

# **Waste Minimisation:**

## **Report on pilot study in Taranaki**

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# 1. Introduction

Waste minimisation refers to the prevention, reduction, reuse and recycling of what would otherwise require disposal. One of the goals of waste minimisation in business is to reduce the adverse impact of production and service activities on the environment. Waste minimisation seeks to improve resource use efficiency and reduce wastes and thereby improve profits. Waste minimisation is also often referred to as cleaner production.

Solutions to New Zealand’s waste problem need to cover both better management of waste disposal and the development of waste minimisation initiatives<sup>1</sup>.

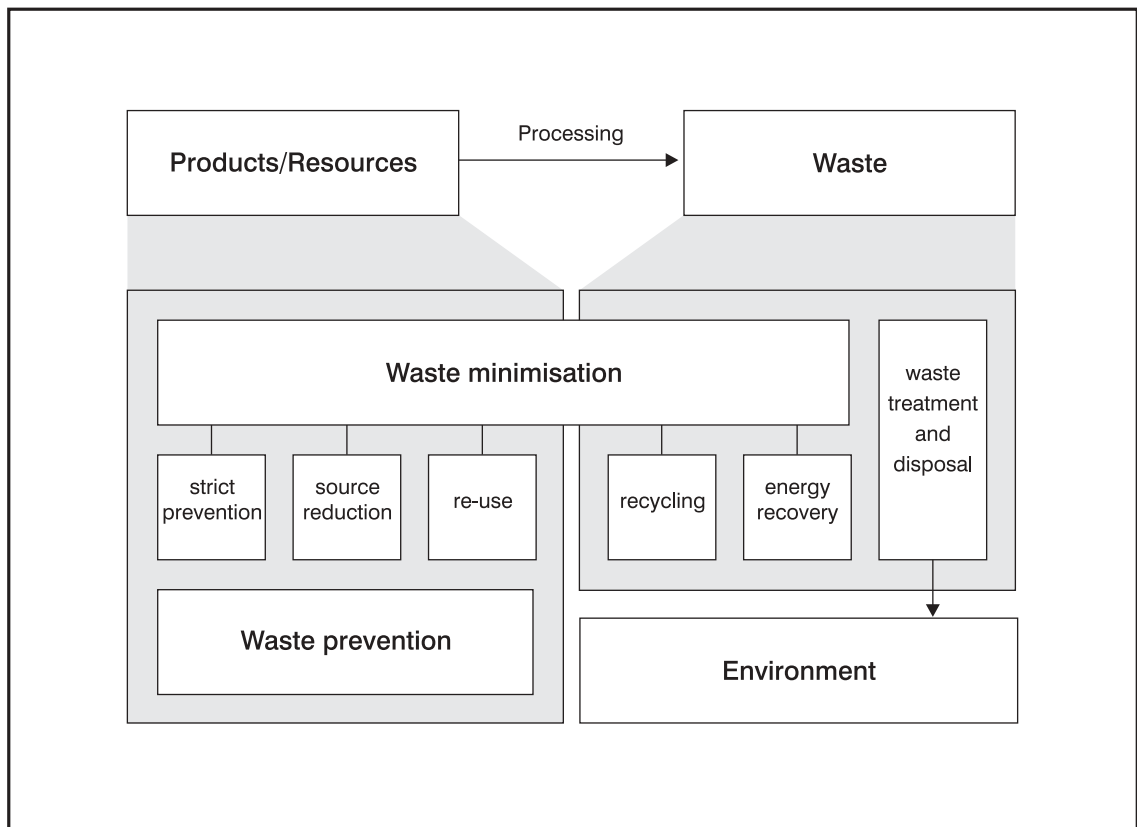


Figure 1 Waste minimisation and management<sup>2</sup>

Figure 1 shows the various options available for waste minimisation and management in business. This “waste chain” includes both **waste prevention** and the best methods available for the **treatment and disposal of wastes**. Waste prevention includes the complete prevention of waste by avoiding the use of materials, reducing the amounts of material used in production, and re-using all other available materials. Recycling and energy recovery practices can help prevent wastes being disposed of into the environment. Changes in production and

<sup>1</sup> Ministry for the Environment and Local Government New Zealand. 2000. Towards a National Waste Minimisation Strategy.

<sup>2</sup> From Ministry for the Environment and Local Government New Zealand. 2000. Towards a National Waste Minimisation Strategy.

consumption, to prevent and reduce waste, can have multiple benefits for the environment, business and the community.

A solid waste management hierarchy for Taranaki identified in the Regional Policy Statement for Taranaki supports the concepts of the “waste chain” in Figure 1 by including the following order of priority:

- Lower levels of solid waste generation;
- Greater levels of re-use, recovery and recycling of solid waste; and
- Efficient and effective treatment and disposal of solid wastes.

Waste minimisation can be linked directly to the concept of sustainable development and to the ‘triple bottom line’, as in addition to environmental benefits, financial and social benefits can also be significant. The concept of the “triple bottom line” integrates a society that cares for its environment, does not waste its resources and takes collective responsibility for its actions.

