sustaining Liverpool

Liverpool city council
creating our future together

Waste Avoidance and Resource Recovery Strategy Part 1

November 2005

Playing our part in Sustaining Liverpool

TABLE OF CONTENTS

Part 1:

STRATEGIC DIRECTION

1 INTRODUCTION

Liverpool City Council must, as one of its key obligations to ratepayers and the community, provide services for the management of waste and recyclables. To meet this obligation, Council has prepared this waste avoidance and resource recovery strategy that has the following objective:

> *"To provide the planning framework for resource recovery and waste disposal, processing and collection for a minimum 10-year period. The Strategy also addresses processes for achieving waste minimisation through avoidance, reuse, planning, and policy. The Strategy incorporates principles of ecologically sustainable development."*

The strategy has been prepared following:

- Extensive review of Council's existing waste management and recycling services;
- Review of the State Government's framework and objectives in relation to waste avoidance and resource recovery;
- Social research amongst Liverpool residents on resource recovery and environmental issues; and
- Identification and assessment of opportunities and options for waste avoidance and resource recovery.

In preparing the strategy Council has applied the strategic planning framework developed under its corporate plan, which has the following objectives:

1. **Valuing the environment**: To conserve, link and enhance the City's natural areas to create a functioning environmental system.

2. **Maximising social well-being**: To support the development of a vital community that has access to opportunities and facilities that improve the quality of life.

3. **Building communities**: To plan and promote sustainable growth, urban equity, urban renewal and choice.

4. **Growing the economy**: To generate new investment and employment which is increasingly linked to the knowledge economy.

5. **Improving transportation**: To develop transport services which improve the quality of life for our community.

6. **Develop our regional role**: To establish Liverpool as the regional centre of South West Sydney.

7. **Providing quality services**: To offer an excellent standard of service to our community and the Council.

1.1 Key Principles of the Strategy

The Strategy embodies the following principles as part of its approach to waste:

- Addressing resource recovery and waste management within the context of agreed sustainability principles.
- Moving Liverpool away from a waste disposal approach to a resource recovery and waste minimisation approach to its municipal waste stream.
- Managing responsibly all wastes generated by households (and where possible commercial operations) so that maximum levels are recovered, in priority of net present resource value.
- Utilising recovered resources for their highest environmental value.
- Directing the responsibility for management of waste to the generator of that waste.
- Disposing or recovering locally, waste and excess resources generated locally where possible.
- Assuming environmental stewardship for any residual waste disposed to landfill.

1.2 Key Objectives of the Strategy

The Strategy is intended to achieve the following primary objectives:

1) Identify and prescribe for Liverpool City Council:

   - Good or best practice waste avoidance and resource recovery options for both household and Council-generated wastes;
   - Strategies for local commercial and industrial waste management to determine a feasible role for Council within the context of recent Department of Environment and Conservation guidelines; and
   - Options to maximise the impact of current Council controls aimed at minimising waste from construction and demolition activities.

2) Provide a context for Council to incorporate the State Government's diversion from landfill targets as set out in the NSW's Waste Avoidance and Resource Recovery Strategy 2003.

3) Provide strategic outcomes that address a balance between environmental, social and economic issues.

4) Establish a framework for the introduction over time of improved resource recovery technologies and practices, while addressing integrated collection systems.

2 BACKGROUND

To provide the framework for strategic planning in relation to this Waste Avoidance and Resource Recovery Strategy, Council has commissioned a range of background studies including:

- Social Research on Resource Recovery and Environmental Issues, including focus groups sessions and phone survey conducted in November 2003 (IRIS Research; 2004);
- Municipal Waste Stream Audit and Analysis, conducted in September 2003 (McGregor Environmental Services; 2003); and
- Strategic Responses to Waste and Recycling Disposal Technologies (Nolan-ITU; 2004)

The outcomes of these studies have provided important background information to help frame the Action and Implementation Program that underpins this Strategy. It is noted that some areas with marginal connection to domestic solid waste are not covered within the Strategy. These include stormwater waste, wastewater reuse, and major industrial waste.

3 WASTE CHARACTERISATION AND DEMOGRAPHIC PROFILE

3.1 Introduction

To establish some context under which the programs included in this strategy have been developed, this section presents a profile of Liverpool's current arrangements for waste and recyclables, as well as Liverpool's demographic features. Information presented here has been sourced from:

- Records provided by Council staff;
- *Liverpool Demographic Profile* (Liverpool City Council; 2004a)
- 2003 audit of garbage and recyclables (McGregor Environmental Services; 2003);
- Australian Bureau of Statistics (www.abs.gov.au); and
- Nolan-ITU's in-house database on waste generation.

3.2 Demographic Features

3.2.1 Population

The historic, current and projected future population of Liverpool is presented in Table 3.1.

Table 3.1: Historic, current and projected future population of Liverpool

Year	Population
1991	98,162
1996	120,197
2001	154,287
2004	173,736
2009	201,851
2014	230,777
2019	260,586
Source: Liverpool Demographic Profile	

The current (2004) population in Liverpool Local Government Area (LGA) is estimated to be 173,736. As at June 2004, there were some 53,800 households in the LGA, consisting of approximately 45,100 Single Unit Dwellings (SUDs) and 8,700 Multi Unit Dwellings (MUDs).

In the period 1991 to 2001, the population of Liverpool increased by approximately 56,000 people, an increase of 60% over 1991 levels. This is the highest growth recorded in NSW. In future, population growth will continue in Liverpool as new residential zoned areas are released for development, as well as from changes in demographics. By 2019, with a projected population of around 260,000 people, Liverpool is expected to be the second most populous LGA in Sydney, behind Blacktown.

