

The Resource Efficient Builder

Issue One Vol. One
February 1998

RMIT



The Resource

Efficient Builder Information Program



Welcome to the first edition of *The Resource Efficient Builder*, a new information program brought to you by the Master Builders Association of Victoria, RMIT's Department of Building & Construction Economics and EcoRecycle Victoria. Over the coming year you will receive eight editions of *The Resource Efficient Builder* which will provide practical examples of ways you can reduce construction waste and increase the efficiency and profitability of your sites. Each edition will bring you the latest information from Australian

and overseas research about methods and techniques for reducing building materials waste. A guide to building materials recycling services in Victoria has been included with this edition to help get you started. The Resource Efficient Builder Information Program will also be promoted at MBAV trade nights, president's breakfasts, and conferences. Aligned with this program is the inclusion of the Waste Minimisation category in the 1998 MBAV Excellence in Construction Awards.

How Resource Efficiency Will Help You Reduce Costs and Win Contracts

In financial terms the cost of material waste is in many cases more than 10% of a building project's prime cost. In environmental terms waste of materials represents the longer-term costs of pollution, resource scarcity and over-consumption of energy. Construction and demolition waste account for up to a third of all waste going to landfill in Victoria each year. It's a similar story in other states as well, which is why the Federal Government has set a target of reducing waste going to landfill by 50% by the Year 2000. The construction industry has been identified as a major contributor to the waste stream and is being encouraged to help meet this target through initiatives like the 'Wastewise' construction program. Increasing disposal costs brought about by the imposed \$3.00/tonne levy on solid waste, and the increasing scarcity of landfill sites, are slowly increasing the cost of disposal. New environmental standards such as the International Standards Organisation 14000 series standards on environmental management are also beginning to change the way construction processes are organised and managed. Contractors such as Baulderstone Hornibrook are beginning to have projects accredited under the new standard and see this as a way of being

identified by clients as offering a higher quality service. On high-profile projects like the Sydney Olympic Village, environmentally responsible design and construction techniques have been made a condition of tender - an indication that time, cost and quality are no longer the only considerations for clients. A recent KPMG survey of company directors revealed environmental issues were a top priority of boards and that the most immediate concern for most was waste minimisation. Why? Because waste costs money, and is a highly visible indication of a company's environmental impact. Changes such as these may be seen by some as a further imposition on the industry; however, experience from companies that are leading these changes show that there are significant opportunities in becoming more resource efficient. Put simply, wasting materials wastes money and wastes opportunities for increasing the profitability and efficiency of building projects. The Resource Efficient Builder Program is therefore designed to help building professionals lead change, decrease material waste, and profit from reducing the overall environmental impact of construction projects.

The Resource Efficient Builder is a Team Effort

EcoRecycle Victoria is a State Government agency which works with industry, commerce, education, local government and the broader community to eliminate unnecessary waste, promote the sustainable use of Victoria's resources and encourage viable long-term solutions in waste management. *The Resource Efficient Builder* will be funded by EcoRecycle Victoria, written by researchers at RMIT and edited and distributed by the Master Builders Association of Victoria. Each issue will feature the efforts of construction companies and professionals who are leading the way in resource efficient construction. If you or your company have implemented a program that would serve as a good example of resource efficiency, please let us know so that we can profile your efforts in future editions of *The Resource Efficient Builder*. A Recycling Information and Waste Exchange Service has been established by EcoRecycle Victoria to assist industry with recycling, material reuse and waste minimisation. The service is available on: Telephone Free Call 1800 35 32 33 and Internet: www.ecorecycle.vic.gov.au

Fletcher saves money on waste removal costs with RECON

Fletcher Construction's waste minimisation and environmental program 'RECON' has significantly reduced costs on a number of the company's projects in Australia and overseas.

RECON was initially trialed on the Dandenong Police and Courts Complex site in 1993. At that time a similar project was being undertaken in Frankston. Because of the similarity of the projects, the levels of waste generated on each site and the related costs could be compared. By implementing the RECON program on the Dandenong project, Fletchers were able to reduce waste removal costs by 55%. This represented a cost saving of approximately \$73,000 plus. The total volume of waste on the project was reduced by 15% before recycling which translated into a 43% reduction in the amount of materials having to be disposed of to land fill sites. The results of this trial project indicated that waste and environmental management could be a cost benefit rather than an additional cost. This prompted Fletcher's to apply RECON to a number of other

projects. Each of these projects delivered cost savings for the company (See Table One). Bruce McDonald, developer of the RECON program and now a private consultant specialising in environmental management in the construction industry, says that the benefits of waste minimisation can be more than project specific. "In addition to reduction in project costs, the RECON program has improved the efficiency and productivity of site operations, and has established Fletcher Constructions as a pioneer in moving the construction industry toward ecologically sustainable development," he says. "The RECON program has also won a number of environment awards, which goes to show that both the industry and the community value initiatives that achieve improved management of the environmental impact of construction."

Project	Waste Removal Costs	Cost savings	Other benefits
Dandenong Police Courts Complex	Reduced by 55%	\$73,000 plus	Waste volume reduced by 15%. Reduced landfill requirements by 47%
St Georges Hospital, NSW	Reduced by 55%	\$80,000	First time NSW plasterboard was recycled
Southbank Project Qld	Reduced by 55%	\$38,000	Reduced landfill requirements by 43%
Microsoft Offices USA	Reduced by 30%	US \$38,000	Recycled 47% of all waste

Table One: The benefits of RECON for Fletcher Constructions.

How does RECON work?

The key to effective waste minimisation is determining a good project specific plan. Implementation of the RECON program included:

- Negotiating lower removal costs with waste contractors
- Separating materials on-site
- Using recycled products
- Reducing drawing sizes to A3
- Using recycled paper
- Specifying precise sizes for materials to reduce cutting waste
- Training and motivating site staff; and
- Sharing the financial rewards with workers.

According to Bruce McDonald, implementing these initiatives is still no guarantee for realising the maximum benefits of waste minimisation. "This requires the full commitment of employers and partners, a practical and cost effective approach by management, a market for recycled materials, and the separate collection of wastes from site." Fundamental to the success of programs such as RECON is reducing the potential for waste through good building design coupled with construction management that is committed to the process. Analysing the entire project from design to completion to identify opportunities to reduce waste is the key to achieving the kinds of savings and benefits that the RECON program has demonstrated. Full copies of the RECON report are available from EcoRecycle Victoria.

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The Resource Efficient Builder



HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 2 Vol. 1

APRIL 1998

Practical Steps for Recovery and Recycling

In issue No 1 of the Resource Efficient we described how Fletcher Construction saved \$73,000 through waste reduction and material recovery on a development in Dandenong. In this edition we detail practical procedures to achieve material recovery and recycling, and save your business money. Hard to believe? This issue also features (overleaf) a case-study revealing why Civil & Civic/Lend Lease think waste minimisation makes sense.

WASTE MINIMISATION SYSTEMS

Building materials are valuable. While the financial cost of materials can easily be measured in dollars, this is only one function of their value. Building materials are made from important natural resources, involve the consumption of large quantities of energy, cause pollution in their production, storage and transportation, and of course are applied in buildings to provide amenity for people. It is therefore important for construction professionals to ensure that this value is not wasted in a landfill.

Construction companies worldwide are recognising this and are beginning to implement waste minimisation programs. These are designed not only to reduce the amount of material being discarded during the construction process, but also to reduce the consumption of valuable materials from the outset. The companies using these systems are now being rewarded with significant cost savings, and recognition as leaders in resource efficiency by an increasingly environmentally aware market place.

Waste minimisation programs target all aspects of a company's operations and set out specific measures for reducing waste on building projects. They target the entire project from pre-design through to hand-over and consist of both design and management responses that support waste avoidance as later outlined. Here is a summary of what goes into a good waste minimisation scheme.

- Make it relevant to the organisation's core activities;
- Genuinely assess the potential causes of waste in the organisation's activities and on projects;
- Direct waste minimisation systems from an executive level;
- Implement the system at all managerial levels within the organisation;
- Foster commitment throughout the entire organisation, and workforce including subcontractors;
- Make provision for setting goals, monitoring, maintaining and improving the performance of the program;
- Collect data to provide positive feedback to all involved on waste reduction achievements.

The core requirements for waste minimisation systems, as with any management system, are commitment, accountability and ownership. In coming months Issues 4 and 5 of the Resource Efficient Builder will provide practical information to achieve these aims and examples of them in practice.

IMPLEMENTING WASTE MINIMISATION

The sophistication of your waste minimisation program will depend on the way your organisation currently operates, the complexity of projects it's applied to, and reporting requirements of clients and public agencies. However, waste minimisation systems can be implemented simply by following some basic steps.