The benefits of waste minimisation can include:

#### Environmental

- Encourages the efficient use of raw materials and energy
- Reduces pollution
- Reduces the need for landfill and effluent treatment

#### Company

- Can help to identify opportunities for cost savings at low or no investment
- Enhance the company’s profile as an ‘environmentally aware’ business
- Employees gain a positive understanding of the benefits of waste minimisation practices

#### Economic

- Reduces waste disposal (including handling and transport) costs
- Reduces on-site waste treatment costs
- Reduces raw material costs
- Reduces water and energy costs
- Improves operating efficiency and hence production costs
- Potential savings to ratepayers by extending the life of landfills

Central Government is working on a sustainable development strategy for New Zealand as a whole through its Rio + 10 initiative. This strategy will include the trialling and testing of Triple Bottom Line Reporting within government at a central and local level and in businesses, as a step towards measuring and assuring the contribution of different parts of society to the achievement of sustainable development goals. The Minister for the Environment stated in her State of the Nation Environmental Report 2001 that Councils can expect to be required to report to Central Government using Triple Bottom Line Reporting.

## **2. The pilot study**

### **2.1 Purpose**

The Taranaki Regional Council recognises the need to continually promote and endorse methods for waste minimisation within Taranaki. Objective 3.2.6 of the Regional Policy Statement for Taranaki is to achieve a reduction in the volume of solid waste being produced and disposed of within Taranaki annually and to achieve an increase in the quantity of solid waste being recycled, reused or recovered. The policy to give effect to this objective aims to reduce the volume of solid waste requiring disposal, with the priority being lower levels of solid waste generation.

As part of the exploration of waste management issues in Taranaki, the Taranaki Regional Council, with the endorsement of the three district councils in the region, carried out a pilot study in 2000/2001 to identify and explore opportunities for waste minimisation in representative businesses. The purpose was to identify whether the concept could be developed further, and if so, on what basis for its successful implementation.

### **2.2 Method**

The project selected thirteen establishments representative of small businesses in Taranaki. These businesses included:

- a gardening contractor
- a tyre dealer and retreader
- a bedding manufacturer and retailer
- a concrete manufacturer
- a primary school
- a long run roofing manufacturer
- a home appliance retailer
- a long term rental accommodation business
- a food retailer (supermarket)
- a painting contractor
- a printery
- a timber and hardware merchant
- a regulatory authority

Small businesses were selected because they represent the greatest number of businesses in Taranaki, and are also less likely to have access to waste minimisation expertise. The study involved site visits and discussions with site owners, managers and operators. Opportunities for environmental and economic benefits from efficient waste management practices were identified.

### **2.3 Case studies**

The following case studies are developed from the pilot study. Each case study contains an analysis of the types of wastes generated in each of the businesses concerned. The types of waste identified are adapted from the publication *What's in your waste? A resource for Trade Businesses* (Ministry for the Environment 2001). A summary of the processes, waste streams and other characteristics of the wastes in each of the thirteen businesses is contained in Appendix 1.

### 2.3.1 Inglewood Primary School

The Inglewood Primary School has a roll of approximately 380 children, and implements some waste minimisation and recycling practices through classroom activities. This includes a comprehensive recycling programme where solid waste streams are separated using a simple colour coded disposal system. The programme also includes the composting of organic wastes with garden wastes supplied from a local contractor, which is then sold.

There are opportunities for this programme to be further developed and applied more widely throughout Taranaki, through a regional programme. This could involve implementing a school waste minimisation strategy, with a person specifically responsible for monitoring waste generation. The additional support of a regional waste minimisation programme could also develop a waste minimisation theme to include in the school curriculum.

The pilot study found that waste minimisation initiatives could reduce operating costs by approximately \$2500 a year. Three key areas were identified where such costs savings could be made: a reduction in paper consumption, a reduction in energy use and a reduction in water consumption.

The largest use of raw material in the school is paper, and very little is reused. Opportunities to reduce paper consumption by up to 20% in the school were identified for the classroom, staffroom and offices. These include:

- Providing class sets of laminated student worksheets so they can be re-used
- Designing handouts to make the most economical use of paper
- Using a noticeboard or whiteboard for staff messages and notices rather than individual copies
- Implementing a distribution folder system for information between classes
- Using double-sided and recycled paper for photocopying where possible
- Sending home one newsletter per family, or email instead of sending a paper copy
- Re-using printed paper for scarp paper or possibly envelope labels
- Having a 'photocopy free week' once a term and unplug the copier.

There are also opportunities available for the school to reduce energy usage, including:

- Turning off computers at the end of the day
- Turning off lights in rooms when they are not in use – use signs reminding students and teachers to conserve energy
- Shutting doors to heated areas
- Installing low energy using triphosphor fluorescent lighting that can reduce energy bills by up to 40%
- Using hand towels rather than air dryers in the toilets

Water consumption can be reduced by installing dual flush systems on all toilets, and by investigating ways to improve the volumetric urinal flushing system by converting to a timed flush system or waterless system.

### **2.3.2 Taranaki Galvanisers**

Taranaki Galvanisers manufacture long run roofing, with all colorsteel and galvanised steel product supplied from BHP NZ Steel. Taranaki Galvanisers have offices in the King Country, Wanganui, New Plymouth and Stratford. The Stratford site employs 12 staff. The staff are aware of the waste streams produced and the associated costs of its disposal. The largest waste stream at the site is associated with the generation of off-cuts from the moulding and shaping of the roofing.

Increasing staff awareness of the true cost of wasted product is an important role of a waste minimisation programme for this business. It was estimated in the pilot study that a reduction in off-cuts by 20% to 30% could result in savings of up to \$11000 per annum. These savings could be made directly from improved operator practices reducing the initial amount sacrificed when feeding the moulding machine and through reducing damage to off-cuts that could otherwise be used.

The pilot study also identified the opportunities available to investigate partnerships with other organisations for the reuse of some product and recycling schemes for recoverable waste streams.

