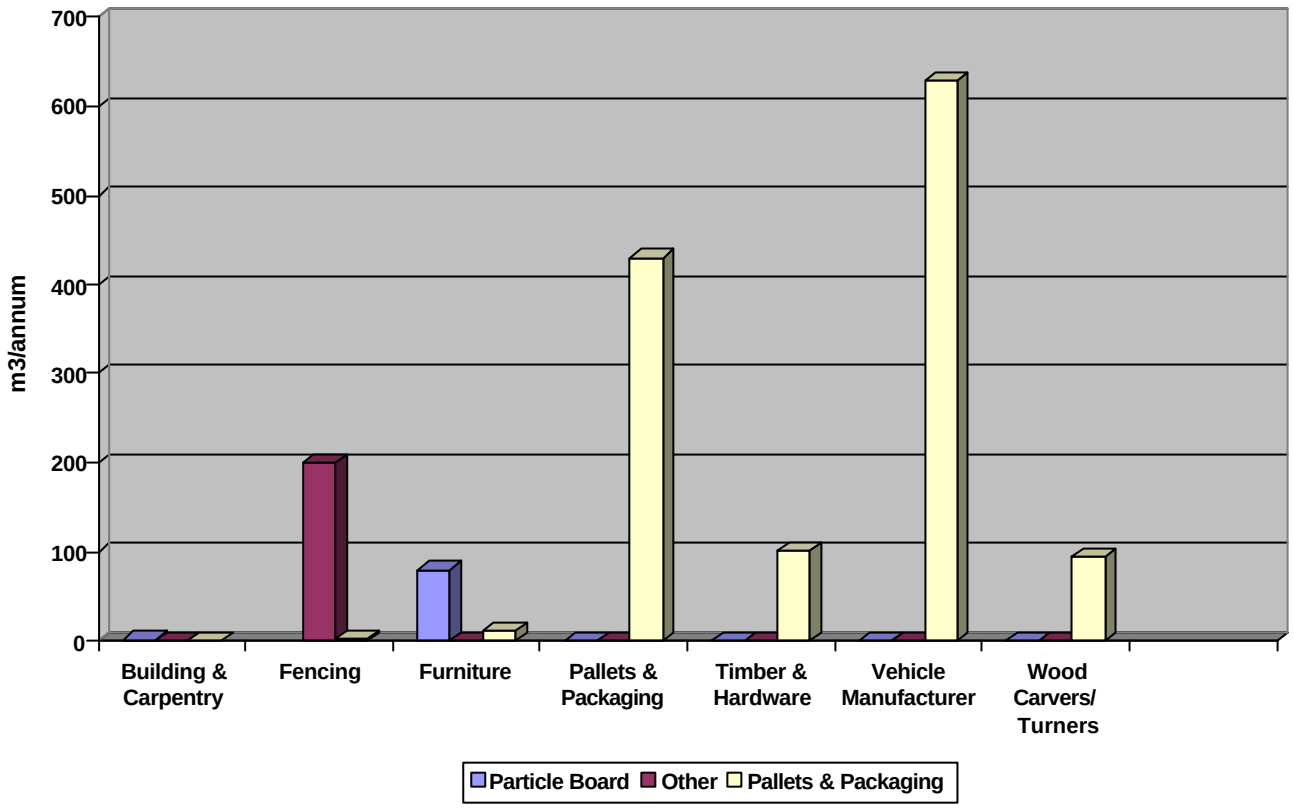


Table 4.14 summarises the total amount of waste timber that is recycled by industries surveyed for the project. Appendix B contains details of this information.

TABLE 4.14 - WASTE TIMBER RECYCLING

Industry	Total Recycled	
	m^3/annum	%[1]
Building and carpentry	41	7
Cabinetmakers	8	5
Demolition	5,430	13
Door, window and floor manufacturers	251	16
Fencing	1,005	45
Furniture	952	2
Pallets & packaging	3,516	72
Saw mill	9,658	98
Timber and hardware	57	5
Vehicle manufacturers	11,029	50
Wood turners & carvers	122	2
Miscellaneous	4	2
TOTAL	**32,568**	**23**

NOTES: 1. % of total waste timber generated by industry type surveyed.

Figures 4.1 and 4.2, and Table 4.14 show that only 23% of all waste timber generated, by the businesses surveyed, is recycled.

The saw mill surveyed recycles 98% of waste timber it generates, and pallet and packaging businesses 72%. The nature of these businesses allows such a high recycling rate. Saw mills generate large volumes of waste timber that is easily segregated from other wastes, and the reuse and refurbishment option is ideal for pallet and packaging businesses.

The vehicle manufactures surveyed, for example, recycle an average of 50% of the waste timber they generate, this equates to over 11,000 m^3 of waste timber diverted from landfill each year. Despite that fact that segregation of waste timber is easily achieved, and that large volumes may be recycled, there is still a limit to the amount that is actually being recycled. The demolition businesses surveyed recycle only 13% of waste timber generated. Due to large volumes generated by each business this equates to over 5,400 m^3 per annum.

The low recycling rate for businesses such as builders and carpenters, cabinetmakers, furniture manufacturing, timber and hardware, and wood turners and carvers may be due to a number factors. This includes the following:

- Lack of knowledge about existence of waste timber recycling drop-off facilities;
- Only small volumes of waste timber are generated by each business;
- Many other types of waste are generated by each business;
- Small size of these businesses.

All these factors may make segregation of waste timber for recycling impractical with little or no cost benefit obvious to these business operators.