STEP 1 Clearly identify possible causes of waste

Examples include:

DESIGN	PURCHASING	HANDLING
<ul style="list-style-type: none"> • plan errors • detail errors • design changes 	<ul style="list-style-type: none"> • ordering error • shipping error • suppliers overpacking materials 	<ul style="list-style-type: none"> • poor storage • deterioration • poor handling off-site on-site
OPERATION	RESIDUAL	OTHER
<ul style="list-style-type: none"> • human error trade labourer • equipment error • acts of God catastrophe accidents weather 	<ul style="list-style-type: none"> • left over scrap • unreclaimables • non-consumables 	<ul style="list-style-type: none"> • theft vandalism • clients actions

Practical Steps for Recovery and Recycling continued...

STEP 2 Choose design, procurement and management responses that deal with these potential causes of waste

MANAGEMENT RESPONSES

- Analyse project waste profile;
- Plan, implement & document;
- Cost control;
- Purchase materials with minimal packaging, while ensuring goods are not damaged during delivery;
- Provide appropriate site transportation;
- Communicate & co-ordinate with clients & designers;
- Evaluate performance & encourage feedback from contractors & site staff;
- Control purchasing to limit over-ordering & to encourage buying of recycled or recyclable materials where appropriate;
- Share responsibility for waste minimisation with sub-contractors;

- Co-ordinate supervision of & communication with sub-contractors;
- Job-site separation of waste for recovery, reuse & recycling.

DESIGN RESPONSES

- Design for Life-cycle flexibility;
- Consider Modular/prefabricated systems;
- Specify recycled products;
- Use dimensions that suit standard material sizes;
- Consider retrofit & refurbishment rather than demolishing;
- Design for deconstruction;
- Detailed construction documentation.

STEP 3 Set challenging and achievable goals, monitor progress, report back to employees and reward good performance.

Civil & Civic show just how this can be achieved in the case study below.

Why Civil and Civic says...

DON'T WASTE IT!

Civil & Civic/Lend Lease's waste management system is currently in its second year of implementation. The "Don't Waste It" management system provides a framework for implementing waste management policy on construction sites. The company has implemented the strategy nation-wide and has just begun to collect standard records of the waste management performance of sites using standard forms.

The company strategy is based on three fundamental goals: implementing design initiatives to minimise waste generation; reusing and recycling 50% of waste which is generated on Civil & Civic construction sites by the year 2000; and promoting the use of recycled products, including products containing recycled components; and actively supporting industry-wide waste minimisation initiatives.

Civil & Civic/Lend Lease is working to achieve these goals by:

- Setting minimum corporate targets for reducing waste disposed to landfill;
- Requiring each project (whether design and/or construction) to formally evaluate and implement opportunities that will reduce the generation of building waste;
- Requiring all projects to identify waste minimisation initiatives and document these in Project Waste Reduction Plans (PWRPs);
- Requiring those responsible for design and development of a project to investigate and promote operational waste minimisation initiatives to all clients;
- Monitoring of project waste management as a formal component of the Company Environmental Performance Indicators;
- Actively pursuing and supporting at a company level, programs to reduce waste streams common to the construction industry.

In addition to these broad activities, Civil & Civic's waste management strategy provides detailed implementation procedures for Project Waste Reduction Plans, sets minimum standards for waste management on construction sites, and sets out the responsibilities of project staff and sub-contractors in implementing PWRPs.

The company's Victorian Environment Health & Safety Manager, Jeff Scott, says that the "Don't Waste It" strategy has made employees more aware of the need to be resource efficient. "Sites are really coming up with innovative ways to reduce waste, recycle and reuse materials" he said. "This is better for the environment and has saved us money".

The \$40 million Artillery Relocation Project at Puckapunyal is just one of a number of Civil & Civic's projects implementing very simple and effective ideas for reusing material that would normally end up at the tip. Resource efficient measures included:

- Providing clean fill to local farms for soil erosion control and to build up low level areas;
- Deconstructing old hangers and sheds which were sold to local farmers for reuse on their properties;
- All trees cleared from the site were cut and sold as firewood or chipped and stockpiled for use in final landscaping.

On the Goodman Fielder Factory Refurbishment and Extension Project, Civil & Civic have established bin segregation to sort concrete, timber, steel and cardboard/paper for recycling. The "Don't Waste It" program also makes it mandatory to recycle vegetation, concrete, bricks and steel as a minimum requirement on all of Civil & Civic/Lend Lease projects.

The company has adopted a pro-active approach and is driving waste management initiatives without it being required of them by their clients. Why? They know it makes good financial sense and so are committed to further improving their waste minimisation program.

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The Resource Efficient Builder



HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 3 Vol. 1

MAY 1998

SEPARATING Makes Sense

Greater savings are made when projects avoid generating waste from the outset. This issue will address some effective on-site strategies to help improve efficiencies and so reduce costs when you do generate material on your site. In our case study (overleaf) **Baulderstone Hornibrook** give us some insight into their waste minimisation achievements under challenging conditions on the **Western Link** project.

ON-SITE SEPARATION

One of the key elements of managing on-site waste is separating leftover materials for recycling. Site conditions can sometimes make this difficult so if this is the case alternative off site separation opportunities like bin hire companies and material recovery facilities that will separate and recycle your materials should be considered. Consult MBA Resource Efficient Builder Recycling Guide for companies and sites that can help you better recover and recycle your construction and demolition material.

So what are the benefits of source separating leftover materials where you can? Firstly it reduces the cost of waste disposal. Separation services for construction and demolition waste are currently limited. Landfilling your unsorted waste incurs a \$3.00/tonne levy that has been imposed by the EPA. Sorting your waste on-site not only provides you with the opportunity to reduce disposal costs but helps you to off-set these costs by recycling the recovered materials. Basically source separating your leftover materials turns your waste into a resource and saves you money.

So how do you do it? Here are some tips for establishing a good on-site separation process.

STEP ONE

Identify the materials likely to be discarded and at what stage of the development.

This is generally called a waste audit and should be carried out prior to the commencement of the site works. This involves looking at your construction program and the project design and identifying material in-flows and outflows. This will

give you the information you need to schedule bin numbers, sizes and likely changeovers.

STEP TWO

Find out who recycles what in your area.

You can use your MBA Resource Efficient Builder Recycling Guide accompanying Issue One as a start. Use this information to identify recycling contractors for your discarded materials. Most of the contractors who specialise in recycling C&D materials in Victoria will negotiate removal logistics and prices for materials with you so that solutions are tailored to your project. Ensure that at all times the collectors implement litter management controls like covering their loads during collection, handling and transportation of materials.

STEP THREE

Design contracts and sub-contract agreements that require sub-trades to minimise waste including initiatives to source separate.

Now that you know what leftover materials will be generated from your project, and identified collectors or outlets for your materials, you can establish agreements with staff or sub contractors to ensure that materials are separated for recycling. Establishing responsibilities from the outset will ensure greater system efficiencies and encourage ownership of your initiatives by all staff and sub contractors.

STEP FOUR

Organise recycling stations and information on-site.

Make it easy for workers to separate materials. Locate bins for different waste streams close to the work places generating material for recovery. Consider colour-coding bins to represent different materials. Consider using different sized colour coded

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SEPARATING Makes Sense continued...

bins or shoots to transport materials to collection points. Use signs to remind workers of the systems in place and to identify the drop-off points for different materials. On residential sites separate materials by placing them in different piles. Indicate where each material pile is to be located with clear signage. Ensure that litter management is practiced. Litter is reduced where materials are contained and piles are covered. Litter fines can be an expensive addition to project costs.

STEP FIVE

Set goals, monitor progress and provide feedback.

The key to the success of source separation is keeping subcontractors and workers participating in the program informed. One of the best ways to keep your workers motivated is to set achievable goals and provide regular updates on progress toward fulfilling these goals. Use charts or posters as visual

records of achievements, have site staff report on progress at site meetings and publicise good performance.

STEP SIX

Keep records of savings and reward good performance.

Keep track of your expenses and cost savings. You may find that initial set-up costs outweigh traditional waste disposal methods, but as your workers and sub-contractors become familiar with the systems you can realise significant cost savings overtime that far out way and justify your initial set up costs. Finally, spend some of the savings on events like site barbecues to reward good performance. Experience has shown that rewarding site staff for their efforts helps the whole process run more smoothly and cost effectively. Savings will be realised where staff are encouraged to sustain their waste minimisation efforts overtime and from job to job.