3.2.2 Demographic Profile

Liverpool is a young and culturally diverse municipality. Presented in Table 3.2 is list of key demographic features of Liverpool LGA with a comparison to greater Sydney.

Table 3.2. Demographic Profile of Liverpool LGA and Greater Sydney

Feature	Liverpool LGA	Greater Sydney
% of population born overseas	38%	31%
% language other than English spoken at home	44%	27%
Median age (years)	30	34
Median Weekly Individual Income	$400-$499	$400-$499
Median Weekly Household Income	$800-$999	$800-$999
Mean Household Size (persons)	3.2	2.7
% Multi-Unit Dwellings (MUDs)	16%	32%
% Single Unit Dwellings (SUDs)	84%	68%
Source: Australian Bureau of Statistics, 2001 Census data		

Recent analyses of waste management systems in NSW conducted by the NSW Jurisdictional Recycling Group (NSW JRG; 2003) suggest that age, income and non-English speaking background can have a notable influence on waste management practices and recycling performance. For systems to be effective, appropriately targeted education campaigns must be engaged that account for such demographic characteristics.

3.3 Existing Waste Collection Systems

Liverpool City Council offers to its residents a four-stream collection system for domestic wastes as follows:

Garbage	Weekly collection from 240 L Mobile Garbage Bins (MGBs)
Dry Recyclables (commingled containers)	Fortnightly collection from 90 L black crates
Dry Recyclables (paper/cardboard)	Fortnightly collection from 90 L blue crates
Household Cleanup	Booked collection with general waste (two free collections provided per year) and whitegoods/metals separated at source (unlimited collections provided)

Council does not currently provide:

- a separate garden organics collection;
- a dry recyclables collection service for the majority of multi-unit dwellings; and
- any commercial waste or recycling collections.

Existing arrangements for the collection and receival/processing of domestic wastes, together with associated contractual arrangements are summarised in Table 3.3.

The 90 L crates used for collection of dry recyclables in Liverpool are not common. Most crate-based collection systems use crates of smaller size (55L or 60L) with collections usually provided weekly. In Liverpool the lower collection frequency (in the current system, fortnightly) is partly compensated by the increased size of the crates. By comparison, many Councils in Sydney have opted for Mobile Garbage Bins (MGB) for fortnightly collection of dry recyclables.

There is no contract in place for receival and disposal of collected domestic garbage. Material delivered to Waste Management Centres is charged by WSN Environmental Solutions (formerly Waste Service NSW) on an ongoing spot gate-fee basis. The current (2004/2005) cost to dispose of putrescible wastes at WSN Environmental Solution's Eastern Creek Waste Management Centre is $79.20/tonne (excluding GST).

To meet future garbage processing and disposal needs, Council is currently preparing a tender for reprocessing/disposal of this material in line with the key principles and objectives of this Strategy (refer Section 1), as well as meeting its legislative requirements with regard to contesting services.

Table 3.3 Domestic Waste Collection Arrangements - Liverpool

Item		Stream			
		Domestic Waste Service (garbage)	Kerbside Recycling Services		Household Cleanup Service
			Commingled Containers	Paper	
Collection	Contractor	JJ Richards	Remondis (formerly Rethmann AES)		In-house
	Collection Receptacle	240 L MGB	90 L black crate	90 L blue crate	N/A
	Collection frequency	Weekly	Fortnightly	Fortnightly	Booked service
	Collection Type	Mechanised Lift	Mechanised Lift		Manual lift
	Contract Term	1 Jan 2001 to 31 Dec 2007	30 Apr 2001 to 29Apr 2008		N/A
	Delivered to	Eastern Creek WMC Jacks Gully WMC	Visy Blacktown MRF	Visy Smithfield Mill	Enviroguard landfill, Erskine Park; Metals to Smorgon Steel, Chipping Norton
Receival and processing	Contractor	N/A	Visy		N/A
	Contract Term	N/A	30 April 2001 to 29April 2008		N/A
	Payment Arrangements	Spot gate fee at landfill	Contract includes limits on contamination levels	If Contamination <1 % (Visy pays Council) If Contamination >3 % (Council pays Visy)	Spot gate fee at landfill Metals at quoted market price

3.4 Waste Generation

3.4.1 Historical

Historical domestic waste stream (garbage and recyclables) generation for Liverpool LGA for the period 1998 to 2004 is presented in Figure 3.1.

