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| Policy Name: | INTEGRATED RESOURCE RECOVERY AND WASTE MANAGEMENT STRATEGY |
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| Responsible Officer: | Group Manager Service Planning & Regulation |
| OBJECTIVE | The objectives listed below are those considered pertinent at the time of writing. These will be revisited periodically to ensure objectives reflect the economic, social and environmental climate of the day. Key objectives to achieve the above goal are also included below: |



Maitland City Council – April 2005

1. EXECUTIVE SUMMARY

Waste Management practices have changed significantly over recent years as the drivers of the services evolve in line with community attitudes. Since community concerns regarding the public health and safety aspects of waste disposal have been adequately addressed, the focus of waste management has shifted in recent years towards improved environmental performance. It is this shift in focus that has led to rapid changes in the

waste industry, and therefore in waste management practices throughout not only the City of Maitland, but also the whole of Australia.

The introduction of a range of services and the ongoing development of new opportunities to improve waste avoidance and resource recovery outcomes has led to the need to establish a clear vision for the future of these services in Maitland. In order to direct future implementation and management objectives this overarching strategic document has been produced. All known aspects of waste management affecting council operations have been included in this strategy, however it is critical to remember that waste management is not a static phenomenon, and therefore this document should and will be updated and reviewed on a regular basis to continue to meet community expectations and achieve industry best practice.

Recent investigations indicate that council's current landfill, the Mt Vincent Rd Waste Facility, is currently being filled at a rate exceeding all original forecasts. This has presented an immediate need to take a holistic view of waste management in Maitland and a concerted effort made to extend the life of the landfill. Such a result would not only increase the lifespan of a valuable asset, but also provide time for the ever-expanding market for alternative waste technologies and processes to be applied to the Maitland context.

Ultimately, all future waste management considerations must strive for the common goal of eliminating the need to landfill waste in Maitland following the closure of the Mt Vincent Rd Waste Facility. Outlined within this strategy are specific actions for council to take in the short-medium term to address a number of waste streams & divert significant quantities of waste from entering the Mt Vincent Rd Landfill. There are a number of solutions for reducing greenwaste, organic waste, construction and demolition waste, commercial and industrial waste, bulky goods, and hazardous waste.



MAITLAND CITY COUNCIL POLICY STATEMENT

The development of this strategy and the implementation of its recommendations, demonstrates to the community of Maitland and beyond, Maitland City Council's progressive and proactive approach to resource recovery and waste management. These actions will provide a basis on which to build community awareness about the possibilities for resource recovery and an understanding that waste need not be waste, but a valuable resource to be utilised.

'To develop and provide for waste management systems that will eliminate the need to Landfill any waste following the closure of the Mt Vincent Rd Waste Facility'

2. OBJECTIVES

The objectives listed below are those considered pertinent at the time of writing. These will be revisited periodically to ensure objectives reflect the economic, social and environmental climate of the day. Key objectives to achieve the above goal include:

- Reduction in the current waste stream landfilled at Mt Vincent by 2008 with the remainder of all landfilled waste eliminated by time of closure of the Mt Vincent Rd, Waste Facility
- Extend the life of the current landfill through significant reduction in waste received in order to cater for the future development of alternative waste technologies and enhanced waste management legislation.
- Develop and establish viable alternatives for resource recovery from existing and future waste streams.
- Ensure that waste disposal is the final consideration in the waste hierarchy in Maitland, not the first.
- Improved community awareness of the possibilities for resource recovery.
- Better understanding within the community of the responsibility of individuals to avoid, reduce, reuse and recycle waste.

3. INTRODUCTION

Council's responsibility for providing waste management services to the local community has lead to the introduction of a number of services. These services have in the past been sufficient to meet the expectations of the community in relation to public health & safety and environmental performance. However, due to a commitment to achieve best practice Australian and International standards, Council is constantly investigating and developing additional services and arrangements to improve waste management in the city. As a result of these endeavours, the relationship between these services from an operational, economic, and environmental perspective has become increasingly complex

to understand and manage. In order to move forward and further improve waste management services, a strategic approach is needed to identify opportunity areas and guide future actions in this area.

As will be outlined in greater detail later in the Strategy, the drivers for past practices in waste management are not necessarily consistent with community expectations and best practice activities.

The foreseeable exhaustion of the Mt Vincent Rd Waste Facility is a key factor in the development of this Strategy. Investigations reveal that there is an immediate need to plan for the closure of the facility, and put in place processes to delay this event, therefore catering for the introduction of new technology & processes suitable in the 21st Century.

Council's Waste Management Working Group has spent the past 6 months investigating and developing ideas and future actions outlined within this strategy. Members of the group include representative Councillors, Senior Managers, Managers and Council Officers.

4. WASTE MANAGEMENT IN NSW - PAST TO PRESENT

Centralised waste management arose from the need to provide a means of disposal that was convenient to the community, whilst reducing the potential for negative health effects caused by waste disposal. These issues have been the guiding principles against which waste management practices have been introduced and operated over the years. However more recently, following a greater understanding of the impact of a number of human activities on the environment, there has been a shift towards a critical review by communities on the environmental impacts of waste disposal. Potential negative environmental impacts arising from landfill operations include water pollution, noise pollution, vermin, visual aesthetics, odours, vectors, and in more recent times public awareness of the environmental impact from the release of greenhouse gases generated through organic waste decomposition.

Whilst concerns regarding public health and safety are still as relevant today as they were in the early days of centralised waste disposal, these issues have been extremely well managed. Improvements in the management of risk to public health and safety have been achieved through a number of means, including the emergence of engineered landfills, more sophisticated collection vehicles, and in the early 1980's the introduction of 240litre Mobile garbage bins (MGB's). MGB's provided a convenient and hygienic way of managing and collecting waste from the householder. However, for all their effectiveness

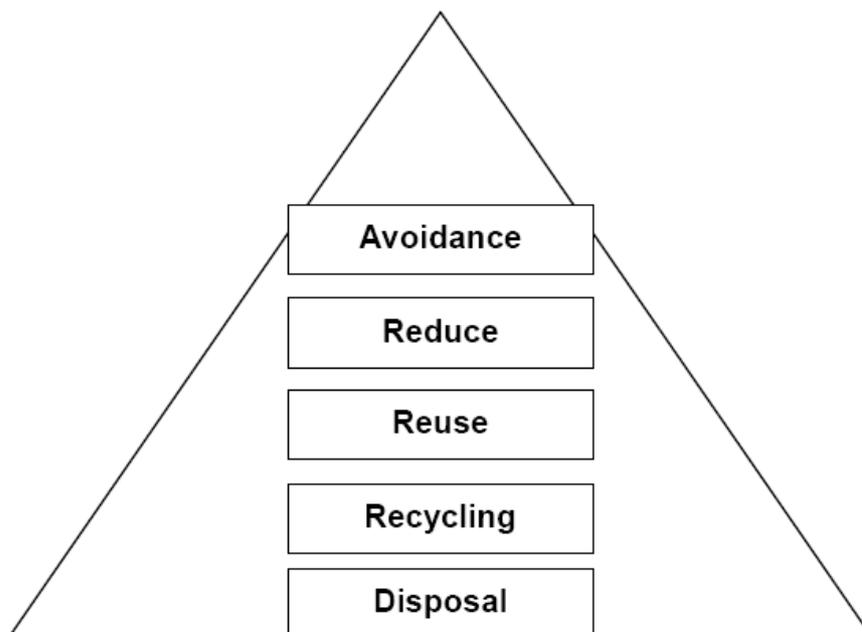
and acceptance by the community they have been arguably counterproductive to waste minimisation with little to no incentive for waste reduction.