4.3 TREATED AND UNTREATED WASTE TIMBER GENERATION

Copper chromium arsenate is used to treat some timbers. As a result of this treatment, treated timber can not be reprocessed or mulched/composted, and can only be landfilled. Hence the need to determine the volume of untreated timber only.

The majority of businesses, from all industries, did not answer this question in the survey. Hence some manipulation of the limited data available is required to determine the total amount of waste timber that is treated and untreated. Table 4.15 shows percentage of waste timber that is untreated, according to the survey results.

TABLE 4.15 - PERCENTAGE UNTREATED WASTE TIMBER

Industry	Hardwood %	Softwood %	Particleboard %	Other %	Pallet & Packaging %
Building & carpentry	**100** *74*	**100** *70*	**100** *59*	**100** *100*	**100** *100*
Cabinetmakers	**100** *100*	**100** *100*	Question not answered	Question not answered	Waste timber not generated
Demolition	Question not answered	Question not answered	Waste timber not generated	Waste timber not generated	Waste timber not generated
Door, window & floor manufacturers	**100** *100*	**100** *70*	Waste timber not generated	Waste timber not generated	Waste timber not generated
Fencing	**N/A** *33*	**90** *55*	Waste timber not generated	**80** *80*	**50** *50*
Furniture	**100** *100*	**100** *97*	**100** *78*	**100** *100*	**100** *100*
Pallets & packaging	**100** *100*	**100** *100*	Waste timber not generated	Waste timber not generated	**N/A** *95*
Saw mill	Question not answered	Waste timber not generated	Waste timber not generated	Waste timber not generated	Waste timber not generated
Timber & hardware	**100** *100*	**100** *95*	Question not answered	Waste timber not generated	**100** *100*
Vehicle manufacturers	**90** *90*	Waste timber not generated	Waste timber not generated	Question not answered	**100** *100*
Wood turners & carvers	**100** *82*	**100** *100*	Waste timber not generated	Waste timber not generated	**100** *100*
Miscellaneous	**100** *72*	**50** *50*	Question not answered	Waste timber not generated	Question not answered

NOTES: **100** *74* : **Mode** *Average*
Mode: The most frequently occurring value in a range of data
Average: The sum of a range of values divided by the number of values

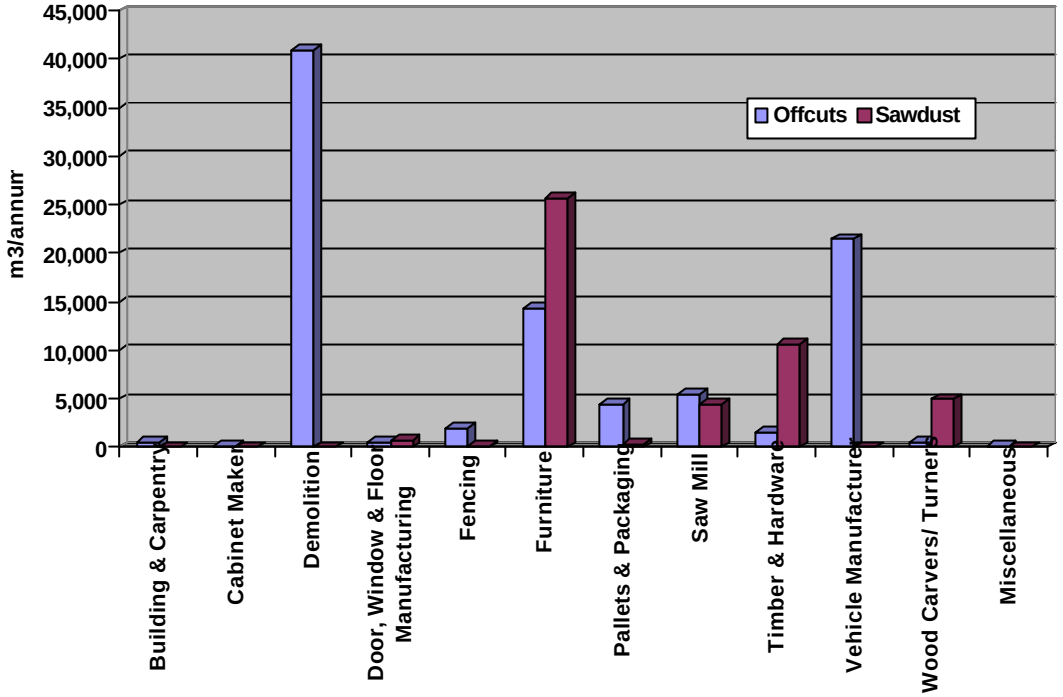
Where the mode and average are similar the reliability of the assumed percentage of untreated timber is high. Where they are different it would appear that the question was answered incorrectly by some businesses completing the survey. Where the mode and average are different the percentage of waste timber has been assumed, based on the figures in Table 4.15 and knowledge of the particular industry type.

It has been assumed that all waste timber is untreated, with the exception of waste timber from fencing businesses. Based on data in Table 4.15, it is assumed that 50% of waste timber from fencing businesses is untreated, this equates to 2,227 m^3 per annum. It is highly unlikely that timber used in other applications is treated.

4.4 TOTAL VOLUME OF WASTE TIMBER GENERATED

The total volume of offcuts and sawdust generated by each industry type is shown in Figure 4.3, and contained in Appendix B. This includes waste timber that is recycled, but only that which is untreated. Hence the current and potential amount of waste timber that is and can be recycled is shown.