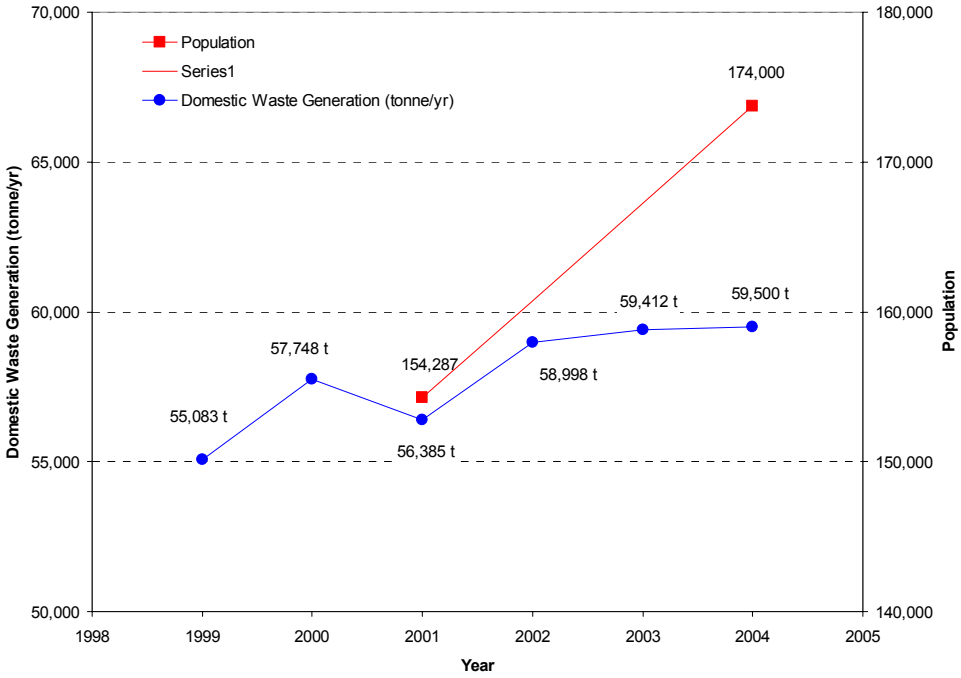


Figure 3.1: Historical Population and Domestic Waste Generation - Liverpool

3.4.2 Current

The total current (2004) domestic waste stream (garbage and kerbside recyclables) generation for Liverpool LGA is presented in Table 3.4.

Table 3.4: Domestic Waste Generation (rounded) – Liverpool 2004

Stream	Total Generation (tonne/yr)	% of Total	kg/pers/yr [(1)]	kg/hhld/yr
Garbage	50 000	84%	288	929
Kerbside Recycling	9 500	16%	55	177
Total	59 500	100%	342	1,106
[(1)] Based on a 2004 population of 173,736 and 53 800 households (Source: Liverpool City Council)				

Based on a comparison of waste generation in Liverpool with that of other Councils in Greater Sydney, Liverpool is one of the higher domestic waste stream generators (on a per household basis). Average waste generation for other Sydney Councils is 970 kg/hhld/yr compared to 1 106 kg/hhld/yr in Liverpool. The difference is at least partly a reflection of the higher household density levels in Liverpool compared to the Sydney average (most recently listed as 3.2 persons per Liverpool household versus 2.7 in Greater Sydney).

The current diversion rate through kerbside recycling is 16%. This is lower than the typical kerbside recycling diversion rates achieved by Sydney Councils of around 20 – 25%.

Comparing the types of containers currently used for garbage and kerbside recycling can provide a partial explanation of the lower diversion rate in Liverpool compared to other Councils. In recent years many Sydney Councils have reduced the size of garbage containers from the previously provided 240 L bins down to 120 L or 80 L bins. At the same time, residents have been provided with larger, enclosed containers for kerbside recycling and, in many cases, garden organics. The net result has been that those Councils providing bin-based recycling services for dry recyclable materials and/or organics (for example rigid mobile containers with regular collection frequencies), together with smaller garbage containers (such as 120L or 80L bins), are generally achieving higher diversion rates than those that do not.

3.4.3 Projected Future Quantities

To undertake strategic planning and to obtain information about potential future changes in the quantity of materials requiring collection and treatment, a projection of future tonnages of domestic waste generation (garbage and recycling) in Liverpool has been performed. The projection is based upon the following:

- The application of Liverpool future population data as provided by Council (Table 3.1)
- An average waste generation rate per capita (342 kg/capita/yr – refer Table 3.4)
- The assumption of a linear growth in population.

The projected annual quantities of total domestic waste are presented in Figure 3.2[1].

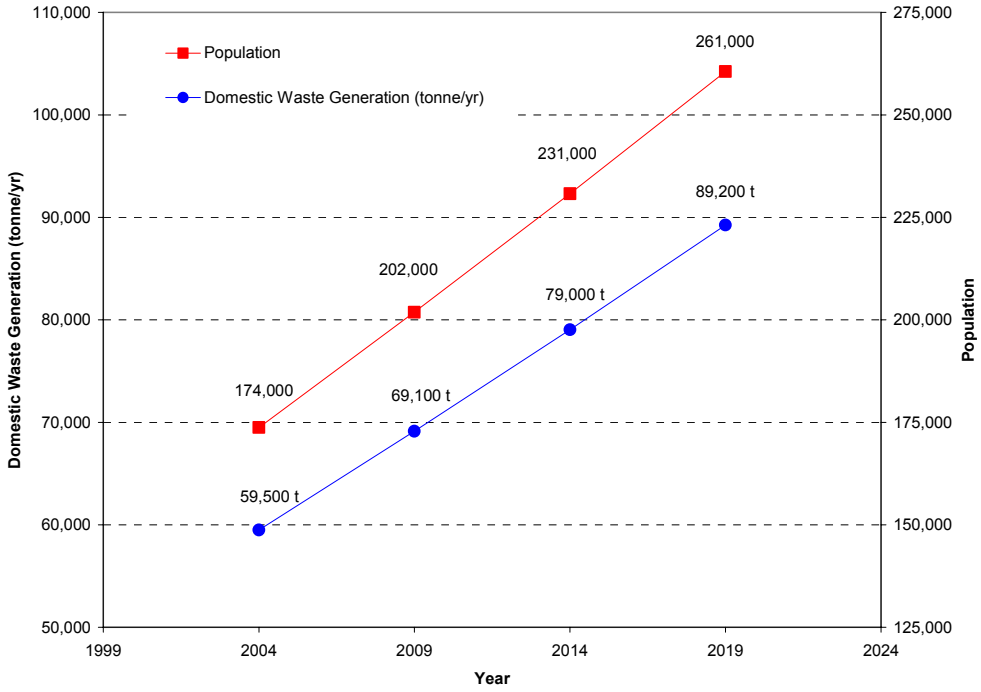


Figure 3.2: Projection of Population and Domestic Waste Generation - Liverpool

From a 2004 starting point of around 59 500 tonnes/yr total domestic waste generation (garbage and dry recyclable materials), waste generation is projected to increase in a linear fashion. By year 2019, the total domestic waste generation for the municipality is projected to be around 89 200 tonnes/yr.