Western Link Closes the Loop and Saves Money

Boulderstone Hornibrook Engineering Pty Ltd (BHE) has been awarded the sub-contract by Transfield Obayashi Joint Venture to design and construct the Western Link, part of Melbourne's City Link freeway project. The project involves upgrading and widening 7.5 km of the Tullamarine Freeway, building 4.2 km of dual elevated roadway and a 490m balanced cantilever concrete bridge. One aspect of Boulderstone's ISO 14001 accredited environmental management system is a material-recycling program that has saved the company about \$200,000 to date with only half of the project completed.

The company firstly identified the major materials that were likely to be discarded. Construction materials included concrete, asphalt, and timber. Office materials such as paper and cardboard were also targeted for recycling.

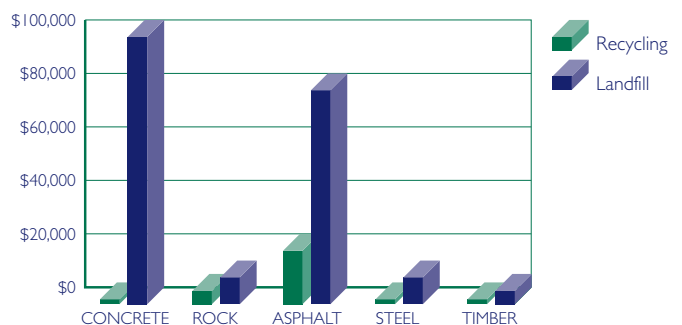
Boulderstone then talked to waste contractors to determine the most effective methods for removing large quantities of materials from the site for recycling.

Once the logistics had been worked out, a cost comparison between targeted materials for recycling and disposal to landfill was conducted. Boulderstone compared the cost implications of the material type, travel distance and time, transport cost, tipping fees and recycling costs. They found that even when both landfill disposal and recycling incur a direct cost, recycling was usually

cheaper because of the EPA levy on landfill disposal. The Western Link environment team estimates they are saving up to \$6.50/m³ by recycling concrete on the project.

Boulderstone's economic evaluations show that recycling major material types is significantly less expensive than disposing it as waste to landfill. They are also valuing these material as resources that have a future use.

Cost comparison for materials of recycling and landfilling on the Western Link Project



Targeted materials are then either sent directly from the site to recycling facilities or are reused on the project.

Elie Elia, a member of Boulderstone's Environment team considers the success of this program in reducing costs will motivate the company to apply similar approaches on future projects. "The successes and difficulties will be taken into consideration in applying waste minimisation principles to future projects. This will ensure continual improvement in the system and lead to high and consistent performance outcomes across all divisions of the company."

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The Resource Efficient Builder



HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 4 Vol. 1

JULY 1998

Issue No 2 of the Resource Efficient Builder discussed the importance of waste minimisation programs targeting all aspects of a company's operations. These programs set out specific measures for reducing waste on building projects and outlined how to most effectively reduce waste and save money throughout the entire life-cycle of the project. While the structure of the program is important, eliciting commitment, accountability and ownership from site staff and subcontractors are vital ingredients. To do this you must make your waste minimisation strategy relevant to the organisation's core activities and genuinely assess the potential causes of waste in the organisation's activities and on projects. This issue of the Resource Efficient builder will give you some guidance and examples of how this can be done.

Making Waste Minimisation Relevant

It is most important to be working on a project that has a positive effect. Waste minimisation is a relatively new performance objective for construction projects and there is sometimes a view among workers that implementing measures designed to reduce waste on site is 'extra work'. To overcome this perception it is important that employees can see that their efforts are making a difference. For this to happen waste minimisation plans must be relevant to the core activities of the project.

Waste minimisation is most effectively achieved if the policies and actions you design for your company place emphasis on activities which avoid waste in the first instance and then seek to reduce, reuse and finally recycle discarded material. Experience has shown that concentrating your efforts on avoiding waste provides the greatest opportunity for cost savings. Prioritising your waste minimisation policy in the following way is therefore important.



Making your waste minimisation program relevant requires an initial analysis of each project to identify the likely causes of waste and opportunities for avoiding, reducing, reusing, and recycling discards. This process of watching your waste, is commonly called a waste audit. Sometimes referred to as a "review," it is very important for determining materials and processes that should be targeted and, most importantly, ways in which your employees can achieve the most positive results.

Watching Your Waste – The Audit

ESTABLISH AN AUDIT (REVIEW) TEAM

A waste audit is a systematic way of identifying options for reducing or eliminating waste and is conducted by an assessment (review) team of company staff. A typical team should consist of a site manager, company environmental

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manager, a works supervisor (foreman, leading hand), and a union representative. For smaller operators, involve the supervisor, sub-contractors, and waste contractor. The team can look at the construction and management process of the project to identify possible causes of waste and develop responses to reduce or eliminate these risks over the life of the project.

DETERMINE THE SCOPE OF THE AUDIT

Audits can apply to the whole company, to an entire project or to a work area. Experience in the industry has shown that it is better to begin implementing waste minimisation on specific projects in order to pilot processes and reduce any financial risks. A consideration in determining the processes you include in the audit is whether you have the physical resources to implement waste minimisation procedures in all areas or processes. It is important to use your audit information to set achievable goals in the areas where greatest impact can be made. Start with the most important construction processes and then move to less important ones.

CHECK LIST

Attribute	Stream 1	Stream 2	Stream 3
Waste Stream	Formwork	Partitioning	Electrical Fit Out
Source	Poor stripping	Room sizes	Product suppliers
Component A Timber	✓	✓	
Component B Plaster B.		✓	
Component C Packaging			✓
Waste Generation Rates Timber Plaster Bd. Packaging	12m3/Day	3m3/Day 12m3/Day	3m3/Day
Cost of Disposal (\$/unit)	\$10/m3		
Cost of Recycling (\$/unit)	\$4/m3		
Method of Management	Increase supervision	Alter room dimensions to standard material sizes	Adopt purchasing strategy to avoid over packaged components
	Supply recycling bins	Negotiate cut-to-size componentry	

*Figures shown are examples only.

Ref: EPA Vic document No. 277; 1994

The results of these audits should be used to develop project waste management plans, specific work procedures and reporting requirements. Make sure this information is kept so that it can be used to help in the development and continual improvement of your waste minimisation and management systems on future projects.

COLLECT DATA

Your team will need to collect information on design, construction schedules, site plans, the production and packaging of materials, and economic information like waste transportation and disposal costs. You can collect and record this information on a checklist if it helps. Once this is done, input materials and processes for significant waste streams.

IDENTIFY WASTE STREAMS

Waste streams are processes on site which result in materials being discarded. When you identify a process you should note the source of the material, what is being discarded as a result, and the financial costs of wasting this material (usually disposal costs). Analyse this information to determine the management strategies or minimisation techniques that may mitigate the problem. A waste stream summary document like the one shown below will help organise the waste audit information so that an integrated waste minimisation plan can be devised for your project.

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The Resource Efficient Builder



HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 5 Vol. 1

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When it comes down to it, you can't minimise waste on a building project unless individuals take action to make your programs work. It is essential therefore to foster a commitment to your waste minimisation plan throughout the entire project organisation, workforce and in your subcontractors. Research has shown that the key to this is directing your waste minimisation plans from an executive level and in a way which involves all managerial levels in the development, implementation and operation of your company's waste minimisation program.

Minimising construction and demolition waste is a team effort and requires the full commitment of managers, employees and subcontractors if it is going to work effectively and provide the most benefits to your company and the environment. Here are some ways you can keep everyone motivated and participating.

DIRECT WASTE MINIMISATION SYSTEMS FROM AN EXECUTIVE LEVEL.

Recent research conducted by RMIT showed that construction company employees consider top management support for waste management to have a significant impact on the effectiveness of waste management systems. Construction workers considered top management support to be a key influence on their motivation to minimise waste.

It is therefore very important for executive management to clearly demonstrate their commitment to waste minimisation programs. If you are in an executive position you can demonstrate your commitment by:

- Being involved in waste auditing and development of project waste management plans;
- Providing copies of the company waste minimisation plan to employees and explaining its relevance to the company
- Creating mechanisms for setting goals and providing the resources required for performance feedback
- Sharing accountability for the performance of waste minimisation efforts
- Working with other managerial levels and workers to streamline quality, environmental and cost management systems and reporting procedures.

IMPLEMENTING WASTE MINIMISATION AT ALL MANAGERIAL LEVELS.