Kerbside recycling services were introduced in the late 1980's & 1990's and in general were well received by many communities throughout NSW. The variations in commodity prices for recyclables continue to make these services dependent on ratepayer subsidies to ensure their success.

In the mid 1990's the NSW State Government introduced waste management reforms through the development and adoption of the Waste Minimisation and Management Act (1995). This act enshrined a 60% waste reduction target in legislation. It also established Waste Management Boards in Sydney, Illawarra and the Hunter. The Boards were empowered to develop regional waste plans that were to provide direction for their regions to achieve substantive changes in waste management practices for their region of Councils. These Waste Boards have undergone

significant changes since their establishment, with the functions once performed by these organisations being transferred to Resource NSW, which was established largely to develop a framework, and to support the implementation of state, regional a local programs to avoid waste and recover resources. Following NSW State Government restructuring in 2003, Resource NSW is now part of the Department of Environment and Conservation (DEC) as the Sustainability Programs Division.

Since the introduction of the Waste Avoidance and Resource Recovery Strategy (2003) the following overall hierarchy of actions for waste management has been adopted.



Using the hierarchy as the basic model, it is clear that a significant shift needs to occur with regard to the level of reliance on landfilling & waste disposal. Current waste reduction targets for the Extended Regulated Area in which Maitland is situated are as follows:

| Municipal Waste | Current performance | Improved scenario | Aggressive scenario |
|---|---------------------|-------------------|---------------------|
| | 2002 | 2008 | 2014 |
| Recycling rate (dry recyclables) | 19% | 23% | 27% |
| Organic processing rate (including garden and food) | 9% | 16% | 23% |
| Residual waste processing rate | <1% | 12% | 16% |
| Disposal rate | 72% | 49% | 34% |

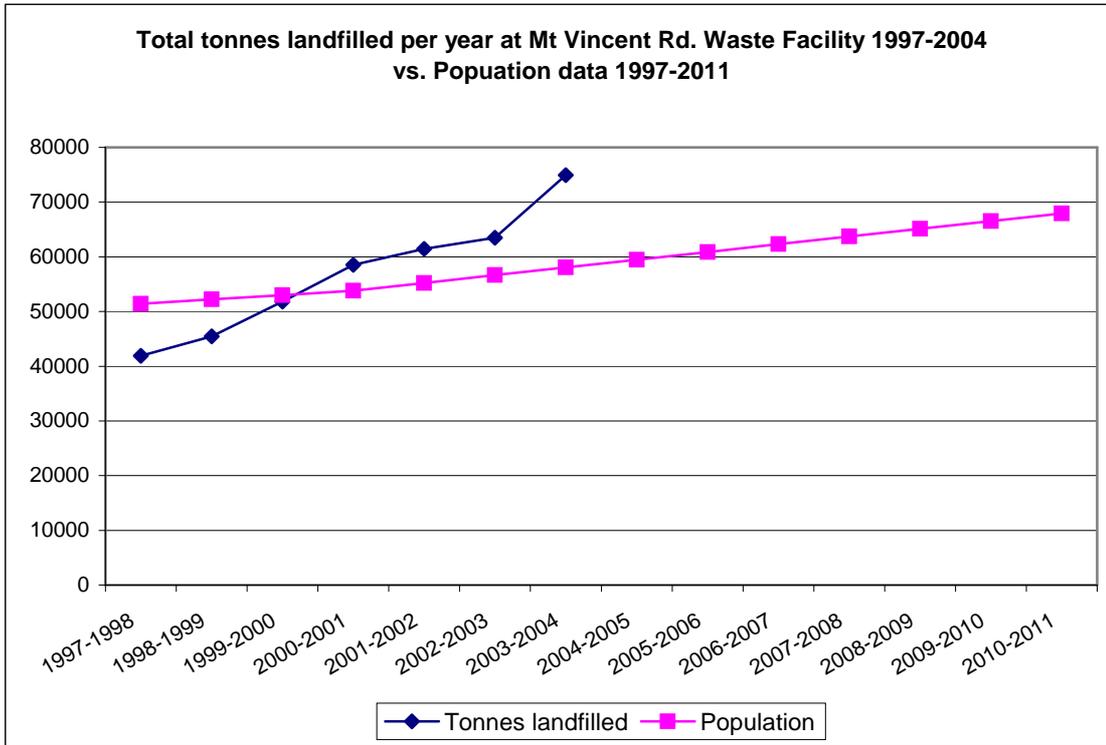
5. CURRENT WASTE MANAGEMENT SERVICES IN MAITLAND

i. Mt Vincent Rd Waste Facility

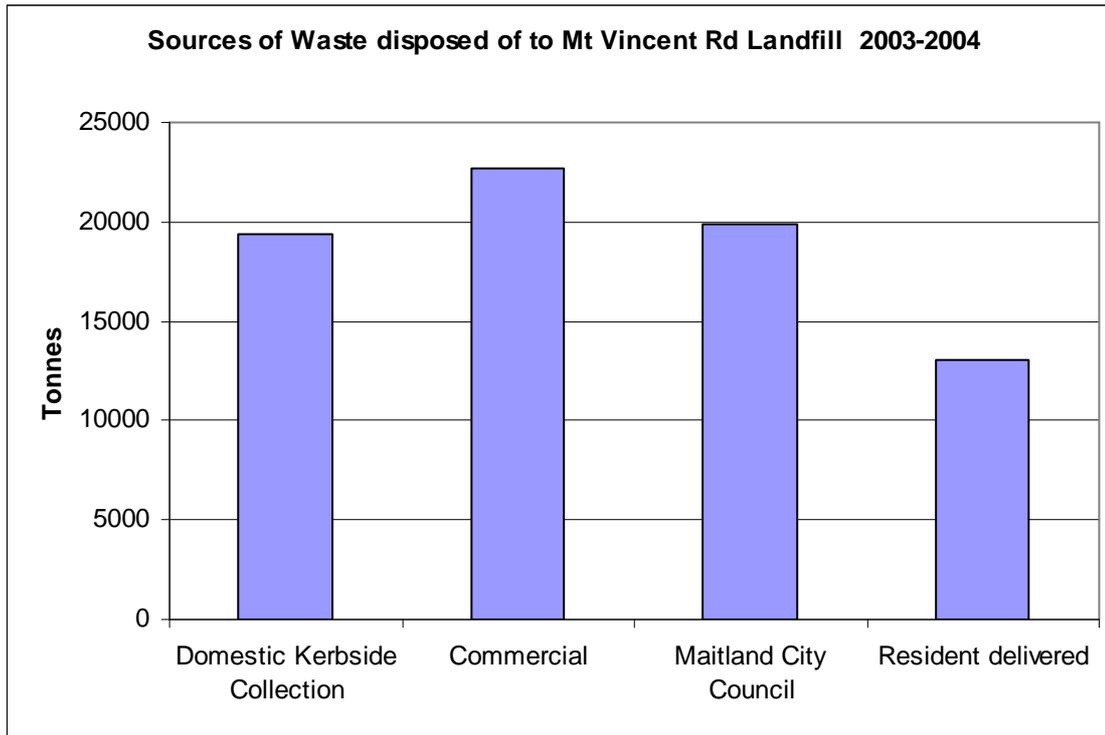
Following the closure of the former Anambah Landfill in 1993, the more modern engineered Mt Vincent Rd Waste Facility commenced accepting waste in 1993 following a 4-year investigation, assessment, design, approval, and construction process. It has an airspace capacity of 2,050,000 cubic metres, with a waste emplacement capability of approximately 1,600,000 cubic metres. Its design life was set to provide a landfilling opportunity for Maitland for approximately 27 years, based on the best available knowledge at that time.