Much of the increase in waste generation will occur due to the opening up of urban release areas within Liverpool. To investigate the impact of such releases, an assessment of waste generation has been undertaken from a geographical perspective. The Liverpool LGA was broken up into three zones: west, southeast and northeast. Predicted proportion of total waste generation for each zone is shown in Table 3.5.

[1] Note that the projected quantities have assumed that total domestic waste generation per capita remains constant over time. This approach is usually adopted for planning purposes in the absence of other information. In practice, per capita waste generation can change over time for a range of reasons, for example, demographic changes as well as the impact of waste minimisation and avoidance programs. For example, in the period between 2001 and 2004, per capita waste generation in Liverpool fell (refer Figure 3.1).

Table 3.5: Estimated Proportion of Total Domestic Waste Generation within Liverpool LGA

Zone	Suburbs	Proportion of Total Waste		
		1998	2001	2011
North East	Green Valley, Busby, Hinchinbrook, Miller, Cartwright, Liverpool, Ashcroft, Lurnea, Heckenberg, Warwick Farm, Chipping Norton, Moorebank, Hammondville, Voyager Point, Pleasure Point	74%	70%	59%
South East	West Hoxton, Horningsea Park, Hoxton Park, Prestons, Casula, Leppington, Denham Court, Edmondson Park, Ingleburn, Wattle Grove, Holsworthy	15%	19%	32%
West	Greendale, Wallacia, Luddenham, Badgery's Creek, Bringelly, Kemps Creek, Rossmore, Austral, Cecil Park, Cecil Hills	11%	11%	9%
	Total	100%	100%	100%

The results demonstrate that, with the release of urban areas to the southeast, a significantly higher proportion of Liverpool's domestic waste will be generated from this area (from the current 19% to 32% of total domestic waste). This is likely to have considerable impacts on waste transportation logistics.

Apart from population changes, future changes in the waste generation (not reflected in the above projections) may occur due to changes in demographics (such as income) and in government policy, as well as industry initiatives and developments (for example, packaging industry developments, Extended Producer Responsibility programs).

3.5 Waste Composition

During July and August 2003 a series of waste audits were performed on the domestic garbage and recycling streams (McGregor Environmental Services; 2003). Previous to this, the most recent audit was conducted in 1999. Presented in Figure 3.3 is the compositional assessment of the domestic garbage stream.

For ease of interpretation, the categories have been summarised together with a weighting based upon the split of single unit dwellings (84% of total dwellings) and multi-unit dwellings (16%), which were separately audited.

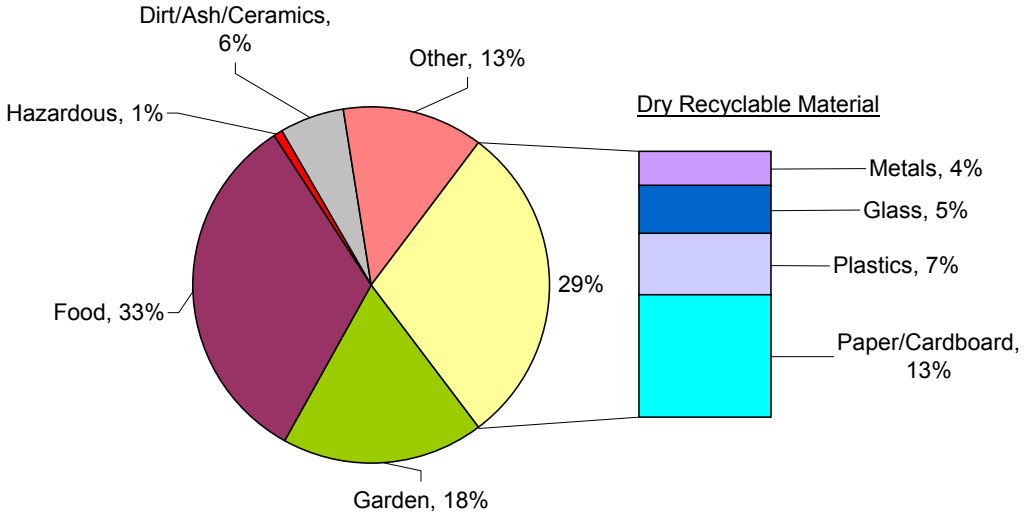


Figure 3.3: Liverpool Domestic Garbage Composition (2003 Audit)

Food and garden organics make up just over 50% of the garbage stream. This is a reflection of the relatively low percentage of Multi Unit Dwellings (16%) in Liverpool (typically houses generate significantly more garden organics than MUDs). There is therefore considerable potential for diversion of organics through the provision of a separate collection service and/or avoidance measures. The suitability of such a service depends however on the ultimate end disposal option adopted by Council (some end disposal options for garbage recover resources from organic materials either in the form of energy or compost, or both). This will become more apparent in later sections.

The garbage composition chart also shows there is considerable potential for increased diversion of dry recyclable material from kerbside recycling.

The composition of the domestic recycling stream is presented in Figure 3.4. All acceptable material categories are presented, together with percentage of contamination encountered during the audit.