FIGURE 4.3 - TOTAL WASTE TIMBER GENERATION – OFFCUTS AND SAWDUST



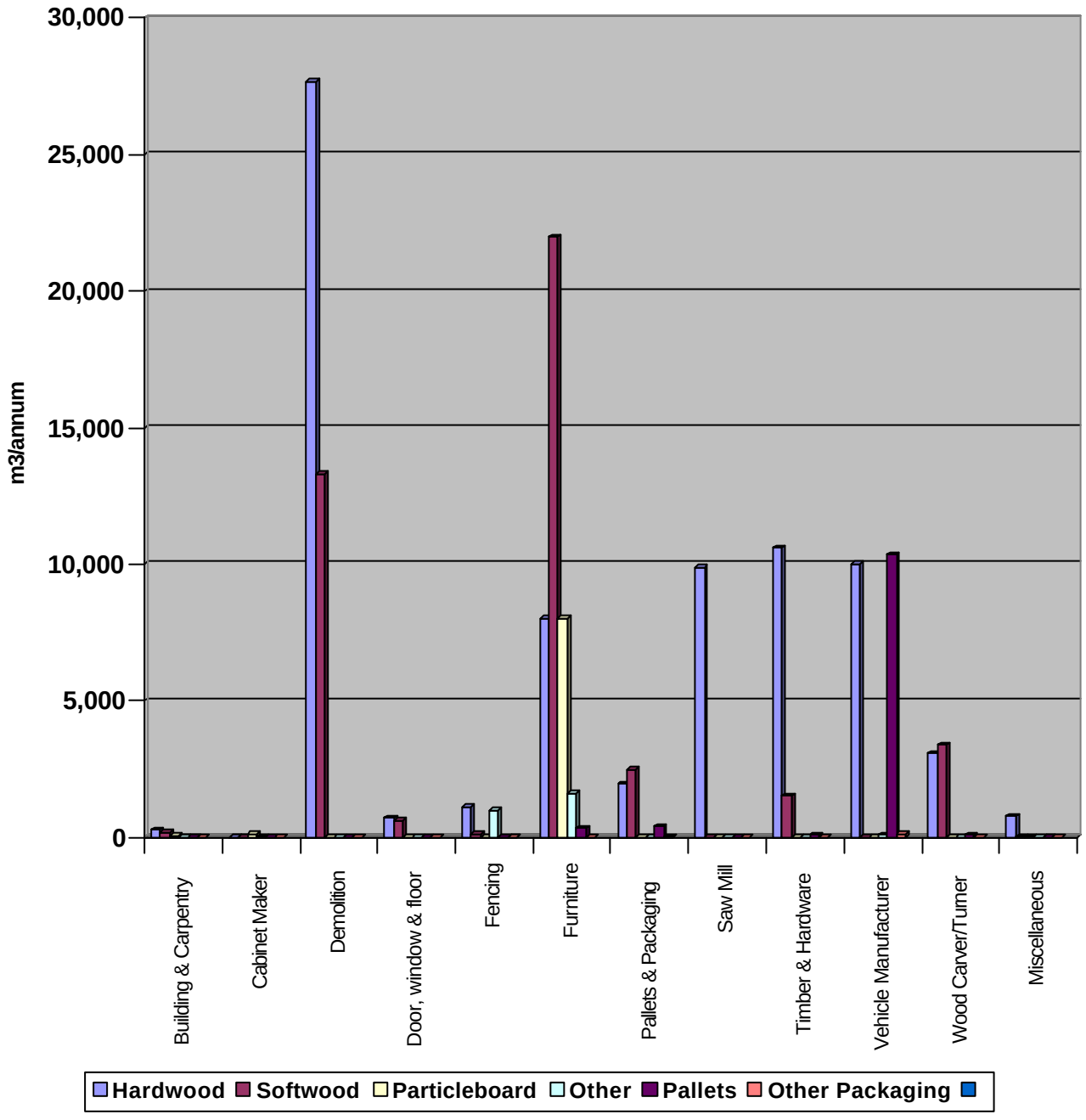
A total of 92,300 m^3 of offcuts, including 11,300 m^3 of pallets, and 47,300 m^3 of sawdust is generated across Melbourne each year by those industries that participated in the waste timber survey. An average of 23% of this waste timber is currently recycled by those businesses surveyed.

The demolition and vehicle manufacturing industries are the largest source of timber offcuts according to the survey results, generating 41,000 m^3 and 21,484 m^3 respectively per annum. This is due to the large volumes generated by individual businesses. The furniture industry is the third largest producer of waste timber offcuts (14,300 m^3) due mostly to the high number of furniture manufacturers located across Melbourne.

The furniture industry and timber and hardware suppliers produce over 10,000 m^3 each of sawdust per year. This is due to the relatively large volumes generated by individual businesses and large number of businesses located across Melbourne.

The total volume of the different types of waste timber generated by each industry is shown in Figure 4.4. This does not include treated timber but does include waste timber that is currently being recycled.

FIGURE 4.4 - TOTAL WASTE TIMBER GENERATION – WASTE TIMBER TYPES



A total of 72,500 m^3 of hardwood, 43,700 m^3 of softwood and 11,300 m^3 of waste timber pallets are generated each year by those businesses participating in the survey. This is 93% of all waste timber generated in metropolitan Melbourne.