Maitland Council owns and operates the EPA licensed (Licence # 6116) Mt Vincent Rd, Waste Facility at East Maitland. This facility caters for the disposal of solid and putrescible waste as defined by legislation. Whilst there are no licensing restrictions in respect to the source of waste, there are strict definitions of acceptable waste that must be met. Council is responsible for site supervision, waste emplacement, weighbridge operations and day-to-day management.

The following graph illustrates the change over time of the total amount of annual waste received and disposed of at the Mt Vincent Rd Waste Facility between 1998 & 2004.



From this graph it is clear that whilst resource recovery efforts may have been successful in diverting significant quantities of waste from landfill, the overall effect has been a steady increase in waste to landfill over time. It is also evident that this trend does not look like easing, as Maitland’s population is projected to increase into the foreseeable future (Maitland Urban Settlement Strategy, 2004). The amount of waste entering the landfill has been increasing at a rate above that of population increase. This is due in part to an increase in commercial waste being accepted at the landfill, along with a slight increase in waste generation per household (represented graphically later in the strategy), and an increase in council generated waste.



Illustrating the sources of waste disposed of to the Mt Vincent Rd Waste Facility demonstrates Council's own contribution to the waste stream. A large proportion of this waste is made up of Construction and Demolition material. Details on specific actions to target this waste stream will be outlined later in the strategy.

ii. Kerbside Domestic Waste Collection Service

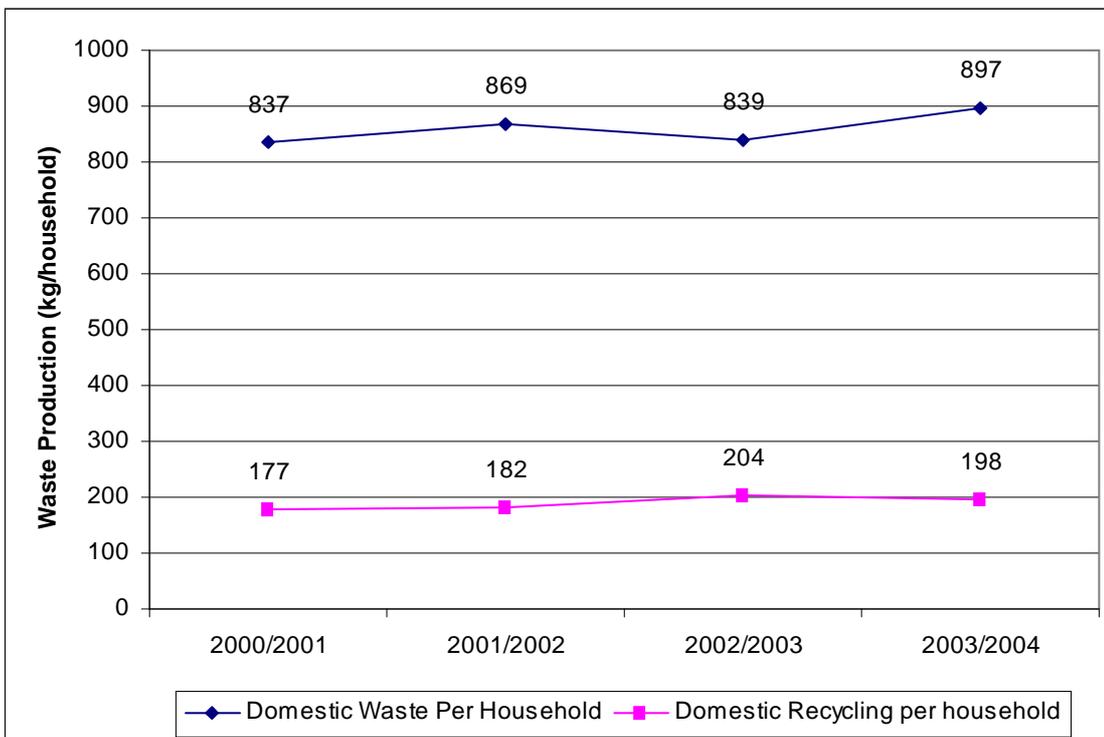
A domestic kerbside collection service has been operating in Maitland since the formation of the current Council in 1945, to provide a convenient method of waste disposal for its citizens. This service has traditionally been, and so remains, a day labour service. The service has continually expanded to its present coverage of 99% of the Local Government Area. Since the inception of a weekly collection of a 240-litre MGB for domestic waste, the service has remained relatively consistent. There remains however, no incentive, financial or otherwise, for residents to reduce the amount of waste they generate or dispose of in these bins. Despite this, there remains opportunity to investigate the implementation of a user pays system of waste collection and disposal in order to provide for such financial incentives for waste reduction. Presently, variable bin sizes appear to be the most effective and equitable system for consideration.

iii. Hunter Resource Recovery (HRR)

In 1997 a fortnightly collection service for 240-litre MGB (split bin) dry recyclables commenced, following the creation of Hunter Resource Recovery (HRR), a company owned and operated by the Councils of Cessnock, Lake Macquarie and Maitland. The success of this service when measured against others is well documented and is recognised as an industry leader in the areas of collection systems, community participation rates, levels of material contamination, on sale of product to market and community education.

In terms of waste reduction to landfill it is assessed that between 23 and 25% of municipal waste that previously presented in the domestic waste bins is being captured and diverted through our participation with HRR. On measuring that diversion rate over the whole of our annual disposal quantities this represent approximately 5.7% of material that would have otherwise presented at the Mt Vincent Facility. Again, whilst the success of the HRR program is well known and a reflection on the Council's efforts to achieve a reduction in waste to landfill, this service is only one component of the entire waste management jigsaw, and there remains significant quantities of waste being disposed of at Mt Vincent that could be recaptured and reused elsewhere.

Average domestic waste generation and recycling per household for the period 2001 to 2004 are illustrated below.



iv. Resource Recovery & Recycling

Notwithstanding Council's commitment to the kerbside dry recycling system provided through HRR, a number of additional practices are currently employed to reduce waste to landfill.

- **Greenwaste reprocessing and reuse.** Through Council's own operations, approximately 80% of greenwaste is reprocessed at the source and reused as mulch or ground cover. Bulky greenwaste is stockpiled at the Mt Vincent Rd site, together with other source-separated greenwaste that presents through commercial or domestic facility users. The stockpile is generally processed twice per year (depending on available funding) on a campaign basis. It is either reused within Council's own operations, provided to environmental projects overseen by Council, or sold.
- **Glass bottle recovery.** A purpose built and placed containerised skip is provided at the facility for capturing glass that may not have been recycled through HRR or is from a commercial source. The skip and product is collected by Solo Waste Australia on a fee for service basis.
- **Metal Recovery.** Through a service agreement with MetalCorp Pty Ltd a skip is available on site for the deposition of metal products, generally whitegoods and the like. This system does not adequately provide for all the recoverable metals that present at the site.
- **Batteries.** A bunded drop off point is provided for batteries. The market for batteries has significantly diminished in recent years as a result of the reduced use of salvageable lead in their manufacture. Operationally it is important to remove as many (theoretically all) batteries from landfills as they are considered a hazardous product that have the potential to increase heavy metals and raise acidity of landfill leachate, and therefore environmental monitoring costs.
- **Oil.** As a solid waste disposal site, all oils are prohibited from being disposed of to the Mt Vincent Rd Waste Facility. A 1000 litre bunded and roofed drop off point is provided and regularly pumped out by waste oil reprocessing contractors in an endeavour to provide a disposal path that mitigates against household quantities of waste oil being placed within other mixed loads.