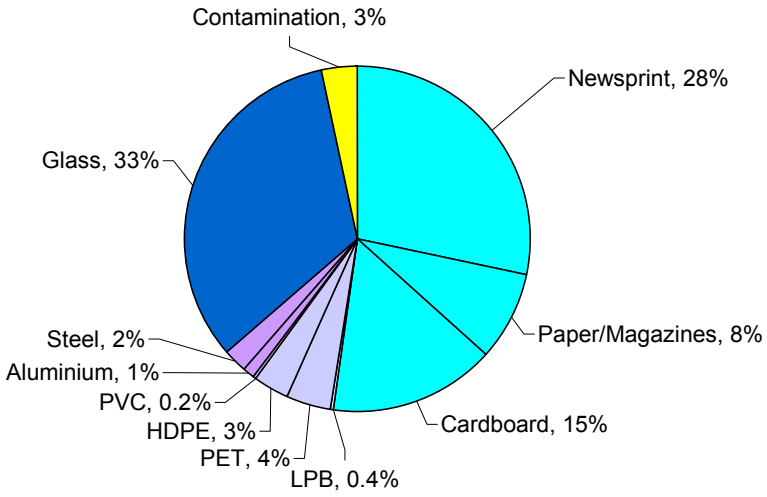


Figure 3.4: Liverpool Kerbside Recyclables Composition (2003 Audit)

Over 50% of the recycling is fibre-based, with glass the next largest component. A contamination level of 3% places Liverpool well below the average of approximately 6% for Greater Sydney. This indicates that residents have a reasonable understanding of the recycling service. In addition, crate-based recycling services generally achieve lower rates of contamination than closed bins (eg MGBs) as collectors are able to readily identify and reject contaminated loads.

3.6 Benchmarking Against Good Practice Performance Measures

The NSW Department of Environment and Conservation (DEC) has recently developed preliminary good practice performance benchmarks for Sydney metropolitan Council kerbside recycling systems. These are documented in the report *Getting more from our recycling systems. Good practice performance measures for kerbside recycling systems* (DEC and NSWJRG; 2004). The aim of the project was to establish 'good practice' performance measures for key elements of kerbside recycling systems in order to assist Councils to deliver more effective and efficient systems.

This section presents a comparison between Liverpool's kerbside recycling system and the 'good practice' measures developed by DEC.

3.6.1 Kerbside Recycling Yield, Contamination and Service Costs

The good practice performance measures established for kerbside recycling yield, contamination and costs are set out in Table 3.6. Also shown is the respective data for Liverpool City Council's kerbside recycling system. The comparison shows that kerbside recycling yield and diversion rates within Liverpool are less than the potential good practice measures established by DEC. This (together with the results of the 2003 audit) suggests that there is some opportunity to increase recovery of kerbside recyclables in Liverpool. Notwithstanding this, contamination levels, as well as service costs are within the target ranges established by DEC. The Action and Implementation Program developed for waste and recycling collection services (Section 6.3) aims to ensure that future recycling services within Liverpool conform to the DEC good practice measures.

Table 3.6: Comparison of Liverpool Recycling Performance with DEC Good Practice Performance Measures

Performance Measure	Unit	Description	Potential Good Practise Measure (baseline)	Potential Good Practise Measure (target)	Liverpool Performance
Household Net Yield	kg/hhld/wk	Total quantity of kerbside recyclables collected per household, excluding gross contamination.	≥ 4.0	≥ 5.5	3.3
Per Capita Net Yield	kg/person/wk	Quantity of kerbside recyclables collected per person, excluding gross contamination.	≥ 1.5	≥ 2.1	1.0
Net Diversion	%	Total proportion of domestic waste diverted to the recycling stream.	≥ 19%	≥ 29%	15.4%
Contamination	%	Contaminants placed in recycling bins by householders	n/a	≤ 3.5%	3%

Performance Measure	Unit	Description	Potential Good Practise Measure (baseline)	Potential Good Practise Measure (target)	Liverpool Performance
Service Cost	$/hhld/yr	Annual cost for collection and MRF acceptance of kerbside recyclables, exclusive of Council administration costs.	Target range $24 - $49		Cost is within specified target range
Tonnage Cost	$/tonne	Cost per net tonne of kerbside recyclables collected and accepted at MRF, exclusive of Council administration costs.	Target range $143 - $225		Cost is within specified target range
Baseline: Minimum performance level as defined in DEC and NSWJRG (2004) Target: Target performance level as defined in DEC and NSWJRG (2004)					

3.6.2 Other Good Practice Measures

In addition to yield, contamination and costs, the DEC has established preferred standard bin colours for garbage and recyclables from households and in public places. The DEC also indicated the preferred range of materials that should be collected for recycling.

a) Standard Bin Colours

A comparison of the DEC-preferred bin colours for domestic services with those provided within Liverpool is shown in Table 3.7. These colours readily identify separated waste streams or materials.

The comparison shows that collection crates for containers employed in Liverpool do not currently conform to DEC's preferred bin colour. This will be addressed when Council negotiates its next recycling contract.

Table 3.7: Comparison of DEC-Preferred Colours with Bins and Crates Provided in Liverpool

Bin Type	DEC Preferred Colour	Liverpool City Council Bin Type and Colour	Conform to Preferred Bin Colour?
Domestic garbage bins	Dark green, grey or black bins with dark green, grey, black or red lids, but red lids are preferred	Dark green bins with dark green lids	Yes, but lid not preferred colour
Domestic recyclables bins (fully co-mingled or containers only)	Green or black bins with yellow lids	Black crates	No
Domestic paper-only bins or sections of bins	Green or black bins with blue lids	Blue crates	No, but crate colour related to preferred colour
Organics bins	Dark green or black with bright green/lime lids	No service	N/A

An Australian Standard is being developed to provide common requirements for dimensions, design, colour, signage, performance and safety of mobile recycling and waste containers.