The demolition, furniture, sawmill, timber and hardware suppliers and vehicle industries each produce over 8,000 m^3 of waste hardwood timber per year. Demolition and furniture businesses are the largest source of waste softwood generating 13,300 m^3 and 21,990 m^3 per annum, respectively. The furniture industry is the only significant source of particleboard, generating approximately 8,000 m^3 per year.

Analysis shows that different sized businesses produce different volumes of waste timber. Figure 4.5 summarises the total waste timber generation by the size of businesses surveyed.

FIGURE 4.5 - TOTAL WASTE TIMBER GENERATION BY NUMBER OF EMPLOYEES

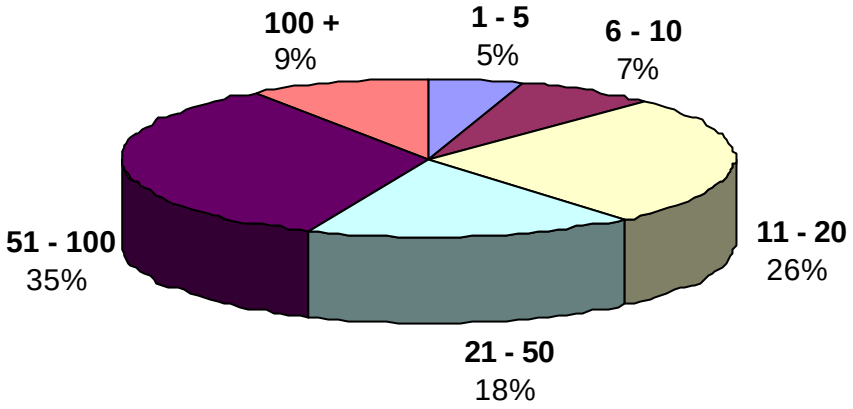


Figure 4.5 shows that businesses with 51 to 100 employees produce 35% of waste timber and 11 to 20 employees produce 26% of waste timber generated across Melbourne.

4.5 LOCATION OF WASTE TIMBER GENERATION

4.5.1 Metropolitan Melbourne

Figures 4.6 and 4.7 show the total volume of waste timber generated in each RWMG by those businesses surveyed for this project. This includes waste timber that is currently being recycled, hence the existing and potential amount of waste timber that may be recycled. Details of this are contained in Appendix B.

FIGURE 4.6 - TOTAL WASTE TIMBER GENERATION – BY LOCATION

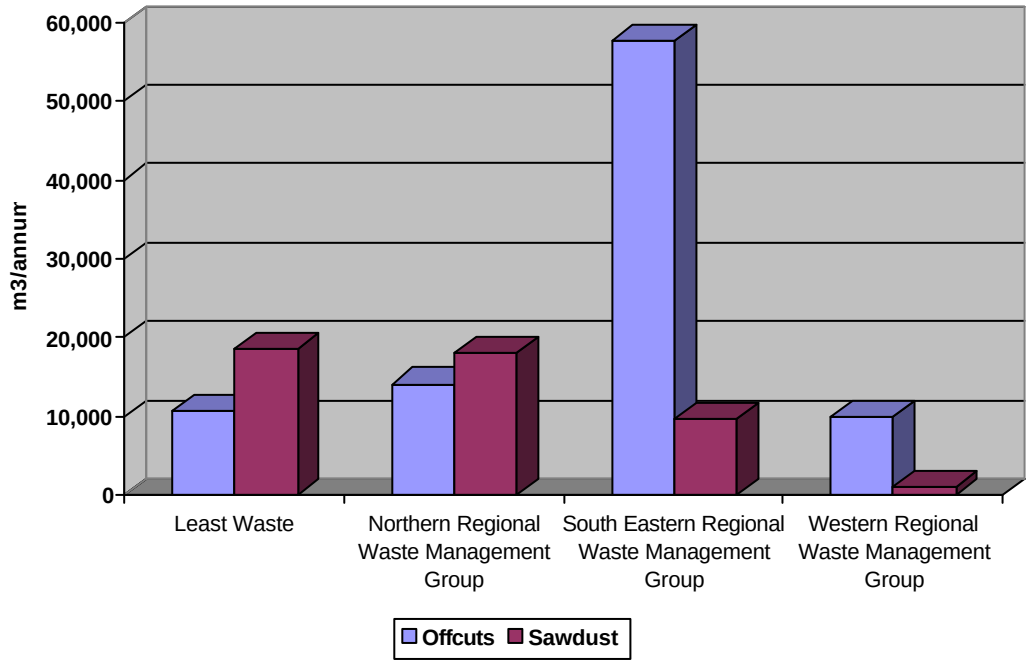
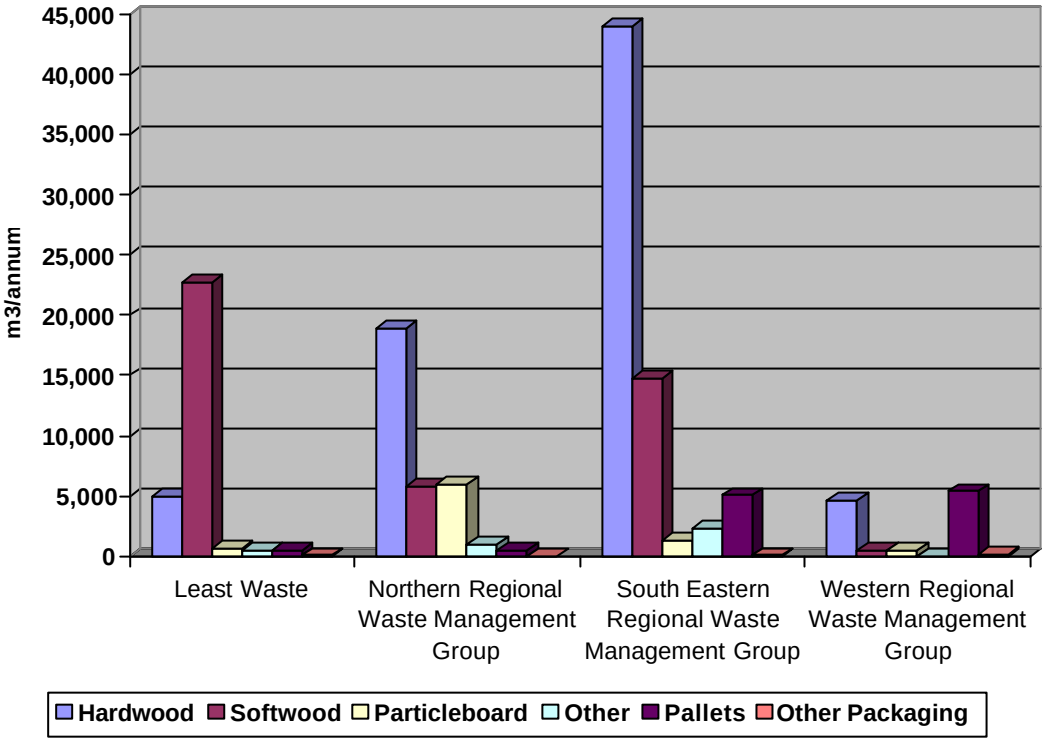