The further improvement in range and effectiveness of these services in capturing material for recycling depends upon offering incentives for the separation of these materials from mixed waste loads. Financial incentives are likely to be the most effective means to ensure separation of wastes and increased rates of recovery.

i. Waste Education

It is important to recognise that all waste management practices and particularly those aimed at avoidance, reuse and recycling need to be supported by community education. Council's waste education is primarily provided on a regional basis through participation in the HRR Company, joint regional strategies of Lower Hunter Councils and the resource and funding opportunities provided by State agencies such as the Department of Environment and Conservation (DEC). Regular media releases are prepared and published to raise the importance of minimising waste to landfill. The strong focus of HRR in the Maitland district, through its School Recycling Program, has seen most if not all schools participating and receiving subsidised recycling collection, waste education material, subsidised opportunities to visit the Materials Recovery Facility and face to face talks. Councils own Schools Environment Program has a focus on improved waste management practices and Council officers are able to help throughout the year with resource material as required.

Despite the above programs and initiatives of council to provide for waste education outcomes to the community, more comprehensive programs are required in order to achieve a substantial shift in public awareness about waste management issues in the short term.

6. ALTERNATIVE WASTE MANAGEMENT OPTIONS

There are numerous alternative waste management technologies currently available on the international market, with the affordability, availability and range of these technologies likely to continue to increase into the near future. A brief discussion on a selected number of these technologies has been provided to encourage long-term consideration of the opportunities for utilisation of these technologies in the Maitland context. The following information on alternative waste management technologies is courtesy of the NSW State Government's Department of Environment & Conservation.

Mechanical

Separation

Technologies

Waste separation is an important part of resource recovery because separation can lead to increased value of materials. The relevance of waste separation technologies depends on the extent to which waste is prevented from mixing at source.

- **Material Sorting Technologies**

These use automated and manual sorting to separate mixed recyclable material to groups of specific materials. The outputs are suitable for reuse, recycling or reprocessing. The main technology types, Material Recovery Facilities (MRFs) perform two key functions in waste separation – consolidation of pre-sorted collected materials for transport to re-processors, and sorting of co-mingled waste streams to aggregate specific commodities. A Material Recovery Facility MRF is currently used to sort recyclable material collected through Hunter Resource Recovery's (HRR) kerbside recyclable service.

- **Waste Separation**

These technologies use a variety of physical processes such as drums and pulverisers, to separate mixed residual wastes. The aim is to recover specific waste streams for further processing or reduced volume disposal.

Biological

Treatment

Technologies

A variety of technologies are available for processing organic material from commercial and industrial and municipal waste sources. Decomposition is achieved by microbial activity within biologically degradable wastes.

- **Land Application**

This involves direct injection of organic wastes to increase the availability of nutrients in farm soils. Typical waste materials include sewage sludge, agricultural wastes and grease trap wastes.

- **Open Windrow Composting**

Composting involves the decomposition of organic materials by microbial activity under open, aerobic conditions to produce a stable organic material containing plant nutrients. The material can be used as a good soil conditioner. The simplest large scale composting processes uses open windrows, which can be applied to garden waste, food waste and sewage sludge. Open windrow composting uses relatively low technology, and is most effective in situations where the proportion of organic material in the waste stream is high and markets for the product are readily available. As a downside to this method of organics treatment, the retention time of material is high in order to achieve the required sterilisation of the product.

- **Vermicomposting**

These technologies use worms to consume organic wastes including sewage sludge, food and animal wastes. The product is high quality compost suitable for soil conditioning.

- ***Enclosed Composting***

Controlled atmosphere and moisture conditions are used to improve the rate of organic waste decomposition (over open windrow composting) and to control odours. Food, sewage sludge and garden wastes can be used to produce good quality compost.

- ***Anaerobic Digestion***

This involves the biological degradation of organic materials by microbial activity in the absence of oxygen. It takes place in digester tanks or reactors, which enable control of temperature and pH levels for optimising process control. The process produces methane suitable for energy generation, and a nutrient rich organic digestate suitable for soil conditioning.

- ***Fermentation***

These technologies involve biological degradation of organic wastes to produce a chemical feedstock or liquid fuel. Primary inputs have been agricultural wastes, but recent developments take municipal organics including food wastes and sewage sludge.

- ***Mechanical Biological Treatment***

There are several forms of this technology to allow compost based processing of source separated waste or mixed municipal waste. One of the processes involves waste separation such as shredding, followed by a biological process, either aerobic or anaerobic. The process results in a significant reduction of biologically decomposable substances. The product is low in gas formation potential and has a low carrying potential of pollutants.

Thermal

Technologies

Thermal waste technologies are well established in Europe and North America, with incineration the most widely used thermal process. Energy recovery is usually in the form of heat and electricity.

- ***Incineration***

These technologies recover the calorific energy contained in residual wastes. Heat and steam for electricity generation is produced through combustion of the input waste. Conventional incinerators consume some 200 to 400 tonnes of waste per day. However, air pollution control is critical because particulates and dust, Nitrogen oxide, acid gases and dioxins, furans, polyaromatic hydrocarbons and heavy metals may be generated.

- **Pyrolysis/Gasification/Melting**

Pyrolysis involves indirectly heating carbon rich material. The aim is to achieve thermal degradation of the material at a temperature of some 500 degrees centigrade in the absence of oxygen and under pressure. Useable energy of around 200 to 400 kWh/tonne of waste is generated in the process. Energy production and greenhouse gas production are lowered due to the starved air conditions. Less volatile heavy metal species are produced in the char, while volatile species need to be caught by gas cleaning systems and treated as hazardous materials. A liquid fraction is also produced which, with further processing, may be used as a synthetic oil. Gasification involves heating carbon rich waste in a slightly reduced oxygen atmosphere. The majority of carbon is converted to a gaseous form, leaving an inert residue. Gasification is widely considered an energy efficient technique for reducing the volume of solid waste and for recovering energy. Waste melting refers to thermal technologies that operate at sufficiently high temperatures to completely oxidise or reduce the waste and produce an inert glassy slag.

Landfill

Technologies

Landfill is the disposal of waste to land. In 1998, 62 percent of waste was landfilled in NSW. Landfill technology is based on anaerobic decomposition, which depends on hydrolysis (breakdown of complex organics to monomers), acidification, and methanogenesis (methane and carbon dioxide formation).

- **Conventional Wet Landfill**

These mature technologies are used to facilitate waste decomposition in a controlled manner. As the process of biodegradation takes place methane and carbon dioxide are released. Landfill gas is usually collected from large-scale developments by a piped collection system, and may be combusted to produce electricity. Landfills now use a liner or natural geological barrier beneath the waste, aimed at reducing and/or eliminating groundwater pollution.

- **Conventional Dry Landfill**

These are feasible in low precipitation climates where the minimisation of water infiltration inhibits the biodegradation of waste. This reduces or eliminates leachate and landfill gas formation because of the dry stable conditions.