3.6.3 Material ranges

The DEC-preferred minimum range of materials that should be collected for recycling is:

- Cardboard packaging and liquid paperboard
- Newspapers, magazines and phone books
- Glass and aluminium rigid packaging
- PET (code 1 plastics) and HDPE (code 2) rigid packaging
- Steel rigid packaging

All the above materials are included in Liverpool City Council's current kerbside recycling program. In addition, rigid PVC containers (code 3 plastics) are recovered by Council.

The DEC's good practice measures also indicate that Councils should explore the merits of expanding the range of plastics collected at kerbside when their contracts next come up for renewal. For those plastics that have not been recycled to any great extent to date (LDPE, PS, UPS and other plastics codes 4 – 7), reprocessing infrastructure and markets are becoming increasingly available. Table 3.8 lists the types of plastics potentially available for recycling as well as common applications.

Table 3.8: Types of Plastics

Plastics Code	Name	Description and Common Applications	Currently Recovered through Liverpool Kerbside Recycling Program?
1	PET (Polyethylene terephthalate)	Clear tough plastic, may be used as a fibre, soft drink, water and juice bottles, some plastic jars	Yes
2	HDPE (High density polyethylene)	Very common plastic, usually white or coloured, commonly used for milk bottles, cream and juice containers	Yes
3	UPVC (Unplasticised polyvinyl chloride)	Hard rigid plastic, may be clear, commonly used for clear cordial bottles, detergent and shampoo bottles	Yes
	PPVC (Plasticised polyvinyl chloride)	Flexible, clear, elastic plastic commonly used in garden hoses, shoe soles, blood bags, tubing	No
4	LDPE (Low density polyethylene)	Soft, flexible plastic. Commonly used for the lids of ice-cream containers, garbage bags, garbage bins	No
5	PP (Polypropylene)	Hard, but flexible plastic which has many uses such as ice-cream containers, potato crisp bags, drinking straws, hinged lunch boxes	No
6	PS (Polystyrene)	Rigid, brittle plastic. May be clear, glassy, used in yoghurt containers, plastic cutlery, imitation crystal glassware	No
	EPS (Expanded polystyrene)	Rigid plastic. Used in hot drink cups, takeaway food containers, meat trays	No
7	Other	All other plastics including nylon and acrylic	No
Sources: www.visy.com.au, www.pacia.org.au			

Liverpool City Council will aim to expand the range of plastics recovered from the kerbside recycling program when it negotiates its next recycling processing contract. This is in line with DEC's good practice performance measures.

3.7 Diversion Potential and Waste Streams Differentiation

Underlying increased diversion is a need to differentiate multiple waste streams generated in Liverpool and deal appropriately with each in accordance with the principles of this strategy. Based upon the data from the 2003 audit, there is considerable potential to further divert materials from the domestic garbage stream in Liverpool.

Increased diversion can be achieved through a range of possible initiatives including:

Possible Initiative 1: Increase Dry Recyclables Recovery

A recent survey of resource recovery and environmental issues carried out by Council (IRIS Research; 2004) identified there is some confusion amongst Liverpool residents on what can and cannot be placed in recycling crates. A number of residents also indicated that the size of the crate inhibited their recycling behaviour. Measures that could be undertaken by Council to increase recovery of dry recyclable material include:

- Foster increased resident participation in recycling, through further education and awareness;
- Increase the range of materials that can be recycled (for example, more plastics grades); and
- Kerbside recycling service enhancement (for example, provide mobile receptacles of increased capacity for collection of dry recyclables).

Possible Initiative 2: Garden Organics Recovery

Introduce regular (fortnightly) collections of garden organics (recovery rates are maximised where rigid mobile containers are provided for collections).

Possible Initiative 3: Alternative Waste Treatment[2]

Process collected garbage through an Alternative Waste Treatment facility instead of direct disposal to landfill as currently occurs, thereby providing further opportunity to achieve improved sustainability outcomes including:

- Reduction in the quantity of material for final disposal;
- Waste stabilisation to reduce gas formation and leachate pollution; and
- Production of outputs (organics / energy / gas / recyclables) that can be beneficially re-used.

[2] Alternative Waste Treatment (AWT) are processes that:

- Reduce the quantity of material for final disposal;
- Stabilise the material to reduce gas and leachate formation; and
- Produce outputs (energy / compost / oil / gas / recyclables) that can be beneficially re-used.

AWT processes can be categorised under the following headings:

1) Mechanical Biological Treatment (MBT): Processes that incorporate mechanical sorting and separation of waste into predominantly biodegradable and non-biodegradable streams. The biodegradable stream is subject to a biological treatment process (for example composting and/or anaerobic digestion). The "non-" biodegradable stream can be further sorted to extract recyclable materials.

2) Thermal treatment (Energy from Waste - EfW): Processes that use heat to decompose waste and produce a stable residue for disposal. Energy is recovered during processing in the form of heat and/or electricity.

3) Combinations of both

An analysis of the costs and benefits of the above initiatives is carried out in this Strategy as part of a Triple Bottom Line Assessment of alternative service provision options (refer Section 5).

4 WASTE LEGISLATION AND POLICY

4.1 Legislation

Waste planning and management have long been recognised as significant issues at both the State and Local Government levels in NSW, evidenced by the number of related statutes. Waste legislation is complex and detailed examination of regulations surrounding the provision of waste-related services and infrastructure development is required to ensure statutory compliance. Acts that outline legislative requirements for management of wastes include the:

- *Waste Avoidance and Resource Recovery Act 2001;*
- *Local Government Act 1993;*
- *Protection of the Environment Administration Act 1991;*
- *Protection of the Environment Operations Act 1997;*
- *Protection of the Environment Operations (Waste) Regulation 1996;*

For the Local Government strategic waste planning the *Waste Avoidance and Resource Recovery Act 2001* is of most relevance. A summary is provided in the following section. A discussion of the remaining Acts listed is provided in Appendix A.