### **2.3.3 New World Supermarket, Hawera**

New World Hawera is a family owned and operated co-operative supermarket that employs approximately 100 staff. New World operates 7 days per week, for 12 hours per day, with staff on the premises from 5am to approximately midnight operating sections such as the bakery, butchery and produce section as well as stacking shelves and cleaning the premises. As part of the company's management programme, New World Hawera participates in a food safety programme that requires staff to address how they will administer waste disposal.

The largest solid waste streams generated at the site are packaging wastes (predominantly cardboard but also plastic wrap, paper and bindings etc). The greatest opportunities for waste minimisation at this site rise from the education of staff as to the costs associated with waste disposal and what on-site waste minimisation practices are available. These include segregating recyclable materials, encouraging suppliers to use reusable packaging materials, and reducing energy consumption through improving energy efficiencies.

The identified benefits of these changes include reducing unnecessary disposal of wastes to landfill and potential reductions in energy usage, both of which will result in reduced operating costs. The pilot study does not quantify the estimated cost savings.

### **2.3.4 D.R. (Jack) Grey Ltd**

DR (Jack) Grey is a painting contractor that services the commercial, industrial, residential and rural sectors with a staff of 21 persons. The specialist services offered include paint and spray coatings (e.g. enamels, acrylics etc) and the application of industrial coatings.

The waste streams associated with this business include epoxies, paints, paint stripping compounds, paint thinners, solvents and cleaners. Some of these wastes are marked as hazardous in the New Zealand Waste List. In addition to these liquid

waste streams there are also plastics, paper waste and empty tins, often disposed of through the contracted sites refuse collection system.

The contractor uses either brush application or air or airless mechanical application dependent on the job to be undertaken and its location. Air application requires paint to be thinned down prior to application, therefore using less paint than air applications.

Thinners are used to clean all equipment, but are generally reused where possible. Residual paint volumes are used as base coats when appropriate or donated to voluntary organisations.

The identification of waste minimisation opportunities to the business, and resulting changes to practice, has potential to produce cost savings of up to \$4000 per annum by reducing product wastage, the preferential use of any residual paints, and preventative maintenance of spraying equipment. The implementation of an inventory control system to log all available useful materials and to arrange painting schedules to reduce wastes is a simple but effective waste management tool. Also, employee training on waste minimisation practices and improved record keeping of work procedures can lead to greater efficiencies and cost savings. In addition, information on the less environmentally hazardous product alternatives available and options available for recyclable materials would be beneficial.

### **2.3.5 G & E Carradus Gardening Contractors**

G & E Carradus have a staff of 2 to 3 persons and operate a gardening contracting business in South Taranaki. The organisation provides a range of services including general garden maintenance, lawn mowing, spraying and tree pruning.

The solid waste streams from the business are organic and include lawn clipping and tree prunings. The current disposal methods for these waste streams depend on the volumes, with the cost of disposal for the green wastes approximately \$650/annum/site. The organisation does utilise mulching where possible to avoid the generation of grass clippings. Tree prunings are typically not mulched on-site and are disposed of at the nearest green waste facility, which can take up to one hour per truckload to transport.

There are opportunities for the organisation to save significant costs through waste minimisation practices, and therefore become better positioned to tender for contracts more competitively. The investment in a wood-chipping unit (approximately \$3000) would allow tree prunings to be chipped on-site. This would offset the costs of waste disposal (by reducing the volumes to be disposed of) and provide mulch for landscaped areas, providing savings of approximately \$2000/annum. Chemical spraying for weed control costs \$1600/annum/site, which could be replaced by steam treatment. However this would require investment of approximately \$8000 in a steam treatment unit, with a payback period of approximately 5 years.

### **2.3.6 Beurepaires Hawera**

Beurepaires is New Zealand's largest tyre retailer with 82 stores distributed throughout New Zealand. Beurepaires Hawera supply wheels, new and retread tyres and conduct electronic wheel alignments and battery checks.

By far the largest waste stream at the site is the generation of unwanted used car and truck tyres. After a tyre has fulfilled the usefulness of its primary function there is a large portion of product left, for which an alternate use must be found or a suitable disposal method identified. Beurepaires provide a retread service at Auckland and Palmerston North, only 20-30% of tyres are retreaded due to the competitive cost of new tyres. Truck tyres are typically retreaded 3 or 4 times before they are no longer considered suitable for reuse.

Beurepaires Hawera manages the on-use or disposal of unwanted used tyres on an ad hoc basis. Used tyres can be taken by farmers for use on silage stacks, by kindergartens and schools for sand playpits, or for constructing retaining walls and garden planters. The introduction of steel belted radials has reduced the amount of tyres that can be utilised for these alternate uses, as they are more rigid than fabric tyres. Shredded tyres (from blowouts) are more difficult to dispose of or supply for on-use, but most are cut up by Beurepaires and disposed of through a local farmer.

Other solid waste streams include used batteries and steel frames. Where possible batteries are sold to a battery recycler and steel frames are either reused on other vehicles or sold to a scrap metal dealer. There is only a very small volume of non-tyre related residual waste generated on site which is disposed of through the domestic kerbside collection.

The reuse, recycling and disposal of unwanted used tyres is a global, and not just a regional problem. There are options available for reusing tyres and tyre materials, however many used tyres must be disposed of. Some of the key factors that influence the generation and disposal of unwanted used tyres include:

- Poorly competitive market for recycled products – new tyres can be sold almost as cheaply as retreads
- Lack of available appropriate recycling technology
- Innovative product development limited and problematic
- No government directive that is supportive of tyre recycling

There are opportunities available to Beurepaires to minimise the volume of tyres disposed of at landfills. There are tyre shredding facilities available throughout New Zealand that utilise tyres that can't be otherwise be reused, however there are costs associated with the transport of the tyres to these facilities. These costs could be offset through formalising transport partnerships within the organisation and possibly with other tyre dealers within the region.