- **Bioreactor Landfill**

These landfills rely on enhanced microbial decomposition that result in an accelerated process compared with conventional landfill. The rate of anaerobic decomposition is accelerated by recirculation of leachate and sometimes sewage sludge. The process aims to improve gas production and to reduce the time taken to achieve landfill stabilisation.

7. HUNTER REGION WASTE PROJECT – OVERVIEW

Hunter Integrated Resources (HIR) a company owned by the Councils of Cessnock, Lake Macquarie, Newcastle and Maitland is currently negotiating with Thiess Services for the construction and operation of an alternate waste technology plant. The technology selected incorporates proprietary engineered machinery to sort and stream the commingled waste products, to anaerobically treat the organic fraction to produce digestate and generate biogas to use as fuel for electricity generation and incorporates a fully enclosed and atmospherically controlled maturation hall and mechanical turner to stabilise the digestate into a compost material for beneficial reuse.

This facility, upon completion, will be used to treat domestic waste collected through council's existing kerbside domestic waste collection service. Whilst the introduction of this service will have a significant impact on improving waste management for domestic waste, it is by no means a complete solution for all waste generated in the Maitland LGA.

8. RATIONALE FOR THE STRATEGY

The above information relating to waste management in Maitland demonstrates the range of services and programs currently in place, and the complexity of the interactions between these components that make up waste management in Maitland. Investigations that have led to the development of this strategy were undertaken primarily in order to plan for the eventual closure of the current Mt Vincent Rd Landfill.

Based on most recent investigations into the longevity of the Mt Vincent Rd. Waste Facility there remains between 5 & 9 years of operation remaining (depending on options taken in relation to capital works on the site), based on current landfilling rates of approximately 75,000 tonnes per year. Given this information and the fact that the investigation, assessment, design, approval and construction process for the current facility took 4-years to complete in a less comprehensive and time consuming legislative environment, it is clear that the current situation needs to be considered in a strategic manner in the short term to achieve the desired long-term result.

From a financial perspective alone, the current operation is beneficial to council and the community in the short term only, whilst recent analysis into the incorporation of current landfilling and waste management expenditure, and the ever increasing potential costs of establishing a new landfill site (in the order of \$20 million), has resulted in the development of a more accurate picture of the true cost of landfilling. Based on this understanding of waste management in Maitland, it is clear that there is an immediate need for a focus and concerted effort to reduce waste going to landfill and thus extend the life of the current landfill site.

It is important to recognise Council's position in the whole waste management process in the region. Council need not be responsible for providing for services to cater for the entire waste stream, however those services that are offered, and the way in which they are offered need to compliment existing and future local waste management options. Therefore, the use of financial incentives to achieve waste reduction is a key component of this strategy.

Proposed 'price signals' will be used to provide waste generators with tools against which to assess the viability of waste separation and recovery, versus disposal to landfill. These price signals are used to structure the pricing system to ensure sufficient revenue to support the services (through increased fees for 'unrecoverable waste' and reduced fees for 'separated and recoverable waste'), with incentives for waste separation. In order to understand the implications for changes to the pricing system for waste management, a holistic view of the entire process is needed.

Given that the primary objective of a reduction in waste to landfill is to extend the life of the landfill, it is clear that the sooner an investment is made for this purpose, both time and money, the greater the return on investment (i.e. extended operational life of the landfill).

9. THE STRATEGY

In broad terms this Integrated Resource Recovery and Waste Management Strategy is designed to provide clear direction for future actions to be taken by Council, the process to be followed, financial commitments, and anticipated outcomes for improved waste management services in Maitland.

Essentially the goal of waste management at present throughout Australia is to reduce waste to landfill to a level where landfilling can be completely eliminated from the scenario in the medium term. In order to achieve this result in the Maitland context, given the forecast life expectancy of the current landfill, the direction from this point forward will be to consider landfilling as the last alternative in the waste management hierarchy. Such a change of focus will require a commitment to continue to enhance current programs, and develop and implement a range of new programs, in an effort to avoid, reduce, reuse and recycle waste.

The following '*Resource Recovery Implementation Plan*' should be considered the heart of this Strategy, and provides clear and specific direction to be taken to achieved the objectives and reach the goals outlined within the Strategy.

10. RESOURCE RECOVERY IMPLEMENTATION PLAN

This Plan is broken down into a number of sections relating to a particular component of the waste stream. Listed under each waste type are detailed specific actions to be taken by council to improve the management of that waste to ensure that the broad goal of eliminating all waste going to landfill upon the closure of the Mt Vincent Landfill facility. These actions are categorised into individual waste types, along with a separate category for Waste Education.

Each action has been given a priority rating based on a number of factors including: the level of importance of reducing that waste to landfill, the achievability of the action in the present economic and social environment, the likelihood of success, and an initial cost benefit analysis.

It is important to reiterate that this document, and particularly this section of the document, should be considered a work in progress, providing direction on the management of waste in Maitland. Waste management is neither a static nor isolated practice where cost and operational changes can and are likely to impact upon complimentary areas of operation. Data relating to specific costs of medium and low priority actions will be investigated further following the implementation of high priority actions.

Waste Type 1 – Greenwaste

Greenwaste can be defined as waste comprising vegetative organic matter including garden waste, food waste and wood waste (eg. tree prunings, lawn clippings, tree stumps, etc.). As outlined above the increasing awareness of the environmental impact of greenhouse gas (GHG) emissions from landfills has lead to efforts to reduce the amount of organic waste including greenwaste within landfills. The decomposition of organic waste under landfill conditions produces a gas which is comprised primarily of methane (CH₄), which is a greenhouse gas greater than 20 times as harmful as carbon dioxide (CO₂). Whilst improving landfill management technology will provide for significant reductions in the emissions of GHG’s generated there remains an immediate need to reduce these emissions in the short term.

The presence of organic greenwaste material within the landfill can also affect the quality of leachate collected on site. Leachate is produced from the transportation of water through the waste layer of the landfill therefore potentially picking up contaminants, nutrients etc. Whilst efforts to limit water infiltration into the landfill are great, the additional cost and potential environmental impact from poor quality leachate is a continual concern for all landfill managers. In addition to reducing GHG emissions and improving leachate quality, providing reprocessing facilities to convert discarded greenwaste into mulch or other suitable materials provides a beneficial reuse for this resource, and therefore a reduction in the demand for virgin materials to be used for such purposes. Thus reducing the demand on the natural environment.

Table 1: Actions relating to Greenwaste.

| No. # | ACTION | START DATE | COST IMPLICATIONS (NETT) | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORIT Y RATING |
|-------|--|------------|---|---------------|-----------------------------|------------------|
| 1 | Expand existing services to capture all available greenwaste material and convert to mulch. | July 2005 | Cost \$59,600/annum | SP&R CW&S | 4000 tonnes | High |
| 1.1 | Maintain a regular mulching service at the existing waste facility. | July 2005 | Approx. \$6.60/tonne to mulch. Cost \$39,600/annum. | SP&R CW&S | 1500 tonnes | High |
| 1.2 | Introduce variable price structuring at the landfill to encourage source separation. | July 2006 | N/A | SP&R CW&S F&A | N/A | High |

| | | | | | | |
|-----|---|-----------|---------------------|-----------|------------------------------------|--------|
| 1.3 | Investigate the establishment of 2 free greenwaste drop-off points throughout the LGA for monthly collection. | Jan. 2006 | Cost \$20,000/annum | SP&R CW&S | 2500 tonnes | Medium |
| 1.4 | Investigate market options for the sale/beneficial reuse of mulched material. | Jan. 2006 | N/A | SP&R CW&S | N/A | Medium |
| 1.5 | Investigate potential for an annual kerbside greenwaste mulching service | July 2006 | N/A | SP&R CW&S | (Future potential for 2000 tonnes) | Medium |
| 1.6 | Investigate feasibility of establishing an ongoing Kerbside Greenwaste Collection | Jan. 2007 | N/A | SP&R CW&S | N/A | Low |

Waste Type 2 – Organic Waste

Organic waste is comprised solely of animal or vegetable matter and typically from which compost can be created. Similarly with greenwaste organic waste can present a problem within landfills with the generation of GHG's and contributing to poor quality leachate. Alternative technologies are emerging on the international market targeting this waste stream (refer to discussion on alternative waste technology, and Hunter Region Waste Project). However, in the short-term, in order to cater for the inevitable affordability of these technologies, there are simple natural processes available to capture and reuse this material.