While waste minimisation programs exist on paper, whether construction and demolition waste is actually minimised or not depends on your construction workers and sub contractors taking action. Research has shown that having all levels of management involved in the implementation of waste management is key to eliciting commitment from your work force. Increased consultation with site staff responsible for implementation of waste management strategies is also necessary. Construction, project, and site managers as well as foremen should be promoting and reinforcing the importance of waste management through leading by example, and involving

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workers in decision making. To do this they need to be supported by executive management. Exactly how you go about implementing a waste minimisation strategy across all managerial levels depends on the size and structure of your company and the nature of the projects you are undertaking. Here are some suggestions that may help get your managers involved:

- Ensuring that all managerial levels are involved with the waste audit and have input into developing policy and project waste minimisation plans
- Allowing managers to develop reporting and feedback mechanisms relevant to their area of jurisdiction
- Coordinating management communication to create foci for information gathering and dissemination
- Make line management responsible for providing feedback to construction workers
- Ensure subcontract management is involved in the process through a combination of contractual responsibility and, where possible, incentives.
- Providing feedback loops and highlighting the achievement of goals.

MOTIVATING WORKERS AND SUBCONTRACTORS.

It is essential to foster a commitment to waste minimisation among direct labour and sub contract workers. The focus for these people will be on avoiding waste through quality work, reusing materials and keeping any materials that they cannot reuse separated for recycling. To physically do this they need management to provide the working conditions for them to be able to minimise waste while still achieving the productivity goals required to get the job done. In addition they need information on how the systems work, and education about why waste minimisation is important. Setting goals and providing feedback on performance are also important for motivation. Workers also appreciate rewards for achieving waste minimisation goals.

Here are five ways to motivate your workforce to increase the effectiveness of your waste minimisation plan:

Information

Include a description of the waste minimisation plan in site inductions and use this opportunity to explain the responsibilities of management and workers in making the system work. Post the waste minimisation policy and project goals as notices in sheds and change rooms. Colour code bins for recycling different materials and use these colours on signs and operating procedures.

Goal Setting

Set challenging but achievable goals for material waste reduction and recycling. Goals should be set in consultation with representatives of your workforce.

Feedback

Use charts and signs which illustrate the achieved performance of the work force. Indicate progress toward achieving goals and provide feedback on how performance has improved.

Rewards

Provide rewards when goals are achieved. Rewards need not be financial. Public recognition of good performance can be effective. If financial incentives are to be offered, make sure they are contingent upon reaching cost saving targets. Some of the money saved could be used for BBQ's, beer money or producing clothing to celebrate achieving goals.

Education

Workers have expressed a need to know why they are reducing waste not just how to do it. General environmental information could be included in occupational health and safety guides, environmental fact sheets can be produced and posted in sheds and change rooms. The reasons why the company are involved in minimising waste should also be accessible.

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HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 6 Vol. 1

FEBRUARY 1999

Reduce Packaging Waste and Save Money

These days almost everything comes wrapped and packaged for our alleged convenience.

Packaging is often designed to protect products from exposure to the elements or from the rigours of transportation and storage. Unfortunately, we rarely give a thought to what might happen to the packaging when it is removed so the product can be used for its intended purpose. Much of the resulting waste ends up in a landfill.

Building products are, like most consumer items, packaged. Research has shown that packaging waste constitutes a significant proportion of the solid construction waste stream by volume. (Ryan, C., Reddrop, A. (1997) "Housing Construction Waste" – Centre for Design, RMIT University, Melbourne.) Studies from countries like Canada support this and show that packaging waste can account for approximately 25% of waste measures by volume.

Packaging waste is generally lightweight and therefore does not necessarily cost a lot of money to dump. The nature of the materials wasted particularly plastics however, means that their environmental cost can be significant. "When you consider that shrink wrap will spend about a week protecting a pallet of bricks and about 20,000 years decomposing in a landfill you can get some idea of the magnitude of the problem that packaging can cause." (P. M. Graham, RMIT University 1998.) In addition packaging waste clutters building sites posing safety risks, complicates other site recycling efforts

by contaminating sorted waste, takes up unnecessary space in bins, and contributes to litter on sites. It is for these reasons that major building companies have targeted packaging as a key aspect of their waste minimisation efforts. The good news is that they are succeeding.

HOW TO AVOID, REDUCE, REUSE AND RECYCLE PACKAGING

Avoid

Avoid packaging waste by selective purchasing. Plastic is the biggest problem for builders and recyclers so emphasis should be placed on avoiding plastic packaging. For example, ask brick manufacturers to use metal straps rather than shrink-wrap or plastic straps. Avoid purchasing finishing materials and fittings that are individually wrapped. (See the MULTIPLEX case study for more handy hints.)

Reduce & Reuse

Reduce packaging waste that can't be avoided by requesting materials be delivered in returnable packaging. For example, paint can be purchased in bulk reusable containers, cable reels and timber pellets can be returned for reuse.

Recycle

Many recycling contractors will collect paper, cardboard and plastic from building sites if it is sorted, flattened, bundled and kept relatively clean. Metal straps can also be recycled. Recyclers in metropolitan and regional areas who will recycle packaging waste have been listed on the 'Recycling Guide' distributed with issue no.1 of the Resource Efficient Builder.

WHAT IS PACKAGING WASTE?

Waste stream	Current Practice	Avoid	Reduce	Reuse	Recycle
Timber pallets	Many returned			Return	By collection
Plastic packing straps	Landfill	through purchasing choice			
HDPE plastic film	Landfill	through purchasing choice			
Metal straps	Most to landfill				Separate/Recycle
Corrugated cardboard boxes	Landfill				Kerb collection
Paint tins	Landfill	Ask for plastic tin liners	Buy Bulk	Reuse tins	
Plastic trigger pack tubes	Landfill		Buy Bulk		

Multiplex use 'RATS' to prevent waste and save cost.

On most MULTIPLEX sites in NSW and Victoria you will find RATS. No, not the furry rodents but the company's 'Reduce At The Source' waste minimisation program. One of the key aspects of the RATS program is signing sub-contractors and suppliers to a waste minimisation action plan that requires on-site waste streams to be analysed prior to work commencing so that ways of avoiding or reducing waste at the source can be identified.

The RATS program has effectively identified and facilitated innovative ways of reducing packaging waste, helping the company to win the inaugural EcoRecycle Victoria sponsored MBAV Excellence in Construction Waste Minimisation Award in 1998.

WHY?

Packaging waste, by volume, is a significant proportion of construction solid waste streams, however due to tipping charges being levied by weight it is not the most expensive. So why do Multiplex bother? Because packaging waste creates problems for other recycling processes on-site and in landfills and also contributes to site litter issues. The company has found that packaging waste, particularly plastic, is a major source of contamination in on-site recycling bins, creates "negative space" by taking up unnecessary room in bins, and is unsightly and a potentially fineable offence when it contributes to site litter. Packaging therefore has cost implications for building operators of all sizes.

Landfill sites are becoming less abundant in Victoria and in NSW limits have already been met. Not only does packaging waste take up space, but some of the materials used in packaging are persistent and can be toxic. Put simply, continued use of landfills is unsustainable and damages the natural environment. Multiplex have a strong commitment to environmental sustainability and realise that immediate action is required in order to reduce the environmental and financial costs of construction waste.

As Multiplex's former Victorian environment manager Simon Zadow says "If we don't start playing the game now, in 10 to 15 years we are going to have a real problem with landfill!" The situation in NSW is more immediate than this where the cost of tipping a 14m³ bin can be as much as \$600.

Litter is also an immediate issue for all operators. Fines for individual offences start at \$500. Poor site management and resulting litter contributes not only to the pollution of land but also waterways and marine areas when litter is washed away from sites and enters storm water drains that flow into creeks, rivers and the Bay.

HOW?

Multiplex implement RATS by establishing contractual requirements with subcontractors, as well as negotiating and cooperating with suppliers to reduce packaging at the source. They are now in the process of beginning cost-benefit and savings analyses for processes that divert waste from landfill.

Actions Multiplex have undertaken on sites to reduce packaging waste.

AVOID

The need for packaging some materials has been analysed resulting in less packaging on-site.

For example:

- On the Stadium Australia project in Sydney, 7000 fire doors have been delivered direct from the factory to the site eliminating the need for packaging.
- Carpets layed in the Mercure Hotel in Sydney are not covered with plastic protection. The cleaning contractor is made responsible for any damage.

REDUCE & REUSE

- Plumbers return all packaging to suppliers.
- Electricians return all reels and boxes to suppliers.
- Schindlers Lifts remove all of their timber crates and return them to the factory for reuse.
- Multiplex reuse cardboard and plastic packaging internally when repackaging materials.

RECYCLE

- Cardboard and paper packaging from office equipment and paper is collected and recycled by VISY Recycling. Where possible recycled paper and cardboard are reused.