4.1.1 Waste Avoidance and Resource Recovery Act 2001

The NSW *Waste Avoidance and Resource Recovery Act 2001* outlines the statutory framework for waste and resource management in NSW. The objectives of the Act are:

(a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,

(b) to ensure that resource management options are considered against a hierarchy of the following order:

  (i) avoidance of unnecessary resource consumption,

  (ii) resource recovery (including reuse, reprocessing, recycling and energy recovery),

  (iii) disposal,

(c) to provide for the continual reduction in waste generation,

(d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,

(e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste,

(f) to ensure the efficient funding of waste and resource management planning, programs and service delivery,

(g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis,

(h) to assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997*.

The Act established Resource NSW, a State Government body charged with developing, coordinating and evaluating the implementation of strategies and programs for the state-wide achievement of government policy objectives in respect of:

- Resource conservation and waste reduction including municipal, commercial and industrial, and construction and demolition waste;
- Resource conservation and waste reduction and management in relation to identified regions, industry sectors or material types;
- Market development for recovered resources and recycled materials;
- Community education and awareness in relation to resource efficiency and waste reduction and management;
- Programs for preventing and controlling litter and illegal dumping;
- Information dissemination.

Resource NSW took over the functions of the former NSW Waste Planning and Management Boards, which were dissolved by the Act. In late 2003, a number of separate agencies within the State Environment Minister's portfolio were consolidated to create a new Department of Environment and Conservation (DEC). DEC incorporates the staff of the EPA, National Parks and Wildlife Service, Royal Botanic Gardens and Resource NSW.

The Sustainability Programs Division of DEC has taken over programs from the former Resource NSW. This Division also incorporates a number of programs from the former EPA, including cleaner industry and cleaner production programs, waste policy, and education and community programs.

4.2 Other Relevant Documents

4.2.1 Waste Avoidance and Resource Recovery Strategy 2003

The *NSW Waste Avoidance and Resource Recovery Strategy 2003* was prepared by the then Resource NSW (now NSW DEC) as part of its obligations under the *Waste Avoidance and Resource Recovery Act 2001*. It represents the primary strategic document intended to guide the efforts of state and local government agencies, industry and the broader community in waste prevention and avoidance, re-use and recycling.

Its purpose is to develop a framework and to support implementation of statewide, regional and local programs to avoid waste and recover resources. The four key outcome areas put forward within the strategy are:

- Preventing and avoiding waste;
- Increased recovery and use of secondary resources;

- Reducing toxic substances in products and materials;
- Reducing litter and illegal dumping.

For each outcome area, the Strategy identifies targets for achieving waste avoidance and resource recovery and sets a framework for delivering targets through the commitment of industry, government and other stakeholders to key programs and actions. Targets for secondary resource recovery are the "Aggressive" targets proposed within "Scheme 7 - Fast take-up Scheme to Ultimate Scenario: Optimistic" of the *Independent Public Assessment - Landfill Capacity and Demand* (WCS; 2000).

The Strategy targets in each of the four key outcome areas are outlined in Table 4.1.

Table 4.1: Key Outcome Areas and Associated Targets

Key Outcome Area	Target
Preventing and avoiding waste	To hold waste generation levels for the next five years to that produced in 2000, taking into account a projected population growth of 1% per year and economic growth of around 2.5% per year
Increased recovery and use of secondary resources	The targets in this area are the "Aggressive" targets proposed within "Scheme 7 - Fast take-up Scheme to Ultimate Scenario: Optimistic" of the *Independent Public Assessment - Landfill Capacity and Demand* (WCS; 2000). The targets are: By 2014, to: • Increase recovery and utilisation of materials from Municipal sector from the current 26% to 66% • Increase recovery and utilisation of materials from the Commercial & Industrial sector from the current 28% to 63% • Increase recovery and utilisation of materials from the Construction & Demolition sector from the current 65% to 76%
Reducing toxic substances in products and materials	By 2014 or earlier: • To phase out priority substances in identified products as a first choice or if not possible to achieve maximum recovery for re-use and; • where identified products containing these priority substances require disposal as a last resort, the permitted "leachability" of the substances will be reduced to the levels that are permitted for inert waste
Reducing litter and illegal dumping	This area does not have a quantitative target since as an accurate picture of the amounts of litter and illegal dumping are not yet available. The general objectives are to: • Reduce total volume and tonnages of litter reported

Key Outcome Area	Target
	annually. • Reduction in total tonnages of illegally dumped material reported by regulatory agencies and Regional Illegal Dumping (RID) squads annually.

Material, sector or system specific sub-targets in the four outcome areas are currently being developed.

Within Section 2.5 of the Strategy, Local Councils are identified as playing a major role in waste management, being largely responsible for dealing with municipal waste through garbage, recycling and hard rubbish collections. In addition, the policy, educative and economic roles are acknowledged. This is reinforced with Section 3.6 which identifies Local Government as a key partner in achieving change through their role in the areas of:

- Service delivery and integration of systems;
- Planning and development – Local Orders Policies, Development Control Plans and infrastructure development;
- Educating communities;
- Local delivery of programs to avoid waste and resource recovery; and
- Data collection and reporting.

In addition, this section details how Local Government should play a lead role in purchasing products and materials with recycled content where these are 'cost and performance competitive'.