### **2.3.7 Bed Rumours New Plymouth**

Bed Rumours are a manufacturer and retailer of beds and bedroom furniture with a staff of four people. Most of the raw materials used for constructing the beds are brought onto the site and then assembled. There is no manufacturing of other furniture on site. Materials used include manufactured springs, comfort layers (foam, rubber, polyurethane and wool), quilted fabric covers (cotton, dacron, polyester), wooden bases (pre-constructed) and adhesives.

Wastes from the site are predominantly offcuts from the raw materials used in manufacturing the beds and from the packaging of these raw materials. Some offcuts are reused in the manufacturing process, and on an ad hoc basis some offcuts and packaging wastes are reused or recycled by other persons. The wastes from the site are co-mingled in a private waste collection skip that is disposed of fortnightly at a cost of approximately \$2080/annum. Despite over 50% of the waste stream generated being recyclable, there is no point source separation conducted on site. Also, any traded beds that are not either on-sold or donated are landfilled at a cost of approximately \$100/annum.

As a high proportion of the wastes generated on site is recyclable, there are clear opportunities for the business to recover and reuse some materials and reduce the volume of waste landfilled. The wool and dacron offcuts have previously been donated for a home insulation initiative, and some materials are periodically donated for handcraft uses. This business would benefit from a network-type system of other organisations that could either utilise the waste materials or that produce similar waste streams so that a co-operative transport system for refuse and recycling could be established.

### **2.3.8 Firth Industries New Plymouth**

Firth Industries make ready mix concrete and delivers this product throughout the Taranaki Region. There are 16 persons employed by Firth at its three sites at New Plymouth, Stratford and Hawera. The site at New Plymouth is a wet batch plant in which the concrete is pre-mixed before being transported in trucks. Raw materials include aggregate, cement, sand and water, and the concrete can be modified or altered through the use of different aggregates, chemicals or additives.

The largest waste streams include the raw solid materials, water and cement slurry from cleaning the pre-mix units and concrete mixers.

Concrete manufacturing is a large consumer of water, using approximately 1000-1300m<sup>3</sup>/month at the New Plymouth site for concrete batch mixing, washing down equipment and cleaning yardage areas. The volume of water used can depend on climatic conditions, the properties of the aggregate used and housekeeping practices, especially in washing equipment. The pre-mix unit is washed out approximately twice per day, and typically uses 1200 litres of water per wash. However some staff can use up to 2500 litres per wash, meaning the overuse of water by more than 100%. Water is also used to clean down the spillage area, and if the pre-mix unit is drained too quickly to the wash water ponds more water is needed to clean down.

Washing the pre-mix unit and concrete mixers generates cement slurry that is directed to wash water settling ponds. The slurry is settled through a series of ponds and then the wash water is recycled back for washing out the cement trucks. Water from the truck washing is then redirected back to the wash water settling ponds. These ponds are cleaned out approximately every two weeks to remove the deposited slurry. This slurry is dewatered and currently stockpiled onsite. On an ad hoc basis small quantities of this waste material is taken away by farmers for use as track metal. Unusable chunks of concrete are also co-mingled with solid concrete aggregate.

Water usage provides the greatest opportunity for waste minimisation practices within the company. Through communicating the costs of excess water consumption to staff and monitoring water usage from washing the equipment to determine the optimum water usage required, water consumption could be reduced from the 1200 litres identified. Other waste minimisation opportunities include utilising the dewatered slurry aggregate for construction of other products (e.g. concrete castings) and selling these products. Also, as the unusable concrete is essentially inert it could be disposed of in a cleanfill as opposed to taking up unnecessary landfill space. These simple changes in company practice could result in annual savings of \$4000.

### **2.3.9 Selectrix Stratford**

Selectrix are a retail outlet for home appliances, bedding and furniture. They sell both new and second hand trade appliances and have a staff of 6 employees. The waste streams and associated disposal costs are well quantified, with many practices in place to recover and reuse old appliances.

The largest waste streams are whiteware appliances or furniture that are traded or disposed of on behalf of the customer. There are many practices in place to recover and reuse old appliances, and Selectrix try not to knowingly accept poor appliances. Appliances that are not suitable for on-selling are utilised for their reusable elements by either Selectrix or their supporting service repair man. For example rings from unwanted stoves are stored for reuse by customers with older type appliances. Fisher and Paykel support waste minimisation and recovery by accepting 1-2 refrigerators each month for the recovery of chlorofluorocarbons (CFC's).

Other wastes are typically from packaging wastes. Any recyclable portion of this waste is separated prior to landfilling, and where possible recovered materials are distributed on an ad hoc or as required basis. Cartons are often donated to schools or kennels, plastic covers are stored for use by people when moving, and some waste paper is shredded and used for packaging. The organisation is aware of the cost of energy for lighting, heating and cooling in the store and has installed low-energy using triphosphor fluorescent lighting in the premises and is investigating other measures to reduce energy usage.

The greatest opportunity for waste minimisation is to establish a more structured sorting system for recyclable waste streams. This would require providing separate bins for recyclable materials and educating all staff members of good waste minimisation practices. The benefits from recycling waste materials could be furthered by creating a co-operative hauling system with other businesses to reduce transportation costs. There are also opportunities for further reductions in energy usage by avoiding the unnecessary loss of energy by keeping doors shut (and encouraging customers to do the same) into the temperature-controlled showroom.