FIGURE 4.7 - TOTAL WASTE TIMBER GENERATION – BY LOCATION AND TYPE



The South Eastern Region is the largest source of total waste timber, producing almost 50% of the total generated across Melbourne according to those businesses surveyed. The South Eastern Region generates 57,681 m^3 of timber offcuts or 62% of all offcuts generated by those businesses surveyed. The Least Waste and Northern Regions produce 77% of the total volume of waste sawdust, each generates over 18,000 m^3 per year.

The Least Waste Region generates 4,879 m^3 of hardwood per annum, 70% of this can be attributed to two businesses (furniture - 85 employees; and fencing). Furniture manufacturing businesses generate 85% of all softwood produced in the Least Waste Region; a total of 22,731 m^3 is produced each year (the Least Waste Region has the highest concentration of furniture businesses surveyed for this project in Melbourne).

Demolition and timber and hardware businesses are the main source of softwood in the Northern Region. Most (97%) waste particleboard is from furniture businesses. Demolition and furniture are the main source of hardwood. A total of 18,908 m^3, 5,830 m^3 and 5,989 m^3 of hardwood, softwood and particleboard, respectively are generated in the Northern Region.

A total of 44,088 m^3 and 14,744 m^3 of hardwood and softwood respectively are generated in the South Eastern Region. Demolition, sawmill and vehicle manufacturing industries are the main source of the waste hardwood in the South Eastern Region. Demolition, pallets and packaging and the furniture industry are the main sources of waste softwood. The vehicle manufacturer located in the region generates 99% of all waste timber pallets generated in the region.

Only hardwood and pallet waste timber is generated in the Western Region in quantities of over 4,500 m^3 per annum. Demolition and vehicle manufacturing is the main source of each of these.

4.5.2 Waste Timber Generated Outside Metropolitan Melbourne

The furniture businesses identified in the survey and located outside of metropolitan Melbourne generate an average of 282 m^3 of waste timber each. One business generates 750 m^3 of waste timber of which 600 m^3 is in the form of softwood offcuts.

The saw mill generates 18,000 m^3 of waste timber each year and is looking for solutions to address this problem. The business generates 8,000 m^3 of softwood sawdust and 10,000 m^3 of softwood sawdust. This waste is currently stockpiled with some sawdust being used as fuel. None of the waste timber has been treated.

5. LEVEL OF INTEREST IN WASTE TIMBER RECYCLING

The level of interest in waste timber recycling varies between industry types and the RWMGs. The level of interest varies from 42% to 71% across the RWMGs. Table 5.1 summarises the level of interest in waste timber recycling for each industry type which completed the survey.

TABLE 5.1 - LEVEL OF INTEREST IN WASTE TIMBER RECYCLING

Business	Interest in Waste Timber Recycling [1.]	
	Yes (%)	No (%)
Building and Carpentry	47	27
Cabinetmaker	60	40
Demolition	100	0
Door, Window and Floor Manufacturing	50	25
Fencing	56	22
Furniture[2]	65	35
Miscellaneous	25	75
Pallets and Packaging	75	0
Saw Mill	0	100
Timber and Hardware	47	47
Vehicle Manufacturer	100	0
Wood Carvers and Turners	50	33

Notes: 1. Not all businesses answered this question
2. Does not include businesses contacted for the FIAA project.

The level of interest in waste timber recycling depends on a number of factors. These include the total volume of waste timber generated and current practices for disposal and/or recycling of waste timber.

The level of interest and total waste timber generation for industries is not necessarily directly related. Demolition businesses and vehicle manufacturers generate large volumes of waste timber and as a result have all indicated an interest in waste timber recycling. Conversely building and carpentry, cabinetmakers and fencing businesses all generating less than 1,500 m^3 of waste timber per annum, have indicated a level of interest of only 43% to 75%.