Multiplex are currently investigating the actual cost savings of reducing packaging waste using the RATS program. They believe that the combination of reducing total waste volumes and more efficient procurement and work practices facilitated through RATS, has resulted in substantial cost savings.

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HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 7 Vol. 1

MAY 1999

Recycling – turning trash into treasure.

Recycling of building materials can save you money. Baulderstone Hornibrook Engineering's final cost saving on the Western Link project from waste minimisation – which has included initiatives like recycling concrete, – is more than \$4 million.

In addition there are significant environmental benefits for recycling building materials. These include:

- protecting land resources by diverting materials from landfills
- reduced pollution associated with the extraction and production of new materials; and
- helping conserve natural resources by reducing demand for new materials in a wide range of markets.



While there are environmental impacts associated with the reprocessing of materials into new materials or for re-use, including the consumption of energy and associated by-products of the manufacturing process, these impacts are generally lower than those associated with new or virgin materials.

Previous issues of the Resource Efficient Builder have highlighted the fact that the most cost-effective way to approach construction and demolition waste minimisation is to follow the hierarchy of 'Avoid-Reduce-Reuse-Recycle'. Issue No. 5 showed how to do this through the implementation of an effective waste management policy. Once all has been done to avoid, reduce, and reuse, all that is left is to recycle.

WOULD RECYCLING HELP REDUCE LOAD ON LANDFILLS?

On average 27 tonnes of waste materials are produced constructing a house in Melbourne. Bricks comprise 1.5 tonnes and plasterboard 161kg. Simply separating and recycling bricks and plasterboard on a typical house-site could potentially divert about 10% by weight of materials normally disposed of in landfills!

WHAT MATERIALS CAN BE RECYCLED?

Most common building materials can be recovered and recycled. In Victoria there are a range of specialised contractors who will recycle material. For information on the range of materials and associated contractors you can contact the EcoRecycle freecall Infoline on 1800 353233 or website at www.ecorecycle.vic.gov.au There are also some ways you can recover and recycle materials and use them again directly in your project. Common uses for recycled materials include:

- Bricks and cement used on-site as clean-fill,
- Stockpiling soil for reuse as fill
- Timber waste like formwork and structural framing timbers ground into mulch garden compost
- Crushed concrete and bricks used as road-base
- Plasterboard crushed for re-sale as a soil conditioner.
- In NSW plasterboard off-cuts are recovered and used in the manufacture of new plasterboard.

IS MATERIAL RECYCLING EASY?

Most common building materials can be recycled, however the cost effectiveness of the operation varies with the materials involved. Here's how Civil & Civic rate the recyclability of common building materials:

Easy to Recycle	Difficult to recycle
Concrete & bricks	Timber
Plasterboard (if in sufficient quantity)	Glass
Steel/metal (reinforcing)	Plastic packaging
Top Soil	Contaminated soil
Cardboard (if in sufficient quantity)	Ceiling tiles
Office paper	Carpet/underlay

This list does not reflect the ease of recycling material on every job. It is important for you to investigate the opportunities available for recycling in your area and make your own priority list for your project.

MAKING RECYCLING COST-EFFECTIVE

The recycling industry for building materials in Victoria is still small and the cost-effectiveness of separating and recycling left-over building materials is dependant on volume of materials generated on-site and the proximity of the job to recycling facilities. Other issues with recycling building materials include bin contamination, available space for separating materials on-site and co-ordination of the process with sub-contractors.

Companies like John Holland and others who are signatories to the Federal Government's Waste Wise construction program are finding ways of making the recovery of waste materials from building sites cost effective. The Waste-Wise construction review report suggests that recycling building materials from site can be cost-effective if it is either:

- Sold to a material recycler or a company that trades in the recovered material; (eg, Moss Rock Pty Ltd who accept timber waste and chip it to sell as garden mulch, and Alex Fraser Pty Ltd who accept concrete waste for crushing and marketing as road base.) or
- Collected by companies that will reprocess and sell products made from the recycled materials.

EXAMPLES OF SUCCESSFUL RECYCLING ON CONSTRUCTION PROJECTS

- South Bank Towers Victoria – Multiplex recycled 100% of plasterboard waste in conjunction with Boral recycling.
- John Holland Diverted approx. 700 tonnes of material from land-fill through reuse of material during construction. 60 tonnes of material was recycled for other uses.
- Queensland Barclay Molem recovered and recycled 55% of structural timber and wooden formwork and 100% of all metal waste between June 96 – June 97.
- Holsworthy Hospital NSW Civil & Civic recycled and reused 82% of all construction and fit-out waste.

RECYCLING SERVICES: Help is not far away

Issue No. 4 showed you how to separate your leftover materials for recycling but there is not much point going to this effort unless there are places that will take your material. The good news is that in Victoria there are plenty of municipalities and private firms that can help.

Figure 1 displays a recent survey of municipal recycling services. The study showed that most Victorian councils will recycle timber, concrete, bricks, ferrous and non-ferrous metals. There are still some materials that are not well catered for: Glass for example, is recycled

by only 10% of municipalities while ceramic tiles, plasterboard and PVC are not currently catered for at a municipal level.

In rural areas building material salvage yards are prevalent. Contact your local salvage dealer using the Resource Efficient Builder Recycling Guide prior to construction or demolition, to arrange a quote or rates for accepting salvaged materials for resale. Updated contact details are available through the EcoRecycle Infoline on 1800 353233 or website at www.ecorecycle.vic.gov.au



MATERIAL RECOVERY FACILITIES – Another alternative for construction waste recycling

The private sector has also discovered that there is a need to provide recycling services to the construction industry. One such firm, Calleja Transport Pty. Ltd has established and is upgrading with EcoRecycle support their innovative resource recovery facility at Altona. The site accepts mixed waste bins from construction and demolition sites and other post-industrial wastes which are sorted and recycled where possible. Operations like Calleja's create a viable option to C&D recycling, particularly when space or work practices makes on-site separation difficult.

In the last 18 months Calleja has extended its recovery and recycling operation at Altona to increase its waste handling facility and improve its ability to recover resources in both industrial and domestic waste streams. The company has future plans to install another transfer station at a company owned site near Bacchus Marsh, north west of the Melbourne.

The facility at Altona manages 80,000 tonnes of 'waste' per year and offers all weather tipping for mixed waste at a rate that is cheaper than competing landfill tipping charges. Once tipped, materials are sorted into REUSE and RECYCLE categories by six staff. Calleja has found many innovative ways of reusing and recycling materials and in the process has created a profitable source of income that reduces LANDFILL.

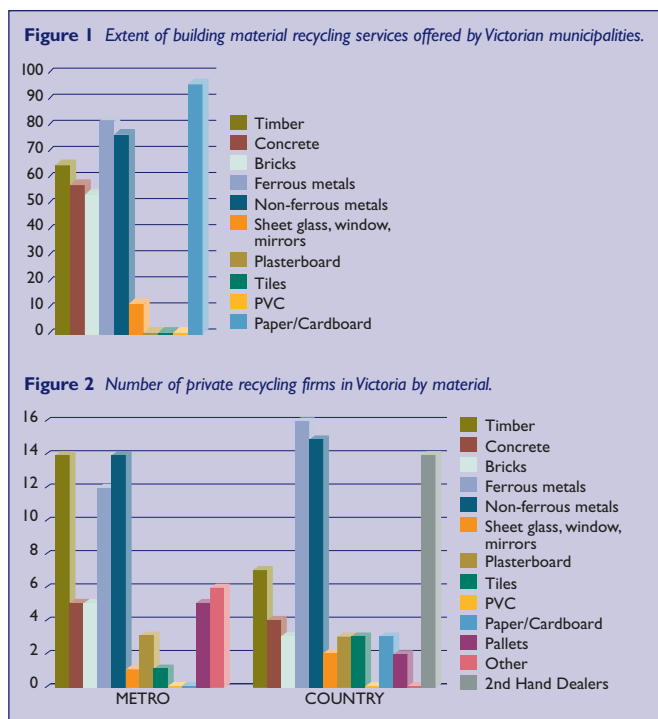
Materials diverted from landfill, recycled or reused at Calleja's Altona facility include:

- Second hand packing pellets – reused
- Plasterboard – farm fertilizers
- Paper/Cardboard – ingredient in soil enhancers
- Concrete – sent to recycler
- Steel – sent to steel manufacturer
- Timber Recovery – chipped & sold for particle board manufacture
- Soil – reprocessed for soil enhancers

Calleja's Project Manager Mr Peter Dudley says that the company will continue to explore ways of finding multiple uses for materials that currently end up in the waste stream. "It is time we all redefined the potential inherent in the materials discarded from construction sites." He said. Calleja's example goes to show that someone's trash is certainly, another's treasure!