### **2.3.10 Fitzroy Villas New Plymouth**

Fitzroy Villas is a privately owned property business that consists of seven units that are rented out to tenants, and a house that is occupied by the property owners. Each unit is rented out either fully furnished or unfurnished according to the renter's preference. The services provided are communal laundry facilities, power, oil heating, water, refuse collection and other amenities, including a swimming pool.

The waste streams generated are typically household refuse and are collected on a weekly basis by the New Plymouth District Council domestic refuse collection service. This is typically two 240 litre waste bins per collection of co-mingled waste. There is no recycling conducted, although organic garden waste is stockpiled onsite with the intent of composting it for use in a vegetable garden.

Approximately 160m<sup>3</sup> of water is metered to the property over a three month period and services all dwellings and the swimming pool. Electrical water heating is provided to the seven units and only some of the water heaters in the units are insulated. Oil heating is used to heat the units, while gas is used in the owners home. Electricity costs can increase vary considerably, increasing by up to 36% during the cooler months. Incandescent lighting is used in all dwellings, and the owners recently fitted the units with lower wattage bulbs.

The implementation of a recycling programme would substantially reduce the volume of household wastes that is landfilled. Providing bins for segregating recyclable wastes from others, and encouraging organic wastes to be added to the composting, requires limited effort and education of tenants, and imposes no additional costs for domestic curbside recycling. A variety of web-based resources were identified, as well as the local District Council, for ideas on how to reduce the volume of wastes landfilled and how to encourage others to recycle. Opportunities to improve energy efficiencies were identified throughout the operation of the business. This includes the insulation of all water-heating cylinders in the units (at very little cost to the business), investigating a more energy efficient heating system, and installing energy efficient lighting. A reduction in energy usage can potentially reduce operating costs of the business by \$1500 per year.

### **2.3.11 Stratford Press and Printing Co**

The Stratford Press is a privately owned printing company that operates 5 days per week and prints a local paper and provides commercial print (letterheads, stationery, business forms and circulars) to customers. The Stratford Press employs 13 full time and 7 part time staff. In total, 65 people are employed with the residual being delivery people etc.

Solid waste streams from the business include approximately 3m<sup>3</sup> per week of paper (from trimmings and offcuts), plastics, cardboard, rags, inks and empty ink containers. These wastes are co-mingled and disposed of to landfill by a private waste contractor.

The amount of waste produced by the business can be reduced through monitoring what is wasted and altering practices to meet waste reduction targets. During production 5-6 layers of paper are sacrificed for each new roll of paper placed in the printing machine, and a 5% wastage factor is applied to producing 'ready-mades' to allow inks etc to be balanced before commencing printing. Opportunities to reduce this wastage include trying to sacrifice just three layers of paper per run instead of five or six, and by challenging the 5% wastage factor of 'ready-mades' through assessing how many sheets are required to be used before each run. Any reductions will not only result in paper savings, but also waste disposal costs and the cost of purchasing expensive inks by 2-3%. These process changes can potentially result in savings of up to \$2500 per annum.

There is currently very limited recycling of waste materials carried out on site, however some wastes are reused by outside organisations. Of the waste available to be recycled, only the silver used for image setting is recovered and taken for recycling by a separate contractor. The recycling of other materials – paper, cardboard, plastics, glass and aluminium – needs to be implemented on site and employees educated about waste minimisation initiatives. Creating a co-operative hauling system with other businesses could reduce any costs associated with recycling waste materials.

### **2.3.12 Stratford Timber and Hammer Hardware**

Stratford Timber and Hammer Hardware is a timber and hardware merchant in Stratford with 10 staff on site. The company constructs timber trusses on site, but does not build or make any other products they sell from the premises.

Solid waste streams are co-mingled prior to landfill disposal and include cardboard, paper, plastic strapping and plastic wraps. No recycling facilities are currently in place for these wastes. There are also small quantities of wood from timber off-cuts and non-returnable pellets. Scrap wood is either given away for firewood or used in the stores log fire, and off-cuts can be turned into saleable products (such as wooden pegs) or used for constructing the corner trusses.

The implementation of a recycling programme for the business could significantly reduce the 0.5m<sup>3</sup> per week of residual waste that is landfilled, especially for the larger volumes of cardboard wastes generated from the packaging of supplies. Creating a co-operative hauling system with other businesses could reduce any costs associated with recycling waste materials. The generation of off-cuts could also be reduced through monitoring wood wastage and ensuring that all staff members are aware of waste minimisation practices.

### **2.3.13 Taranaki Regional Council**

There are opportunities for waste minimisation in the Taranaki Regional Council, particularly in regard to the printing of documents and energy consumption. Approximately 300 reams of A4 printer and copier is consumed over two months, equating to paper costs of \$11088 for plain printing and copying (i.e. excludes colour paper, letterhead or A3 size).

A reduction in paper consumption by 20% would result in savings of \$2200 per year. This could be achieved through simple changes including using both sides of the paper for drafts before recycling (e.g. dedicating a 'draft' printer or print tray that is loaded with already printed paper).

The installation of energy efficient triphosphor fluorescent lighting can reduce lighting requirements in office buildings by up to 40%. These reduced energy costs could result in savings of approximately \$10000 per year.

The Taranaki Regional Council currently has a recycling programme for office waste streams, particularly paper. This programme could be further publicised throughout the offices and extended to include the recycling of all printer cartridges, and by

supporting the recyclable markets by purchasing recycled and recyclable paper and other materials.