For each industry, those businesses indicating an interest in waste timber recycling tend to generate a larger volume of waste timber than those who did not indicate an interest. For example, those pallet and packaging manufacturers who are interested in waste timber recycling each generate over 500 m^3 per annum of waste timber. The business that is not interested only produces 15 m^3 per annum. It should be noted that there are a number of exceptions to this.

Current arrangements for waste timber collection and/or disposal has some effect on whether or not a business is interested in investigating further opportunities to recycle waste timber. For example, the saw mill surveyed recycles 60% of waste timber it produces and as a result is not interested in further recycling opportunities. Conversely demolition businesses typically only recycle very small volumes of waste timber and as a result are interested in investigating further opportunities to do so.

A building company surveyed believes recycling is a good idea but acknowledges that the time and space required to properly sort materials and place in separate bins might be prohibitive.

6. COLLECTION REQUIREMENTS

6.1 OVERVIEW

The collection requirements of each source depends on both the amount and type of waste timber generated and the location of those businesses.

A number of options exist for the collection of waste timber; these include the following:

- Self haul to local transfer station, landfill, or other facility for storage in designated waste timber bins. Waste timber could then be taken off site and reused, mulched and sold on site or shredded and transported to a central composting or reprocessing facility;
- Self haul directly to a central reprocessing or composting facility, this would require large volumes of waste timber to ensure that transport to a central facility is economical;
- Collection of waste timber by a recycling contractor from businesses. Waste timber would then be transported direct to a reprocessing or composting facility. Each business receiving this service would need to be supplied with a bin for the collection of waste timber that is of a standard design, eg front lift bins. Consideration may be given to the separate collection of timber offcuts and sawdust if two separate end uses are established;
- Waste exchange system be established such that particular sources of waste timber are matched to businesses that use timber as a raw material, for example waste pallets be transported directly to pallet manufacturers for reuse or refurbishment;
- Establishment of, or utilising existing, sorting facilities for commercial and industrial waste where waste timber is separated from other waste and recyclable material. Other materials such as concrete, bricks and metals could also be separated for recycling.

Figure 6.1 shows that most sources of waste timber identified in this project are located within five kilometres of a transfer station, landfill or regional composting facility. The transfer stations and landfills all have recycling drop-off facilities. It should be noted that the Bayswater and Croydon areas are not located within five kilometres of a facility. However Bayswater, a major manufacturing centre, is located less than ten kilometres from Knox transfer station.

This suggests that the RWMGs may have some role in the collection of waste timber through the provision of waste timber recycling facilities. There may be associated financial implications for the RWMGs in providing these facilities.

Any system developed for the collection of waste timber needs to be established such that segregation of waste timber occurs, ie offcuts and sawdust are separated, and treated and untreated timber are separated. Different processes utilise offcuts or sawdust. Separation is best done at the source of waste timber generation and requires that staff are made aware of the requirement to separate timber types. This can be achieved by a number of ways including those outlined below:

- Including waste minimisation practices as part of job descriptions, induction and on-going staff training, and procedural reviews;
- Encouraging staff to separate timbers, and other wastes, through incentives and rewards;
- Quantify the amount of waste timber produced and recycled, and savings in overall waste disposal costs and inform staff of any improvements in this.

Alternatively, if waste timber were to be self hauled to a waste management facility, recycling drop-off facilities should be well signed advising that only untreated waste timber can be deposited.

6.2 INDUSTRY COLLECTION REQUIREMENTS

- **Building and Carpentry**

Building and carpentry businesses surveyed have indicated an interest in recycling waste timber of over 40%. At present, businesses recycling waste timber utilise bins with an average capacity of 1 m^3 that is emptied monthly to weekly. This suggests that utilising contractors for the collection of waste timber will be costly given the small quantities generated by each business and the fact that builders and carpenters are not based in the one location, ie they are required to move location when each job is finished. However larger carpenters may be based in the one location if they assemble timber products at a factory rather than on site.

One building business surveyed is forced to landfill waste timber because the quantities produced are too small from each project for anyone to collect. Hence self hauling waste timber to the local transfer station or landfill, where it is separated, may be the most viable option.

- **Cabinetmakers**

Cabinetmakers generate small quantities of waste timber per annum, most of this is particleboard offcuts. They have indicated a high level of interest in waste timber recycling. The small quantity of waste timber generated suggests that if external recycling contractors were to be utilised, only small bins would be required.

- **Demolition**

The demolition industry is a major source of timber waste offcuts. Collection of waste timber from this source would divert large volumes of waste timber from landfill each year. Businesses surveyed have expressed a high level of interest in recycling waste timber.

The average volume of waste timber generated per year suggests that bins with a capacity of at least 20 m^3 are required by most demolition businesses for the separation and collection of waste timber. The frequency of collection could be weekly or daily. At present most demolition businesses self haul waste to landfill and separate some materials for recycling. Hence most demolition businesses own or lease trucks and bins. This would suggest that businesses may wish to

self haul waste timber to a central reprocessing or composting facility, provided transport economics are favourable.

- **Door, Window and Floor Manufacturers**

Those door, window and floor manufacturing businesses surveyed that recycle waste timber, engage external contractors for the collection of the timber. However these businesses typically generate small volumes of waste timber. Encouraging businesses to separate and self haul waste timber to their local transfer station or landfill may also be an option worth pursuing.

- **Fencing**

Fencing businesses generate timber offcuts and old timber fences in quantities that may make collection viable. It should be noted that old timber fences may not be of sufficient quality to suit reuse or refurbishment, but may be better suited to a composting, or similar operation, where the timber is shredded. It has been estimated that 50% of waste timber is treated, so separation is important.