For more information on contractors and sites like Calleja, contact the EcoRecycle Victoria free call Infoline on 1800 353233 or website at www.ecorecycle.vic.gov.au

Ryan, C., Reddrop, A. (1997) "Housing Construction Waste" Centre for Design RMIT University, Melbourne.
Wastewise Construction Review Report, 1998.
Graham, P. (1998) Resource Efficient Builder Recycling Guide.



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HANDY INFORMATION FOR SAVING MONEY BY MINIMISING WASTE

Issue 8 Vol. 1

JUNE 1999

How home-builders can reduce waste and cut costs.

Domestic construction in Victoria makes up 44% of all the state's construction activity per year and at last count represented \$4.5bn of commercial activity. Given that an average of 27 tonnes of materials are wasted per house, the impacts both on the environment and landfill is significant.

According to an EcoRecycle Victoria study the combined volume of domestic construction waste being dumped in landfills from housing sites has been shown to be greater than from commercial sites. EcoRecycle surveyed the contents of 371 vehicles arriving with C&D waste at eight metropolitan landfill sites and found that residential construction material accounted for 10.5% by volume of waste delivered compared with less than 5% for commercial construction¹.

TIPS FOR COST EFFECTIVE WASTE REDUCTION ON DOMESTIC CONSTRUCTION SITES

There are many variables that effect the profitability of separating superfluous building materials on site. These include the proximity of the site to recyclers, limitations due to lack of recycling services in certain areas, site space constraints and the variability in tipping charges at land fills. Research² has shown that due to the volume of material generated on a large construction site, most of the financial benefit of reducing waste and recycling has been obtained by commercial contractors in the reduction of waste disposal costs, rather than in profiting from selling left-over material.

Individual house construction sites however, do not produce much waste by volume. Domestic builders therefore stand to

gain the most from avoiding waste at the outset, reducing the likelihood of creating waste on-site, re-using left-over materials on-site or on other jobs, and where possible, specifying or purchasing resource efficient materials. Once you have tried these approaches to minimising waste, there are some ways that you can increase the amount of residual material that ends up being recycled. Here are a few tips for cost-effective waste minimisation on domestic projects.

WAYS TO AVOID WASTE ON HOUSE SITES

Giving sub-contractors responsibility for supplying materials and disposing of their waste

This approach to contracting has a number of benefits. Firstly it increases the care taken to estimate quantities and to not over-order materials. Secondly, there is more incentive to provide adequate protection of materials and good practices to reduce damage during construction. Ensuring that sub-contractors are responsible for paying to dispose of their waste, can help to improve the chances of product recovery and recycling. This increases the financial incentive for subcontractors to minimise waste from the outset.

Using resource efficient materials and technology

There is an increasing number of resource efficient substitutes to common building materials on the market. Examples include butt jointed claw nail-plated studs and joists that utilise short lengths of milled timber, cellulose insulation and ceramic tiles made with recycled glass. The use of these substitutes, particularly some of the engineered timber products available, can often save on the overall quantity of materials required on a project through increased structural performance and decreased overall weight. Information on resource efficient, recycled, and recyclable building materials will be available through the EcoSpecifier Guide currently being prepared by the RMIT National Centre

for Design with EcoRecycle funding. The Guide will be available mid 1999 as a booklet and also electronically. For more product information also see www.ecorecycle.vic.gov.au and www.onsite.rmit.edu.au

Consider prefabrication

Using prefabricated wall frames and roof trusses is also more resource efficient than framing on-site because the controlled manufacturing environment and replication of elements reduces waste from off-cuts. Some builders in NSW have had roof trusses numbered and packed sequentially to improve on-site coordination and reduce the risk of wasting materials^{iv}

You should also avoid purchasing materials that are over-packaged. In NSW material suppliers have been asked to unpack materials upon delivery and take their packaging back^v. This makes them responsible for their packaging and avoids a waste disposal problem on your site.

WAYS TO REDUCE WASTE ON HOUSE SITES

Providing adequate site storage & protection for perishable or fragile materials

Weather, theft and vandalism are major causes of waste on domestic construction sites so provide secure storage for materials prior to lock-up. You could also reuse off-cut ply bracing or leftover packaging material to protect windows and doors from damage.

Being on-site to receive deliveries

Materials often leave suppliers' yards in good condition but end up being damaged during delivery or as a result of where they are left on-site. Ensure someone is on-site to prepare an area to receive materials, accept delivery and direct the delivery driver to appropriate storage areas.

Controlling run-off from your site

Construct barriers around your site with earth or hay bails and drape with hessian or geotextile to reduce the amount of pollutants such as silt, solvents and paint residues from leaving the site. This will reduce the quantity of solid waste from your site entering stormwater systems and water-ways, and could help you avoid potential EPA fines.

WAYS TO REUSE MATERIALS ON HOUSE SITES

Purchasing second hand or recycled materials

In Victoria there are many companies that specialise in selling second hand building materials. Certified structural and non-structural timber for example is widely available. Consider using this type of material for feature beams, or consider using second-hand hardwood flooring in small areas. For information on suppliers contact EcoRecycle's freecall

Infoline on 1800 353233 or website at www.ecorecycle.vic.gov.au

Re-use masonry left-overs, top spoil and excavation spoil on-site

Masonry materials such as broken bricks, roof tiles and concrete rubble can be crushed and used as a fill material under paths and driveways. Stockpile excavation spoil for landscaping and run-off control, and reuse topsoil on-site for landscaping. Some builders have also stockpiled green waste for mulching on-site at the end of the job. If you are going to do this, ensure you check with local councils on any requirements they may have.

WAYS TO RECYCLE WHAT IS LEFT

Using stockpiles to separate material streams

On most house construction sites space is at a premium and therefore providing bins to separate materials for recycling is not feasible. Using stockpiles in a designated area of the site has been shown to work. A recent trial by Bellevalle Homes in Sydney proved that this was a viable method. The company managed to sort 1800kg of bricks, 200kg of timber and 360kg of plasterboard for recycling and reduce waste disposal costs by 40%^{vi}

Co-ordinate material collection to coincide with major trades or use transfer stations and recycling facilities

Recent research has suggested sequencing the separation and collection of waste to correlate with on-site construction activity^{vii}. It is based on the observation that on house sites there are usually a limited number of major trades working at one time. In addition, these trades generally are using only one or two major materials. Consider organising with your waste contractor the provision of mini-skips to collect waste materials specific to a particular trade while the work is taking place. If this approach isn't feasible, don't forget that there are an increasing number of organisations that will sort your mixed waste consignments for recycling. For information on suppliers contact EcoRecycle's freecall Infoline on 1800 353233 or website at www.ecorecycle.vic.gov.au

ⁱ Ryan, C., Reddrop, A. (1997) *Housing Construction Waste* Centre for Design RMIT University Melbourne.

ⁱⁱ EcoRecycle Victoria Construction & Demolition Sector Survey 1998.

ⁱⁱⁱ Graham, P and Smithers, G. (1996) *Construction waste minimisation for Australia residential development* Asia Pacific Journal of Building & Construction Management. Vol. 2, No. 1, pg. 14-18.

^{iv} *Onsite Construction Waste Minimisation Web Site* – Centre for Design RMIT University Melbourne <http://onsite.rmit.edu.au/>

^v Lingard, H., Graham, P and Smithers, G. (1998) *Waste Management – Civil & Civic Research Report*. Dept. Building & Construction Economics, Royal Melbourne Institute of Technology, Victoria, February.

^{vi} Malin, N. (1996) *Contractors can now choose from a variety of recycling and disposal options on the job-site* Resource Recycling, February, pg. 30-39 USA.