## 2.4 Results

The study identified what waste minimisation practices are currently in place in small businesses in Taranaki. Of the thirteen businesses studied, all had some method of either a reduction of waste produced, the reuse of wastes generated, or the recycling of some waste streams. However, the focus of business practice in Taranaki parallels the New Zealand focus of waste reduction being on the recycling and reuse of used products.

Although the recycling of products is mostly carried out off-site, many businesses have developed opportunities within their production to reuse materials that would otherwise be disposed of. This includes transport and packaging materials, parts and off-cuts from production. Many businesses have also established informal exchange agreements with individuals and other businesses that can benefit from the otherwise waste materials.

Of the thirteen businesses involved in the pilot study, estimated cost savings resulting from waste minimisation practices of up to \$12000 per annum were identified for some businesses. The greatest opportunities for cost savings in the study were from:

- increased efficiencies in energy and water use;
- a reduction in the amount of by-products and off-cuts associated with production, when the use of raw materials are maximised; and
- the reduction of waste disposal costs as a result of a reduction in the amount of waste produced and the reuse and recycling of waste streams.

Opportunities for reductions in energy and water consumption were identified for most of the businesses. Significant savings in water consumption could be made with little or no capital investment, as determining optimum efficiencies and monitoring usage, and making changes to on-site practices can considerably reduce the amount of water wasted. The most significant reductions in energy consumption require capital investment to replace high energy consuming appliances and lights with low energy alternatives (for example triphosphor fluorescent lighting can reduce energy bills by up to 40%). However, by simply turning off all lights and appliances when not in use, energy consumption is reduced.

There are opportunities available in all businesses to reduce the amount of materials used. These range from raw materials used in manufacturing that can be used more efficiently to reduce the amount of wastage, to materials that are used in all businesses (for example stationary supplies). These materials can often be re-used or recycled on-site when all opportunities to reduce the volumes used are exhausted. Maximising the use of all products used within the business has significant economic, as well as environmental, benefits.

Disposal of wastes (typically to landfill) is a significant cost to most businesses. In addition to the actual cost of disposal, the waste must be transported off-site. Businesses can make significant disposal cost savings by reducing the amount of waste that needs to be landfilled. These reductions can be made by an actual reduction in the amount of waste (strict prevention), the re-use and recycling of all

available waste streams, and disposing of all suitable waste (for example unusable concrete) in a cleanfill as opposed to taking up unnecessary landfill space.

### 3. Difficulties faced in Taranaki for waste minimisation

The development of successful waste minimisation efforts in Taranaki is limited due to both the distance of Taranaki business from key markets, and the limited expertise available to or within small and medium businesses.

The additional transportation costs associated with the isolation from key markets can make the recycling of some products a greater expense than existing waste disposal costs, and the opportunities to market reusable products to other organisations throughout New Zealand are reduced. There is also no co-ordinated network in place in Taranaki to deal with the small and dispersed volumes of recyclable materials produced by local business.

Within many small to medium sized businesses in Taranaki there are not staff resources available to recognise, develop and implement effective waste minimisation programmes. Both management and employees of these businesses require knowledge of the waste streams and the best practice options for their management, for waste minimisation to be successfully implemented. There is also no significant expertise readily available within the region for waste minimisation.

In addition, some key waste minimisation practices require significant capital outlay of waste reducing equipment before there are any financial and/or environmental benefits. This may restrict some Taranaki businesses from becoming involved in any programme of waste minimisation.

There is a widespread lack of publicly available information on the processes that generate wastes and what the waste consists of, and there is a need for better integration between local government and businesses when it comes to information sharing about waste and waste management.

### 4. Further opportunities for waste minimisation

There are additional opportunities for businesses in Taranaki to **reduce** the amount of waste produced, **reuse** any waste streams, and to **recycle** as much as possible.

Not producing waste (or reducing the material intensity of goods and services) in the first place is the best way to minimise the amount of waste used in business. Methods to do this can include:

- optimising water and energy consumption  
e.g. invest in energy efficient lighting, ensure equipment is performing at maximum efficiency, control heating and cooling of premises, check regularly for pipe leaks
- considering options for reducing the amount of resources used in business e.g. paper
- recommending suppliers use re-usable transporting containers
- purchasing goods in bulk to reduce packaging wastes
- monitoring all waste streams

- investigating opportunities for substituting hazardous products for those that are environmentally safe e.g. vegetable inks, water based correction fluids, citrus based cleaning products

Reusing any available products is the second best method to minimise waste in business. By utilising all 'waste' materials used, there are significant cost benefits by optimising all raw materials and in reduced waste disposal costs. Options for reusing materials can include:

- investigating uses for by-products and off-cuts onsite
- developing agreements with individuals and organisations who can utilise any industrial by-products, surplus materials and waste from a business
- using packaging and pellets from incoming products for dispatch of finished products
- investing in waste reduction equipment where possible e.g. photocopiers that accept recycled paper and copy double-sided, steam treatment unit to replace chemical weed spraying,
- using things more than once wherever possible e.g. water, cleaning equipment.