Most fencing businesses currently receive a waste collection service from external contractors. The average volume of waste timber produced suggests a weekly collection of waste timber in a bin, with a capacity of at least 5 m^3 ideal. However one fencing business surveyed takes all waste timber to landfill because the volumes generated are too small for collection by recycling contractors to be economical. However those who currently recycle waste timber generally do so without external recycling contractors. Hence self haul to waste management facility and collection by recycling contractors is most appropriate.

- **Furniture**

Furniture manufacturers are a significant source of waste timber due to the large number of furniture businesses, and relatively large volume of waste timber generated by each. Most waste timber is in the form of sawdust. Those businesses surveyed have expressed a high level of interest in waste timber recycling.

At present most furniture businesses engage collection contractors to collect general waste from their premises and some engage recycling contractors for the collection of waste sawdust. This system is viable for the collection of separated waste timber from most furniture businesses given the volumes generated and current waste collection practices. Additional bins for the collection of separated waste timber are required. Alternatively waste timber could be directly transported to timber processors for reuse, for example sawdust to garden suppliers for incorporation in compost mixtures.

- **Pallets and Packaging**

Those pallet and packaging businesses that participated in the survey have indicated a high level of interest in waste timber recycling due to the large volumes of waste timber they generate each year. Waste pallets are typically remachined on site. There may be increased opportunities to do this if old pallets from other sources can be collected and transported to these businesses. Those businesses that do recycle waste timber engage external contractors to collect waste timber. This is likely to be favoured by all pallet and packaging manufacturers given average volumes of waste timber generated and current practices.

- **Saw Mill**

The saw mill surveyed currently recycles most waste timber it generates. Sawdust and timber offcuts are separated and collected by two different recycling businesses. The large volume of sawdust and offcuts generated make separate collections viable. Other saw mills that may later be identified as large generators of waste timber, and not currently recycling waste timber, may enter into agreements with recycling contractors for the provision of bins and collection of waste timber. Waste timber from saw mills may not be kiln dried, and if it is still wet can not be reprocessed. Hence composting may be the best option for waste timber collected from saw mills.

- **Timber and Hardware**

Most businesses surveyed engage waste management contractors for the collection of general waste and some for the collection of separated waste timber. This is the most viable option for the collection of waste timber from timber and hardware businesses. Bins with a capacity of at least 10 m^3 would be required, with the frequency of collection varying but may be daily for some businesses.

- **Vehicle Manufacturers**

Vehicle manufacturers are major sources of timber offcuts and pallets. At present both businesses surveyed have their waste timber collected for shredding by a recycling business. An alternative to this may be the collection of waste pallets from these businesses for refurbishing into new pallets. Collection of the waste pallets could be by the pallet manufacturing business, or external transport business.

- **Wood Carvers and Turners**

Wood carvers and turners typically generate large volumes of sawdust that may be directly transported to timber processors, for example garden suppliers or animal husbandry operations. However most businesses who recycle waste timber do so by utilising external recycling contractors. Most businesses use bins with a capacity of at least 10 m^3 for the collection of waste sawdust. This is likely to be the most favoured option for collection of waste timber by wood carvers and turners.

- **Miscellaneous**

Miscellaneous businesses identified during the survey typically generate small quantities of waste timber per annum. Current recycling procedures undertaken typically involve the use of 1 m^3 bins with collection of the waste timber weekly to monthly. For those miscellaneous businesses generating smaller volumes of waste timber, self hauling to a waste management facility may be the most viable option.

6.3 COLLECTION SYSTEM OPTIONS

Table 6.1 summarises waste timber collection system options and collection requirements that each option best satisfies.

TABLE 6.1 – WASTE TIMBER COLLECTION SYSTEMS

Collection System	Collection Requirement Best Suited To	Example Industry Sources
Self haul to local transfer station or landfill	• Businesses generating small volumes • Businesses who currently self haul general waste to transfer stations or landfill	• Builders and Carpenters • Cabinetmakers
Self haul to central composting or processing facility	• Businesses generating large volumes • Businesses who own trucks and bins and haul general waste to landfill	• Demolition • Saw Mill
Collection of waste timber by recycling contractor	• Businesses generating large volumes over a period of time • Businesses currently using external contractors for general waste collection	• Furniture • Cabinetmakers • Fencing • Saw Mill
Direct waste exchange between generator and timber processor	• Businesses located within economical travel distances of timber processors	• Vehicle Manufacturing • Furniture
Utilisation of commercial and industrial sorting facilities	• Businesses who generate a high proportion of other recyclable material	• Demolition • Furniture

All collected waste timber needs to be transported to either a transfer station or landfill, composting facility or reprocessing facility. Information contained in section 6.2 suggests that some waste timber will be transported directly to the processing facility. However most waste timber will arrive via local transfer stations and landfills and/or regional composting facilities.

Separating waste timber offcuts and sawdust at transfer stations and landfills allows the option of either reuse or recycling. For example small offcuts may be reused by toy and craft manufacturers, or in other processes, or all waste timber may be transported to a regional composting facility. Separating waste timber at transfer stations requires that dedicated waste timber collection bins are located at each transfer station. Adequate supervision and signage is also required to eliminate contamination of the waste timber and to ensure waste timber types, ie offcuts and sawdust, are segregated. It is important that only untreated timber is collected.