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Recycling Guide



for the Victorian Building and Construction Industry

METROPOLITAN MUNICIPAL SERVICES • RURAL MUNICIPAL SERVICES – BY MBAV COUNTRY SECTION • PRIVATE RECYCLING SERVICES

Metro Area Recyclers

- | | | | |
|--|--|---|--|
| <p>A & E Scrap Metals
Preston. Tel: 03 9484 4176
FM, NFM</p> <p>Abette Salvage and Disposals
Keysborough. Tel: 03 9798 4811
FM, NFM</p> <p>Archer George Metals Pty Ltd
Dandenong. Tel: 03 9794 7250
NFM</p> <p>Associated Metals Pty Ltd
Thomastown. Tel: 03 9357 3900
NFM</p> <p>Boral Resources (Vic) Pty Ltd
Malvern. Tel: 03 9564 1111
A, Co, B, CM, TRT, Ce, P, ST</p> <p>Buyrite Metal Company
Carlton. Tel: 03 9347 0366
NFM</p> <p>Organic Recyclers
Brooklyn. Tel: 03 5561 3326
TW, GP</p> <p>Cleanaway
East Melbourne. Tel: 03 9270 7700
FM, ST, C</p> <p>Consolidated Metal Industries
Brunswick. Tel: 03 9380 6112
NFM</p> | <p>CSR Limited
Melbourne. Tel: 03 9286 2666
Co, B</p> <p>Green Circle
Port Melbourne. Tel: 03 9646 9599
S</p> <p>Haulaway Recyclers
Mitcham. Tel: 03 9872 4144
T, ST</p> <p>Homestead Collections Classic Aged
Wilston. Tel: 0417 817 597
ST</p> <p>Just Old Flooring
Research. Tel: 03 9439 9293
ST</p> <p>McMats
Bayswater. Tel: 03 9761 4451
W, SC</p> <p>Minibah Recycling
Narre Warren. Tel: 03 9709 5725
MRF</p> <p>Hampton Park. Tel: 03 5941 1535
FM, NFM</p> <p>Norstar
Laverton. Tel: 03 9369 2099
NFM, FM</p> | <p>Overboard
Sorrento. Tel: 03 5984 2055
ST</p> <p>Paddy's Bricks
Footscray. Tel: 03 9687 2338
B</p> <p>Potters Industries Pty Ltd
Laverton. Tel: 03 9314 7555
SG</p> <p>Price Edinburgh Pty Ltd
Lilydale. Tel: 03 9739 7007
ST</p> <p>Recycling Industries Pty Ltd
Laverton. Tel: 03 9369 7388
Co, B, A</p> <p>Salvage Timber and Pallets
East Burwood. Tel: 03 9574 0967
T, Pw, M</p> <p>Simsmetal Ltd
Brooklyn. Tel: 03 9314 0844
NFM, FM</p> <p>Urban Salvage
Kensington. Tel: 03 9376 3166
ST</p> <p>Warragul Recyclers
Mulgrave. Tel: 03 9544 7222
NFM</p> | <p>Whelan Kartaway
Brunswick. Tel: 03 9387 9999
T, ST</p> <p>WM Waste Management Services Pty Ltd
Boronia. Tel: 03 9720 4644
ST, T</p> <p>Waste Converters
Dandenong. Tel: 03 9799 1935
T, FM, Co, SR, S, B</p> <p>Branch Office
Lyndhurst. Tel: 03 9799 1935</p> <p>South Yarra Metal Merchants Pty Ltd
Williamstown. Tel: 03 9397 8385
FM, NFM</p> <p>Paddison Wentworth
Lara. Tel: 03 5274 1369
P</p> <p>Mossrock
Thomastown. Tel: 03 9460 3380
ST, T, TTL</p> <p>Kinkade Hardwoods
Richmond. Tel: 041 444 9985
TTL, ST, FM</p> <p>Kenney Pierce Timber
Healesville. Tel: 03 5962 2181
ST</p> |
|--|--|---|--|

MBAV Region

NORTH WEST

- Wilson's Salvage Yard**
Cabarita/Mildura. Tel: 03 5025 2871
SM, FM, NFM
- H.E. Timber**
PO Box 1 Cabarita 3505
RT
- Swan Hill Recycling**
Swan Hill. Tel: 03 5033 1082
Ca, PP
- Swan Hill Demolitions**
Swan Hill. Tel: 03 5032 3818
SM

WESTERN

- CBM Waste Management Pty Ltd**
Colac. Tel: 03 5231 3076
Branch Office Ballarat
Branch Office Kenny Road
FM, NFM
- Metalcorp Recyclers**
Warrnambool. Tel: 03 5562 7211
FM, NFM
- Stawell Recyclers**
Stawell. Tel: 03 5358 2490
FM, Ca, PP
- Gay K.**
Maryborough. Tel: 03 5461 1119
SMR
- Maryborough Recycling Centre**
Maryborough. Tel: 03 5460 4606
FM, NFM
- Madman's Junk Emporium**
Maryborough. Tel: 03 5464 1170
- Talbot Demolition Yard**
Talbot. Tel: 03 5463 2461
SM, SDT
- Dunolly Second Hand Timber Yard**
Dunolly. Tel: 03 5468 1766
- Barton's Waste Removal**
Warrnambool. Tel: 03 5561 1198
CR, CF
- Solidsep P/L**
Henty. Tel: 03 5448 8366

Organic Recyclers

- Warrnambool. Tel: 03 5561-3326
TW, GP
- Organic Recyclers**
Colac Shire Saleyards
TW, GP
- Organic Recyclers**
Ballarat
TW, GP

BENDIGO

- The Restorer's Barn**
Castlemain. Tel: 03 5470 5696
- Sandhurst Enterprises**
Bendigo East. Tel: 03 5441 6795
Ca, PP
- A.B. Metal P/L**
Bendigo. Tel: 03 5443 1360
- Brennan's Timber Yard**
Golden Square. Tel: 03 5441 1146
SM
- Midland Recycling**
Tel: 03 5422 7144
FM, NFM, B, Ti, ST, Co, SM
- Bell's Glass Recycling**
Broadford. Tel: 03 5784 1613
SG
- Cohuna Steel**
Cohuna. Tel: 03 5456 2917
FM, NFM, SM
- Cab'N'Co Recycling & Casting Co.**
Riddles Creek. Tel: 03 5428 6044
NFM, FG

NORTHEAST

- Macca's Demolition & Secondhand Building Materials**
Echuca. Tel: 03 5482 6748
SM
- Nullabor Forest Timber Industries**
Moama. Tel: 03 5480 0044
SM, TTL
- East Side Metals**
Benalla. Tel: 03 5762 5261
FM, NFM

Garrets Waste Management

- Shepparton. Tel: 03 5821 7555
C, FM, NFM
- Seymour Trading**
Seymour. Tel: 03 5792 4144
FM, NFM, ST, B, Ti, SM
- Bell's Glass Recycling**
Broadford. Tel: 03 5784 1613
SG
- Murphy Salvage & Demolition**
Wodonga. Tel: 060 56 2059

GIPPSLAND

- Board Trading P/L**
Warragul. Tel: 03 5623 1055
SM
- Building Bitz**
Wonthaggi. Tel: 03 5672 4021
- Dowson T.A. & H.J.**
Wonthaggi. Tel: 03 5672 1186
GB, AC
- Bairnsdale Scrap Metal**
Bairnsdale. Tel: 03 5152 5711
FM, NFM, SG
- Ecologia P/L**
Morwel. Tel: 03 5133 9422
RR, B, Co
- LaTrobe Valley Recyclers**
Morwell. Tel: 03 5134 2828
- The Secondhand Shed**
Warragul. Tel: 03 5623 2761
SM
- SOS Recycling**
Sale. Tel: 03 5144 4229
FM, NFM

MORNINGTON PENINSULA

- Budget Demolition & Recyclers**
Crib Point. Tel: 03 5983 6777
SM
- Mornington Peninsula Recyclers**
Mornington. Tel: 03 5975 9759
- Commercial Sands Pty Ltd**
Lyndhurst. Tel: 03 9799 1305
SR, TS, T, FM, Co, B, FS

Southern Peninsula Recycling

- Rye. Tel: 03 5988 6067
- Burdett's Sand, Soil and Stone Supplies**
Frankston. Tel: 03 9789 8266
B, SR, ET, T

BALLARAT

- Chic Waste Disposal Systems**
Ballarat. Tel: 03 5335-8805
FM, NFM
- Goldfields Waste & Recycling**
Wendouree. Tel: 03 5339 1970
ST
- King's Marine Store**
Ballarat. Tel: 03 5332 1601
NFM
- Skiddy's Recycling Services**
Wendouree. Tel: 03 53392488
- ACE Scrap Metal**
Wendouree. Tel: 03 5339 1753
FM, NFM

GEELONG

- Metalcorp Recyclers**
Geelong Nth. Tel: 03 5278 8333
FM, NFM
- Angus Robert Demolition**
Moolap. Tel: 03 5248 3049
SM
- Bernie Leen & Sons**
Geelong North. Tel: 03 5278 9464
B
- Geelong Paint Stripping**
Breakwater. Tel: 03 5222 2727
Ex
- Laurie Voutier**
Breakwater. Tel: 03 5229 2799
- Ray's Shed**
Moolap. Tel: 03 5248 7557
SM

NO RECYCLING SERVICES WERE FOUND IN WIMMERA REGION.