Composting is a process that occurs naturally in the environment and within landfills, however a specific facility to cater for this process would provide a threefold benefit. Properly managed, composting can either reduce GHG generation through controlled environmental conditions or enhance the generation of these materials and capture them for beneficial reuse (eg. electricity generation) and provide an additional revenue source. The resultant compost material can also be reused for landscaping purposes both on-site

and throughout Council's Parks and Garden operations. Finally, as with all waste avoidance and resource recovery initiatives Council, through the reuse of valuable organic material will be demonstrating best-practice waste management to the Maitland community.

Table 2: Actions relating to Organic waste.

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|---|-------------------|---|--------------|-----------------------------|-----------------|
| 2.1 | Investigate the feasibility of establishing a centralised organics treatment option for Maitland waste. | Invest. July 2006 | In-house investigations. Detail on establishment costs to be updated later. | SP&R CW&S | N/A | Medium |
| 2.2 | Investigate the feasibility of establishing a kerbside organics collection service | Invest. Jan. 2007 | In-house investigations. Detail on establishment costs to be updated later. | SP&R | N/A | Low |

Waste Type 3 – Construction & Demolition

Construction and Demolition waste is all waste generated in the process of construction and demolition work. This waste may include materials from roads, footpaths, houses etc. and is predominantly inert.

The Mt Vincent Rd Waste Facility is licensed with the NSW EPA to accept Solid and Putrescible wastes and therefore the disposal of inert and ultimately less harmful material in the landfill represents the least effective use of the facility. There are existing opportunities for the reuse of a significant proportion of this waste, including reuse as fill and cover material within the landfill site, source separation and crushing for reuse on road works, footpath construction etc.

Table 3: Actions relating to Construction and Demolition Waste

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|---|------------------|---|--------------------------|-----------------------------|------------------|
| 3 | <i>Introduce a range of services to capture, reprocess and use construction and demolition waste</i> | <i>July 2005</i> | <i>Saving of \$49,000/annum + approximately 20,000 m³ of landfill space.</i> | <i>SP&R CW&S</i> | <i>20,000 tonnes</i> | <i>Very High</i> |
| 3.1 | Implement source separation scheme within City Works and Services Group to recover potentially valuable material | July 2005 | Additional operating costs to CW&S Group. | CW&S | N/A | Very High |
| 3.2 | Investigate obtaining approval to replace purchased cover material with recovered C&D waste from CW&S Group. | July 2005 | Cost saving of \$69,000 in purchased material. | SP&R CW&S | 10,000 tonnes | Very High |
| 3.3 | Establish an internal revolving fund to support recovery of C&D material | Jul 2005 | N/A | SP&R F&A CW&S | N/A | Very High |
| 3.4 | Investigate the use of Greenspec (Department of Environment & Conservation specification for the use of recycled materials) in all Tender/quotation specifications. | Jan. 2006 | N/A | Consult & Projects | N/A | High |
| 3.5 | Establishing concrete crushing services to reprocess waste material for reuse as road sub-base | Plan July 2005 | Additional cost of approx. \$2/tonne. Therefore, \$20,000 | SP&R CW&S | 10,000 tonnes | High |

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|-----|---|--------------------|-----|---------------------|-----|------|
| 3.6 | Introduce variable price structuring at the landfill to encourage source separation. | Plan. July 2005 | N/A | SP&R CW&S F&A | N/A | High |
| 3.7 | Liaise with Department of Environment & Conservation for waste levy rebates for recovered C&D material. | October 2005 | N/A | SP&R | N/A | Low |

Waste Type 4 – Commercial & Industrial

Waste generated as a result of institutional, commercial, manufacturing or industrial activity. At present this component of the waste stream entering the Mt Vincent Rd Waste Facility is largely unsorted waste, and therefore presents particular challenges for on site resource recovery. Therefore, targeted actions for this waste stream require a particular focus on financial incentives and education to encourage greater source separation and awareness of the waste hierarchy. The following table of action has been developed with this concept in mind.

Table 4: Actions relating to Commercial and Industrial

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|---|-------------------------|-----------------------------------|------------------------|-----------------------------|--------------------|
| 4 | <i>Investigate and introduce programs and services to achieve reduced C&I waste.</i> | <i>July 2007</i> | <i>Cost \$20,000/annum</i> | <i>SP&R</i> | <i>N/A</i> | <i>High</i> |
| 4.1 | Investigate the feasibility of tendering for the disposal of Commercial waste. | April 2005 | N/A | SP&R | N/A | High |

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|-----|--|-----------|--|------|-----|--------|
| 4.2 | Liaise with Department of Environment & Conservation reduce timeframe of commencement of regional C&I education/project officer to 2006. | July 2005 | N/A | SP&R | N/A | High |
| 4.3 | Implement full tender process for Commercial waste (depending on the outcomes of feasibility investigations). | Jan 2006 | N/A | SP&R | N/A | Medium |
| 4.4 | Investigate opportunities for recycling services to Commercial & Industrial properties. | July 2007 | In-house investigations. Details on potential costs to be updated later. | SP&R | N/A | Medium |
| 4.5 | Investigate the implementation of a cleaner production program for businesses in Maitland, with a focus on improvement waste management performance. | July 2007 | Provision of resources to support businesses, and employment of program officer \$20,000 (Potential for sourcing grant funds to support program) | SP&R | N/A | Medium |

Waste Type 5 - Bulky Goods

Bulky Goods refers in general to 'waste' material (generally from domestic sources) that is too large for conventional garbage bins. This waste stream includes items such as furniture, electrical goods, building materials, scrap metals, sporting equipment, automotive parts, clothing, whitegoods etc. These materials often present a specific opportunity to reuse with little or no reprocessing and therefore represent an excellent opportunity from an environmental perspective to reduce waste to landfill. Recovering materials that require little or no reprocessing to produce a valuable product represents energy and time efficiency.

There are a number of local examples of operations to recover these materials prior to their entry onto the landfill site. An Expression of Interest process was undertaken in 2004 to determine interest from contractors for the establishment and operation of a reuse centre at the Mt Vincent Rd Waste Facility

entrance. Although this process resulted in little interest, it is considered an extremely worthwhile process to undertake again.

Community interest in the introduction of a Kerbside Bulky Goods collection service warrants further investigation of this issue. However, based on current knowledge of the issues concerned, current thinking suggest that the introduction of such a service is counterproductive to achieving waste reduction, as there is no incentive base for individuals to reduce such waste. In addition to this, at present there is no opportunity for resource recovery of this material (another justification for the investigation into the establishment of a reuse Centre). Loss of public amenity is also an issue of concern.