Before looking at disposing of any waste stream, there are further opportunities available for the recycling of a number of products. Recycling takes many forms and can be carried out at all levels. Opportunities in Taranaki for beneficial recycling include:

- segregating all recoverable waste streams for recycling e.g. paper, foam, natural fibres, organic waste,
- enhancing the recyclability of materials used in business
- purchasing recycled or recyclable products to support recycling businesses
- developing partnership agreements with business neighbours to co-ordinate transport of recyclable wastes to recycling facilities

The greatest opportunity available to businesses in Taranaki to make these practices work and to see the resulting benefits is to encourage good practice through the **education** of both managers and staff. This could involve the development of a "Waste Minimisation Programme" specifically for the business, focussing on what opportunities for waste minimisation are available and the potential benefits to the business of implementing such a programme. The New Zealand Waste List is a useful tool for businesses to identify waste streams and to provide contact details for the right people about these waste streams.

The pilot study has highlighted the potential for an integrated and coordinated waste minimisation programme to promote these benefits throughout the region and to enhance their implementation/adoption.

## 5. Conclusion

There are significant opportunities available in Taranaki for businesses to improve their waste management practices and therefore improve environmental performance and at the same time reduce costs and increase profitability through the implementation of a structured waste minimisation programme. The multiple benefits of a waste minimisation programme have been clearly identified from the pilot study. Due to the nature of industries in Taranaki, and their size, location and number, there are benefits to be gained from co-ordination among all interested stakeholders to address common waste management themes. A broader waste

management strategy will provide an opportunity for Taranaki stakeholders to achieve an integrated and coordinated approach to waste management in Taranaki.

## **Appendix I**

## Inglewood Primary School

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
General		Used paper	Solid	Recycled Landfill	Paper	No	20 01 01	Paper and cardboard
		Cardboard	Solid	Recycled Landfill	Paper	No	20 01 01	Paper and cardboard
		Food waste	Solid	Compost	Cardboard	No	20 01 01	Paper and cardboard
		General rubbish	Solid	Landfill	Organic	No	20 01 08	Biodegradable kitchen and canteen waste
Cleaning		Detergents	Liquid	Sewer	Plastics	No	20 01 39	Plastics
					Paper	No	20 01 01	Paper and cardboard
					Textiles	No	20 01 11	Textiles
					Detergents	No	20 01 30	Detergents other than those in 20 01 29

**Note:** If the cleaning detergents contain hazardous substances they would be marked as hazardous in the NZ Waste List and would be listed as 20 01 29

## Taranaki Galvanisers

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Manufacturing long run roofing		Steel product	Solid	Scrap metal dealer	Coloured steel	No	12 01 99	Wastes not otherwise specified
					Galvanised steel	No	12 01 99	Wastes not otherwise specified
		Packaging waste	Solid	Landfill	Paper	No	15 01 01	Paper and cardboard packaging
					Cardboard	No	15 01 01	Paper and cardboard packaging
					Firewood	No	15 01 03	Wooden packaging
General		General waste	Solid	Landfill	Plastics	No	20 01 39	Plastics
					Paper	No	20 01 01	Paper and cardboard
					Organic	No	20 01 08	Biodegradable kitchen and canteen waste

**Note:** The general wastes are not collected separately

## New World Hawera

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
		Packaging materials	Solid	Recycling contract	Cardboard	No	15 01 01	Paper and cardboard packaging
					Paper	No	15 01 01	Paper and cardboard packaging
					Plastic	No	15 01 02	Plastic packaging
					Plastic wrap	No	15 01 02	Plastic packaging
					Wood pellets	No	15 01 03	Wooden packaging
					Plastic containers	No	15 01 02	Plastic packaging
Bakery		Organic waste	Solid	Pig farmer scraps	Organic	No	02 06 01	Materials unsuitable for consumption or processing
Butchery		Organic waste	Solid	Pet food manufacturer	Organic	No		
Produce		Organic waste	Solid	Pig farmer scraps	Organic	No	02 03 04	Materials unsuitable for consumption or processing

## DR (Jack) Grey

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Painting	Mechanical air application	Waste paint	Liquid	Reuse or donated	Waste paint	Yes	08 01 11	Waste paint and varnish containing organic solvents or other hazardous substances
		Thinners	Liquid	Collected & weathered off & reused	Waste thinners	No	08 01 99	Wastes not otherwise specified
	Mechanical airless application	Waste paint	Liquid	Reuse or donated	Waste paint	Yes	08 01 11	Waste paint and varnish containing organic solvents or other hazardous substances
	Brush application	Waste paint	Liquid	Reuse or donated	Waste paint	Yes	08 01 11	Waste paint and varnish containing organic solvents or other hazardous substances
Cleaning		Thinners	Liquid	Collected & weathered off & reused	Waste thinners	No	08 01 99	Wastes not otherwise specified
		Epoxy resins	Liquid		Epoxy	Yes	08 01 17	Wastes from paint or varnish removal containing organic solvents or other hazardous substances
		Paint strippers	Liquid		Waste stripper	Yes	08 01 21	Waste paint or varnish remover
Packaging		Cardboard	Solid	Recycle contractor	Cardboard	No	15 01 01	Paper and cardboard packaging
		Paper		Landfill	Paper	No	15 01 01	Paper and cardboard packaging
		Plastic		Landfill	Plastic	No	15 01 02	Plastic packaging
		Plastic Tape		Landfill	Plastic	No	15 01 02	Plastic packaging
		Metal Tins		Empty tins	Metal	Yes	15 01 09	Packaging containing residues of or contaminated by hazardous substances

## G & E Carradus Gardening Contractors

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Lawn mowing		Grass clippings	Solid	Mulch or transported to green waste facility	Biodegradable waste	No	20 02 01	Biodegradable waste
Tree pruning		Tree prunings	Solid	Mulch or transported to green waste facility	Biodegradable waste	No	20 02 01	Biodegradable waste
Weed spraying		Chemical residue	Liquid	Waste water	Agrochemical	Likely to be yes	02 01 08*/ 02 01 09	Agrochemical waste containing hazardous substances; agrochemical waste other than those mentioned in 02 01 08