Waste timber may be transported direct from the waste timber generator or via local transfer stations to a central composting operation. All waste timber arriving at composting facilities would be mulched and composted, however this precludes it from any further reuse.

Alternatively waste timber may be transported directly from the generator to the timber processor, ie direct waste exchange. This allows reuse and reprocessing of the waste timber.

6.4 MARKET ANALYSIS

There are many applications in which the use of waste timber may be suitable. As a result competition for the supply of collected waste timber may occur. The waste hierarchy may be used as guide to the preferential destination of collected

waste timber. The waste hierarchy is as follows and is in order of the most to least desirable option:

- Waste Avoidance;
- Waste Reduction;
- Reuse;
- Recycling;
- Energy Recovery;
- Waste Treatment;
- Waste Disposal.

Hence waste timber reuse, for example refurbishment of used pallets, is a better option than recycling, such as composting. Energy recovery, ie using waste timber for firewood, is also an option that currently occurs, however this should be the least favoured method of reducing the amount of waste timber landfilled. Another energy recovery option is the production of briquettes from collected waste sawdust.

Some waste timber reuse and recycling already occurs through activities such as pallet refurbishment and composting. These existing outlets should be further developed.

An interest in utilising waste timber needs to be established and maintained such that supply is matched by a demand for the product. An interest in utilising waste timber may be achieved through the following:

- Advertising the availability of waste timber for reuse;
- Educating businesses of the benefits of recycling waste timber on site and using waste timber in product manufacture.

This may be achieved through the use of industry association magazines, industry training programs, and possibly through the RWMGs, via Regional Education Officers.

Guaranteeing both the quantity and quality of collected waste timber will assist in maintaining a demand for the supply of waste timber. Contamination is a particular concern, waste timber from the building and demolition industries, for example, may be contaminated with nails and screws. While this does not preclude its use in grinders and chippers, metal may need to be removed prior to some reprocessing activities.

6.5 FINANCIAL IMPLICATIONS

Minimising transport and handling costs will contribute to the viability of the collection system. Hence the need to reduce double handling of waste timber by establishing a system, and associated infrastructure, capable of this. Identifying the final use of the waste timber at the source will also eliminate the need to double handle the waste.

The cost of each option is a major factor in determining the optimum system for the collection of waste timber from Melbourne businesses. Different industry types have different collection requirements, hence the cost of each collection option should be structured to cover the cost of collection, processing and/or transport. One pallet manufacturer surveyed indicated that their only cost to recycle waste timber was freight and bin hire charges.

Each system should also be structured to encourage businesses to separate and recycle waste timber, rather than landfilling waste timber, possibly through financial incentives (ie differential disposal charges). A fencing business

surveyed has recycled waste timber in the past until the cost of doing so was similar to landfill disposal charges. As a result they now landfill all waste as it more convenient and there are no financial incentives in place to encourage recycling.

Costs associated with a system to collect waste timber from Melbourne can be recovered in two ways. The first is income from disposal and/or collection charges. The second is from the sale of the waste timber to reprocessing or composting businesses.

The following costs should be recovered:

- Collection (at transfer stations, or by collection contractors);
- Sorting (if required);
- Transport.

These costs should be incurred by those who utilise the collection service provided and those who utilise the collected product.

7. CONCLUSION

Businesses who participated in the survey generate 92,300 m^3 of timber offcuts and 47,300 m^3 of sawdust per year. Hardwood, softwood and pallets are the main waste timber types generated. The demolition, furniture and vehicle manufacturing industries are the main sources of waste offcuts, with each industry generating over 10,000 m^3 per annum. The furniture and timber and hardware industries are the main sources of sawdust; each generates over 10,000 m^3 per annum.

An average of 23% of waste timber generated by those industries surveyed is currently being recycled. Hence 32,500 m^3 of waste timber is diverted from landfill each year. Fencing businesses are the only significant source of treated timber.

Waste timber is generated in each RWMG, however approximately 50% is generated in the South Eastern Region.

Demolition businesses, saw mills and vehicle manufacturers present the greatest potential source of waste timber given the large volumes produced by each individual business. Furniture and timber and hardware businesses are also a large source of waste timber due to the large number of these types of businesses. The demolition, furniture, saw mill, timber and hardware, and vehicle manufacturing industries should be targeted for collection of waste timber from across Melbourne. These industries generally recycle only minimal amounts of waste timber.

A number of opportunities exist to collect waste timber from Melbourne businesses. However the best system depends on the collection requirements of each industry. Collection system options include the following:

- Self haul to local transfer station or landfill;
- Self haul to central composting or processing facility;
- Collection of waste timber by recycling contractors;
- Direct waste exchange between waste timber generator and timber processor;
- Utilisation of commercial and industrial sorting facilities.

The cost associated with each system should be incurred by those utilising the collection service and by those utilising the collected waste timber. Collection, sorting and transport costs should be recovered.

The collected waste timber can be utilised in a number of applications including reuse, reprocessing either in whole or part, ie with or without shredding prior to use, and mulch and compost.

8. REFERENCES

Environment Australia/Keep Australia Beautiful, Waste Minimisation Manual for Local Government, Environment Australia.

Meinhardt (Vic) Pty Ltd (1998), Furniture Industry Waste Minimisation, Meinhardt (Vic) Pty Ltd.

Meinhardt (Vic) Pty Ltd (1998), Clean Pine Wood Waste Recycling, Meinhardt (Vic) Pty Ltd.

APPENDIX A

WASTE TIMBER SURVEY

APPENDIX B

TOTAL WASTE TIMBER GENERATION