Above all else, perhaps the most critical concern in this debate, are issues relating to public health and safety. These are real and justifiable concerns as all material for collection is placed on roadsides and represents a potential hazard to the community. Further investigation is needed before such an initiative can be considered viable.

Table 5: Actions relating to Bulky Goods waste

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|---|----------------|--------------------|------------------------------|-----------------------------|-----------------|
| 5 | <i>Investigate and introduce a range of services to capture bulky goods 'waste' for reuse.</i> | July 2006 | Cost 250,000/annum | SP&R Consult & Projects CW&S | 7,000 | Medium |
| 5.1 | Undertake an EOI process for the establishment and operation of a Reuse Centre | July 2006 | N/A | SP&R Consult. & Projects | N/A | Medium |
| 5.2 | Proceed with full Tender process for the establishment of a Reuse Centre (depending on outcome of EOI). | September 2006 | N/A | SP&R Consult. & Projects | N/A | Medium |

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|-----|--|-----------|---|--------------|--------------|---|
| 5.4 | Establish Reuse Centre | July 2007 | Annual cost to operate centre, taking into account overheads and operating costs, loan repayment, loss of revenue from gate fees, and revenue from sale of goods. \$250,000 (worst case scenario) | SP&R CW&S | 7,000 tonnes | Medium (essential to have system in place prior to the closure of Mt Vincent) |
| 5.5 | Investigate the feasibility of establishing a central collection point for free/rebated drop-off of bulky goods (Only after establishment of a Reuse Centre or similar). | July 2007 | In-house investigations. Details on potential costs to be updated later. | SP&R CW&S | N/A | Low |
| 5.6 | Investigation of kerbside bulky goods collection service (only after establishment of a Reuse Centre or similar) | July 2007 | In-house investigations. Details on potential costs to be updated later. | SP&R CW&S | N/A | Low |

Waste Type 6 – Hazardous

Hazardous waste can be described as substances and/or the products used to contain substances that are explosive, corrosive, flammable, reactive, contagious, and or toxic. The presence of these materials in any environment is potentially dangerous, and this is no different for landfill facilities. Similarly with organic waste, hazardous wastes present significant challenges in regard to water quality control on site, and increase the potential for injury to staff and visitors. In addition to these points the presence of hazardous substances in the domestic waste stream is an issue of concern for the transportation of waste throughout the LGA. Overall, while the quantities of these waste types are not significant, there potential to cause harm warrants careful consideration for the elimination of these wastes from the waste stream.

Table 6: Actions relating to Hazardous waste

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|---|----------------------|---|---|---|-----------------|
| 6 | <i>Expand upon current services to further reduce the presence of hazardous waste materials from the landfill.</i> | <i>May/June 2005</i> | <i>Cost \$2000/annum</i> | <i>SP&R CW&S Consult & Projects</i> | <i>110 tonnes</i> | <i>High</i> |
| 6.1 | Continue support for NSW State Government's Household Chemical Cleanout Program, and lobby for expanded program (i.e. more regular collection days) | Ongoing | Cost \$2000/annum | SP&R | 5-10 tonnes | High |
| 6.2 | Continue with current battery collection service at Mt Vincent | Ongoing | N/A | CW&S | 50-100 tonnes | High |
| 6.3 | Establish a 3600 Litre oil containment shed at the existing landfill site. | July 2005 | Purchase and installation costs fully funded through Environment Australia. (Grant application pending) | CW&S SP&R | More detailed data will become available following installation | High |
| 6.4 | Evaluate outcome of regional tender/quotation process for contractor to establish Oil recycling locations throughout the LGA. | May/June 2005 | A detailed financial analysis will be available upon completion of the tender/quotation process. | SP&R Consult & Projects | N/A | High |

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|-----|---|----------------|---|-------------------------------|-----|--------|
| 6.5 | Depending on outcome of tender/quotation process enter into contract for delivery of service. | July 2005 | Will be determined through the tender/quotation process | SP&R Consult & Projects | N/A | High |
| 6.6 | Introduce variable price structuring to encourage source separation and increase the viability of alternative disposal options. | Plan July 2005 | N/A | SP&R CW&S F&A | N/A | High |
| 6.7 | Investigate establishment of storage facility for wider range of hazardous materials (to compliment oil and battery collection) | October 2005 | N/A | SP&R CW&S | N/A | Medium |

Waste Type 7 – Other

This category has been reserved for particular items in the waste stream that offer particular diversion opportunities of their own. New opportunities for recovery of individual waste types are opening regularly as new markets develop for recycled material. Therefore this list will be continuously updated to keep up with demand for products.

Table 7: Actions relating to ‘Other’ waste

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|--|------------|-------------------------|-------|-----------------------------|-----------------|
| 7.1 | Facilitate the establishment of Tyre Recycling Collection Station by C & R Tyre Recycling. | April 2005 | No net loss to Council. | SP&R | N/A | High |

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|-----|---|-----------|--|-------------|--|--------|
| 7.2 | Continue management of HRR (Hunter Resource Recovery) kerbside dry recycling service. | Ongoing | Cost neutral to Council. Revenue collected through DWMS. | SP&R | N/A (recycled material already diverted) | High |
| 7.3 | Investigate increased dry recyclable (glass, plastics, paper etc.) recovery at the landfill. | Jan. 2006 | N/A | SP&R | N/A | Medium |
| 7.4 | Extend implementation of Council's Waste Reduction and Procurement Plan (WRAPP) throughout Council operations. | Ongoing | Cost \$5,000/annum | SP&R F&A | N/A | Medium |
| 7.5 | Notwithstanding the strategic goal and vision for Waste Management in Maitland, investigate potential for further landfill opportunities at Mt Vincent. | July 2006 | N/A | SP&R | N/A | Medium |

8 – Management of Service Agreements

The management of contracts and service agreements for the range of services provided is an ongoing process that requires time effort and an awareness of the changing nature of waste management. Those responsible for the management of these services are required to participate in regional management groups, ensuring the Maitland community and the Maitland environment gain adequate benefit from regional waste avoidance and resource recovery services.

Table 8: Actions relating to Management of Service Agreements

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|-------|--------|------------|-------------------|-------|-----------------------------|-----------------|
|-------|--------|------------|-------------------|-------|-----------------------------|-----------------|

| | | | | | | |
|-----|---|------------|---|------|---|------|
| 8.1 | Undertake a review and assessment of current HRR contracts for services. | March 2005 | N/A | SP&R | N/A | High |
| 8.2 | Investigate opportunities for increased dry recycling opportunities for commercial premises within Maitland. | July 2005 | N/A | SP&R | N/A | High |
| 8.3 | Investigate opportunity for community dry recyclable collections through Public Place Recycling. | July 2005 | N/A | SP&R | N/A | High |
| 8.4 | Continue with contract negotiations with HIR (Hunter Integrated Resources) for the establishment of the Hunter Region Waste Project | March 2005 | Contract negotiations are underway to determine degree of change to the Domestic Waste Management Charge. There will be an estimated loss of revenue of \$600,000 due to the attribution of the DWMS to the Hunter Region Waste Project. The significant savings in landfill space offsets the financial losses outlined above. | SP&R | Upon opening of Hunter Region Waste Project, all domestic waste collected from the kerbside will be diverted from landfill in Maitland. In 2004 this would represent approximately 20,000 tonnes. | High |
| 8.5 | Undertake a comprehensive review and investigation of a user pays kerbside waste collection system (i.e. variable bin sizes) | July 2005 | N/A | SP&R | N/A | High |



9 - Waste Education

As with all behavioural changes within society education is essential to achieve significant waste reduction and resource recovery outcomes in the long term. Providing all the necessary information in a way in which the community can easily understand, and most importantly act upon provides the necessary link between the introduction of a range of new services and the success of these services. Essentially it is little use providing services to the community unless they are adequately informed and educated on the role those services play in the waste management jigsaw.