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## Beaurepaires Hawera

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
		Car parts	Solid	Tyre recycler or landfill	Tyres	No	16 01 03	End-of-life tyres
				Reused or sent to scrap metal dealer	Wheels	No	16 01 06	End-of-life vehicles, drained of liquids and emptied of other hazardous components
		Waste batteries	Solid and liquid	Reuse or reclamation	Lead/acid batteries	Yes	16 06 01*	Lead batteries

## Bed Rumours New Plymouth

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Bed manufacturing		Comfort layer material off-cuts	Solid	Landfill or reused/recycled	Foam	No	03 01 99	Wastes not otherwise specified
					Rubber	No	03 01 99	Wastes not otherwise specified
					Wool	No	03 01 99	Wastes not otherwise specified
					Polyurethane	No	03 01 99	Wastes not otherwise specified
		Cover material off-cuts	Solid	Landfill or reused/recycled	Cotton	No	03 01 99	Wastes not otherwise specified
					Dacron	No	03 01 99	Wastes not otherwise specified
					Polyester	No	03 01 99	Wastes not otherwise specified
		Adhesive	Liquid		Adhesive	Yes	08 04 09*	Waste adhesives and sealants containing organic solvents other hazardous substances
		Packaging wastes	Solid	Landfill	Paper	No	15 01 01	Paper and cardboard packaging
					Plastic	No	15 01 02	Plastic packaging
					Foam	No	15 01 08	Textile packaging
					Steel drums	Yes	15 01 10*	Metallic packaging containing a hazardous solid porous matrix, including empty pressure containers
		Trade-in		Beds	Solid	Landfill or reuse	Foam	No
Rubber	No						20 01 11	Textiles
Wood	No						02 01 38	Wood other than that mentioned in 20 01 37
Polyurethane	No						20 01 11	Textiles
Cotton	No						20 01 11	Textiles
Dacron	No						20 01 11	Textiles
Polyester	No						20 01 11	Textiles
Adhesive	Yes	20 01 27*	Paint, ink, adhesives and resins containing hazardous substances					

**Note:** Assume adhesive is hazardous due to need for ventilation during use

## Firth Industries New Plymouth

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Concrete manufacturing	Washing mixing units	Cement slurry	Solid / liquid	Settling ponds	Aggregate	No	01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07
					Cement	No	01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07
					Sand	No	01 04 09	Waste sand and clays
					water	No	01 04 12	Tailings and other wastes from washing and cleaning of minerals other than those mentioned in 01 04 07 and 01 04 11

## Selectrix Stratford

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Trade appliances		Home appliances	Solid	Reuse/recovery or landfill	Refrigerator	Yes	16 02 11*	Discarded equipment containing chlorofluorocarbons
					Television	No	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
					Video	No	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
					Stereo	No	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
					Oven	No	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
					Elements	No	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
Retail appliances		Packaging wastes	Solid	Recycle or landfill	Cardboard	No	15 01 01	Paper and cardboard packaging
					Paper	No	15 01 01	Paper and cardboard packaging
					Polystyrene	No	15 01 02	Plastic packaging
					Plastic straps	No	15 01 02	Plastic packaging
					Plastic covers	No	15 01 02	Plastic packaging

## Fitzroy Villas New Plymouth

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Household		Domestic refuse	Solid	Domestic refuse collection (landfill)	General waste		20 01	Municipal wastes including separately collected fractions
					Garden waste	No	20 02 01	Biodegradable waste

**Note:** General waste could include any or all of the wastes listed in 20 01 of the New Zealand Waste List

## Stratford Press and Printing Co

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Printing	"Ready made" –	Trial runs	Solid	Landfill	Paper	No	20 01 01	Paper and cardboard
					Ink	Yes	08 03 12*	Waste printing ink containing hazardous substances
	Print feeding	Off-cuts	Solid	Landfill	Paper	No	20 01 01	Paper and cardboard
	Cleaning inks	Solvents	Liquid	Left to weather off	Mineral or vegetable solvent	No	08 01 99	Wastes not otherwise specified
	Image setting	Silver	Solid	Collected by waste contractor for silver recovery	Silver	Yes	09 01 06*	Wastes containing silver from on-site treatment of photographic wastes
		Packaging waste	Solid	Landfill or reuse	Cardboard	No	15 01 01	Paper and cardboard packaging
				Plastic	No	15 01 02	Plastic packaging	

## Stratford Timber and Hammer Hardware

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Timber supply		Wood off-cuts	Solid	Reused or recycled	Wood	No	20 01 38	Wood other than that mentioned in 20 01 37
		Packaging waste	Solid	Landfill	Cardboard	No	15 01 01	Paper and cardboard packaging
					Paper	No	15 01 01	Paper and cardboard packaging
					Plastic wraps	No	15 01 02	Plastic packaging
					Plastic straps	No	15 01 02	Plastic packaging

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## Taranaki Regional Council

Process	Sub processes	Waste stream	Types of wastes	How does the waste leave the site?	Waste constituent	Is it marked as hazardous in the NZ Waste List?	NZ Waste List entry	Description on NZ Waste List
Printing reports		Waste paper	Solid	Recycled	Paper	No	20 01 01	Paper and cardboard
		Printer cartridges	Solid	Returned to supplier for disposal	Printing toner	Yes	08 03 17*	Waste printing toner containing hazardous substances