LEGEND

AC Aluminium Cans	Co Concrete	GB Glass Bottles	RT Recycled Timber	SC Synthetic Carpet
A Asphalt	CR Concrete Rubble	GP Gypsum/Plaster	SMR Scrap Metal Recyclers	TRT Terracotta Roof Tiles
B Bricks	CM Concrete Masonry	M Masonite	SM Secondhand Materials	TT Tiles
C Cardboard	ET Earthenware & Terracotta	NF Non Ferrous Metal	SDT Secondhand Dressed Timber	T Timber Pallets
Ca Cardboard Packaging	EX Secondhand Exotic Timber	P Plaster	SG Sheet Glass	TW Timber/Wood Waste
Ce Cement	FG Fencing & Gates	PP Plastic Packaging	S Soil	TS Top Soil
CF Clean Fill	FS Foundry Sand	Pw Plywood	SR Soil and Rubble	TTL Tree Trunks and Limbs
	FM Ferrous Metal	RR Rock/Rubble	ST Structural Timber	W Wool Carpet

RESOURCE SERVICES

MUNICIPAL RECYCLING SERVICES	TIMBER	CONCRETE	BRICKS	FERROUS METALS	NON-FERROUS METALS	SHEET GLASS WINDOWS MIRRORS	PLASTERBOARD	TILES	PVC	PAPER CARDBOARD
Alpine Shire Council Tel: 03 5755 1811		◆		◆	◆			◆		◆
Ararat Rural City Council Tel: 03 5352 2332	◆									◆
Ballarat City Council Tel: 03 5339 3299	◆	◆	◆	◆						◆
Banyule City Council Tel: 03 9490 5888	◆	◆		◆	◆	◆				◆
Bass Coast Shire Council Tel: 03 5671 2211	◆			R/W	R/W					◆
Baw Baw Shire Council Tel: 03 5624 2424	◆	◆		◆	◆					◆
Bayside City Council Tel: 03 9583 6842	◆	◆	◆	◆	◆					◆
Boroondara City Council Tel: 03 9811 6911	◆	◆	◆	◆	◆	◆				◆
Brimbank City Council Tel: 03 9249 4961		◆	◆	◆	◆	◆				◆
Buloke Shire Council Tel: 03 5492 2200										◆
Campaspe Shire Council Tel: 03 5481 2200	◆	◆	◆	◆	◆					◆
Cardinia Shire Council Tel: 03 5945 4222	◆	◆	◆	◆	◆					◆
Casey City Council Tel: 03 5991 1651	◆	◆	◆	◆	◆					◆
Central Goldfields Shire Tel: 03 5461 1566	◆	◆	◆	◆	◆	◆				◆
Colac Otway Shire Tel: 03 5232 9400				◆	◆					◆
Corangamite Shire Tel: 03 5593 7100	◆	◆	◆	◆	◆					◆
Darebin City Council Tel: 03 9479 4796	◆	◆	◆	◆	◆					◆
Delatite Shire Council Tel: 03 5733 3533	◆	◆	◆	◆	◆	◆				◆
East Gippsland Shire Tel: 03 5150 9136				◆						◆
Frankston City Council Tel: 03 9784 1872										◆
Gannawarra Shire Council Tel: 03 95450 9333				◆	◆					◆
Glen Eira City Council Tel: 03 9534 4343										◆
Glenelg Shire Council Tel: 03 5522 2213	◆			◆	◆					◆
Golden Plains Shire Tel: 03 5281 1202	◆			◆	◆					◆
Greater Bendigo City Tel: 03 5434 6115	◆	◆	◆			◆				◆
Greater Dandenong City Tel: 03 9239 5240	◆			◆	◆					◆
Greater Geelong City Tel: 03 5227 0270	C	C	NG	NG D	NG D					◆
Greater Shepparton City Tel: 03 5832 9800				◆	◆					◆
Hepburn Shire Council Tel: 03 5348 2306	◆			◆	◆					◆
Hindmarsh Shire Council Tel: 03 5391 1811	◆	◆	◆	◆	◆					◆
Hobsons Bay City Council Tel: 03 9316 1461	◆	◆	◆	◆	◆	◆				◆
Horsham Rural City Tel: 03 5382 9724	◆	◆	◆			◆				◆
Hume City Council Tel: 03 9205 2435	◆	◆	◆	◆	◆					◆
Indigo Shire Council Tel: 03 5728 1021	◆	◆	◆	◆	◆					◆
Kingston City Council Tel: 03 9556 4425	◆	◆	◆	◆	◆					◆
Knox City Council Tel: 03 9298 8128	◆	◆	◆	◆	◆					◆
LaTrobe Shire Council Tel: 03 5173 1400	◆	◆	◆	◆	◆					◆
Loddon Shire Council Tel: 03 5494 1200				◆	◆					◆
Macedon Ranges Shire Tel: 03 5422 6999	◆	◆	◆	◆	◆					◆
Manningham City Council Tel: 03 9840 9341		◆	◆	◆	◆					◆
Maribymong City Council Tel: 03 9688 0261										◆
Maroondah City Council Tel: 03 9724 3365	◆	◆	◆	◆	◆					◆
Melbourne City Council Tel: 03 9658 8665				◆	◆					◆
Melton Shire Council Tel: 03 9747 7211	◆	◆	◆							◆
Mildura Rural City Council Tel: 03 5022 2777	◆		◆	◆	◆					◆
Mitchell Shire Council Tel: 03 5734 6200										◆
Moira Shire Council Tel: 03 5862 0222	◆			◆	◆					◆
Monash City Council Tel: 03 9566 0357	◆	◆	◆	◆	◆					◆
Mooney Valley City Tel: 03 9243 8891	◆	◆	◆	◆	◆					◆
Moorabool Shire Council Tel: 03 5366 7100					◆					◆
Moreland City Council Tel: 03 9240 1282										◆
Mornington Peninsula Shire Tel: 03 5986 0141	◆	◆	◆	◆	◆					◆
Mount Alexander Shire Tel: 03 5472 1611	◆		◆	◆	◆					◆
Moynes Shire Council Tel: 03 5568 2600										◆
Murrindindi Shire Council Tel: 03 5772 1233	◆	◆	◆	◆	◆					◆
Nillumbik Shire Council Tel: 03 9433 3111										◆
Northern Grampians Shire Tel: 03 5358 8786	◆			◆	◆					◆
Port Phillip City Council Tel: 03 9209 6666	◆			◆	◆					◆
Pyrenees Shire Council Tel: 03 5349 2000	◆	◆	◆	◆	◆					◆
Borough of Queenscliffe Tel: 03 5258 1377	◆		◆	◆	◆					◆
South Gippsland Shire Tel: 03 5662 9200	◆	◆	◆	◆	◆					◆
Southern Grampians Shire Tel: 03 5573 0456				◆	◆					◆
Stonnington City Council Tel: 03 9823 1183				◆	◆					◆
Strathgogie Shire Council Tel: 03 5795 2010				◆	◆					◆
Surf Coast Shire Council Tel: 03 5261 0600	A/W			◆	◆					◆
Swan Hill Rural City Tel: 03 5032 0333										◆
Towong Shire Council Tel: 03 060 712 999	◆			NE	NE					◆
Wangaratta Rural City Tel: 03 5722 0888	◆	◆	◆	◆	◆					◆
Warrnambool City Council Tel: 03 5564 7800	◆	◆	◆	◆	◆					◆
Wellington Shire Council Tel: 03 5142 3473	◆	◆	◆	◆	◆					◆
West Wimmera Shire Tel: 03 5585 9900				◆	◆					◆
Whitehorse City Council Tel: 03 9244 3445		◆	◆	◆	◆					◆
Whittlesea City Council Tel: 03 9401 0518	◆	◆	◆	◆	◆					◆
Wodonga City Council Tel: 03 060 559 200	◆			◆	◆					◆
Wyndham City Council Tel: 03 9724 0744	◆									◆
Yarra City Council Tel: 03 9302 2255	R	R	R	R	R	R				◆
Yarra Ranges – Healesville Tel: 03 9735 8407	L		L	◆						◆
YR – Lilydale Tel: 03 9735 8407	◆			◆						◆
YR – Sherbrook Tel: 03 9735 8407	◆		◆	◆	◆					◆
YR – Upper Yarra Tel: 03 9735 8407				◆						◆
Yarriambiak Shire Council Tel: 03 5398 0100										◆

R/W Rhyll/Wonthaggi NG Nth Geelong L Lysterfield A/W Anglesea/
C Corio R Richmond NE Not Eskdale Winchelsea only
D Drysdale