Table 9: Actions relating to Waste Education

| No. # | ACTION | START DATE | COST IMPLICATIONS | RESP. | EST. ANNUAL WASTE REDUCTION | PRIORITY RATING |
|--------------|---|--------------------|---|--------------------------|------------------------------------|------------------------|
| 9 | <i>Expand upon current waste education programs to ensure a continued message of responsible waste management practices is conveyed to the community.</i> | <i>July 2005</i> | <i>Cost \$9000/annum</i> | <i>SP&R CW&S</i> | <i>N/A</i> | <i>High</i> |
| 9.1 | Develop and Implement an Advocacy Plan to promote continued State Government expenditure of Waste Levy directly to MCC waste management effort | July 2005 | \$1000 Potential for significant financial benefit to Maitland from increased State Gov. expenditure. | SP&R | N/A | High |
| 9.2 | Develop and deliver specific community education campaign to increase awareness of new services and improve source separation rates. | July 2005/On going | Cost \$3000/annum | SP&R | N/A | High |
| 9.3 | Develop & implement an internal training program to ensure adaptation to new services and arrangements. | July 2005/On going | Cost \$2000/annum | SP&R CW&S | N/A | High |

| | | | | | | |
|-----|--|----------------------|---|------|-----|--------|
| 9.4 | Develop and deliver hazardous waste education program to avoid hazardous waste generation, and reduce hazard waste disposal to landfill. | October 2005/Ongoing | Cost \$2000/annum | SP&R | N/A | Medium |
| 9.5 | Continue involvement in Hunter Waste Educators Group (HWEG) & associated programs, to ensure regional waste messages are provided to Maitland residents. | Ongoing | \$1000 Annual budget (Grant funds are sought at every opportunity to support regional programs) | SP&R | N/A | Medium |

11. WASTE REDUCTION & FINANCIAL IMPLICATIONS SUMMARY

The following table provides a summary of the financial implications of implementing the above actions to the current financial position of Council:

| WASTE TYPE | SUMMARY OF ANNUAL COST IMPLICATIONS | ESTIMATED ANNUAL WASTE REDUCTION |
|---|-------------------------------------|----------------------------------|
| <i>Greenwaste</i> | \$59,600 | 4000 |
| <i>Organics</i> | N/A | N/A |
| <i>Construction & Demolition</i> | \$49,000 (saving) | 20,000 |
| <i>Commercial & Industrial</i> | \$20,000 | N/A |
| <i>Bulky Goods</i> | \$250,000 | 7,000 |
| <i>Hazardous</i> | \$2,000 | 110 |
| <i>Other</i> | \$5,000 | N/A |
| <i>Management of Service Agreements</i> | N/A | N/A |
| <i>Waste Education</i> | \$9000 | N/A |
| Total | \$296,600 | 33,110 |

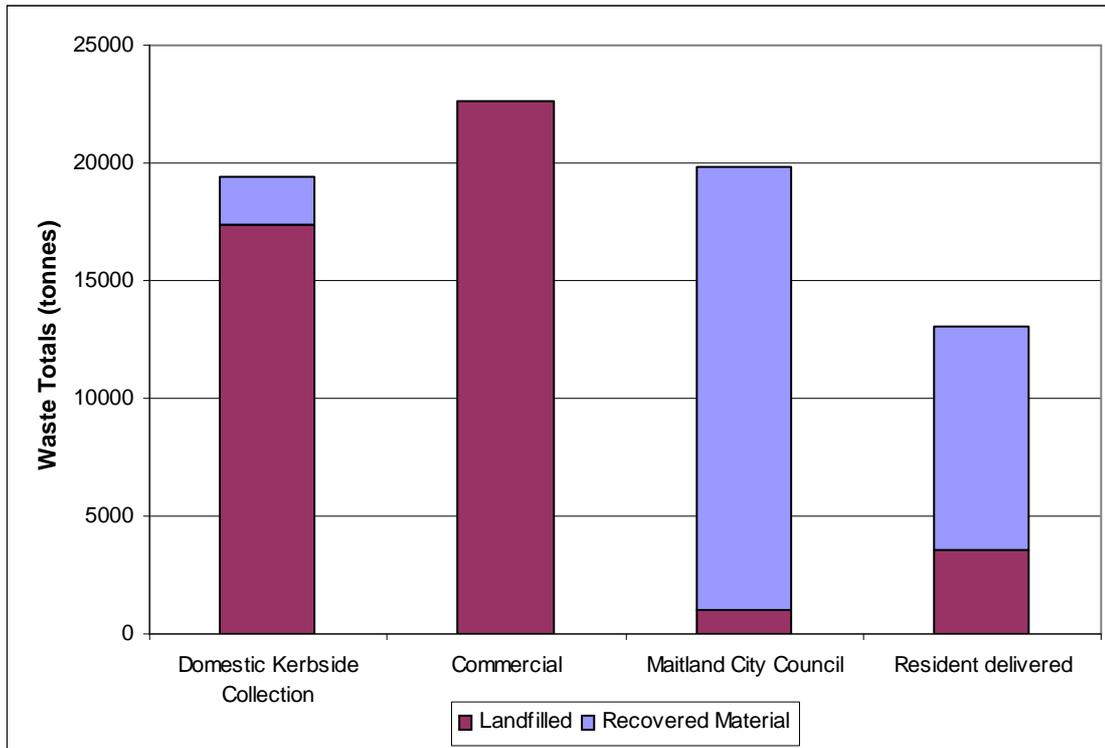
From the above table, adopting a whole of Council approach to waste management there are significant opportunities for waste reduction and a reduced rate of landfilling within Maitland. By reducing annual waste to landfill by 33,110 tonnes (or 44%) the life of the current landfill can be extended by a further 3 to 6 years. Given the fact that establishing a new landfill facility (assuming that such an endeavour would be possible in the current/future legislative environment) would cost in the order of \$20 million, and the average life of such a landfill is likely to be 20 to 30 years, additional long-term savings from the



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introduction of these services would be between \$2 million & \$6 million. However, in order to achieve these long-term financial savings, and provide for improved environmental performance, a short-term reduction in return of approximately \$300,000 should be anticipated.

In order to demonstrate graphically the major areas of waste reduction (as outlined above), and the remaining sources of waste to landfill, the following graph was prepared based on 2003/04 landfill statistics.



12. CONCLUSION

Council's adoption of this strategy provides a clear direction for waste management in Maitland into the future. This document was designed with the ever-changing nature of the waste management industry in mind, and therefore represents a proactive, yet flexible approach to achieving the strategic goal of eliminating all waste from landfill in Maitland upon the closure of the Mt Vincent Rd Waste Facility. Within each action outlined in this strategy, there is a definite focus on treating all material first as a resource to be utilised, before considering waste treatment options. It is this attitudinal shift that is at the heart of many changes in the way waste is perceived in the present day.

This Strategy will be reviewed and updated by 30th January 2006 to ensure the most accurate and up to date information is contained within the strategy and the approach of Maitland City Council is flexible to both the demands of the community and changes in the waste management industry.