4.2.2 NSW Waste and Resource Recovery Strategy – Action Plan for Local Government Consultation Paper, 2003

Within this consultation paper, the increasingly significant role of Local Governments in co-ordinating waste management activities is acknowledged. In particular, the following Council activities are specifically referred to:

- Service delivery and integration of resource recovery systems;
- Land-use planning and development through local orders and policies,
- Development Control Plans, infrastructure development and strategic land use planning;
- Purchasing recycled content products and materials;
- Educating communities and delivering local programs on waste avoidance and resource recovery; and
- Data collection and reporting.

Moreover, this paper details the intention to adopt a resource recovery target for the municipal waste stream amounting to an additional 700,000 tonnes per year by 2014, which

amounts to increasing the resource recovery rate from the current 26% to around 66%. To achieve this, actions in the areas of:

1. Increased organics diversion;
2. Increased collection of kerbside recyclables; and
3. Treatment and processing of mixed residual waste;

are put forward for the medium term (2008) and long term (2014), according to the targets listed in Table 4.2.

Table 4.2: Waste Avoidance and Resource Recovery Impacts, NSW (2002 to 2014)

Municipal Waste	Current Performance (2002)	Improved Scenario (2008)	Aggressive Scenario (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%

It is noted however that not all Councils may choose to implement the specific actions put forward, rather opting for other opportunities for increased resource recovery, based on local or regional waste characteristics. Notwithstanding this flexibility, Councils are strongly encouraged to measure the performance of new resource recovery systems and develop protocols for reporting their progress against the suggested targets.

4.2.3 Extended Producer Responsibility Statement 2004

In March 2004, the DEC released the *Extended Producer Responsibility Priority Statement 2004* (DEC, 2004). This document identifies 16 wastes of concern with nine of these wastes receiving priority focus in 2004. The intention of this statement is to put the industries producing the identified waste on notice to act to reduce the amount and/or impact of their products in the waste stream. It specifies the action that will be taken over the next 12 months in relation to the identified wastes of concern, particularly those to receive priority attention.

The criteria used to identify waste of concern suited to management by Extended Producer Responsibility (EPR) schemes were:

- Detrimental environmental and/or public health impacts resulting from the recovery and/or disposal of the product;
- Total volume of the waste requiring disposal and/or the percentage of the waste stream it comprises;
- Potential for waste avoidance, reuse or beneficial resource recovery;

- Potential to contaminate waste streams and limit opportunities for resource recovery;
- Likelihood of illegal disposal through dumping or littering;
- Level of community concern about the waste; and
- Extent to which EPR is the appropriate tool for managing the waste.

In determining the extent to which EPR is the appropriate tool for managing a particular waste, consideration was given to whether:

- There are clearly identifiable producers;
- The producers have a reasonable capacity to take action;
- There is a well structure or organised industry sector; and
- There is a capacity to influence the whole supply chain.

Using the above assessment criteria, the DEC has identified the following 16 wastes of concern that are suitable for management by EPR schemes (Table 4.3).

Table 4.3: Identified Wastes of Concern

Wastes of Concern			
Computers	***Plastic bags***	***Packaging waste, excluding plastic bags***	Household hazardous and chemical wastes
Televisions	***Agricultural / veterinary chemicals***	Cigarette litter	Office paper
Used tyres	***Agricultural / veterinary chemical containers***	Electrical products, excluding computers, televisions and mobile phones	Polyvinyl chloride (PVC)
Nickel cadmium batteries, excluding mobile phone batteries	***Mobile phones and batteries***	End-of-life vehicle residuals	Treated timber
Wastes highlighted in ***Bold Italic*** text are subject to priority focus in 2004			

Nine wastes have been assigned priority focus for the initial 12 month period (refer Table 4.3). This will involve asking manufacturers / industry bodies to develop strategies for recovery of the above items to be considered by an expert panel. Depending upon the industry response, legislation may subsequently be introduced which may incorporate fines for those deemed not to be taking adequate action.

5 TRIPLE BOTTOM LINE EVALUATION OF SCENARIOS

5.1 Identification of Service Provision Options

A range of potential future service provision options have been identified taking into account the existing collection and resource recovery arrangements within Liverpool City Council together with the principles and objectives of this waste management strategy. In developing service provision options, opportunities for increased resource recovery were identified and assessed within an integrated service provision context (i.e. the implications of changes to one aspect of overall service provision on other services were considered when framing options).

The provisions for multi-unit dwellings need to be considered by separate assessment, as the current system for this sector has a separate baseline for service provision. Part of the aim is to provide the broadest service option across all dwelling types in Liverpool while maintaining optimum resource recovery for each specific type.

Seven alternative service provision options for domestic wastes generated within Liverpool have been identified. These are outlined in Table 5.1.

Table 5.1: Service Provision Options

Option	Single Unit Dwellings				Multi Unit Dwellings			
	Garbage		Kerbside Recycling	Organics	Garbage		Kerbside Recycling	Organics
	Collection	Disposal or Treatment Type			Collection	Disposal or Treatment Type		
Existing	240 L bins collected weekly	Landfill disposal with energy recovery	Containers: Fortnightly collection from 90 L black crates Paper and Cardboard: Fortnightly collection from 90 L blue crates	No service	240 L bins collected weekly,	Landfill disposal (with energy recovery)	No Service	No service
Option 1	120 L bins collected weekly	MBT processing (no energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	240 L garden organics bin collected fortnightly	240 L bins collected weekly,	MBT processing (no energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	No service
Option 2	240 L bins collected weekly	MBT processing (with energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	No service	240 L bins collected weekly,	MBT processing (with energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	No service
Option 3	240 L bins collected weekly	MBT processing (no energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	No service	240 L bins collected weekly,	MBT processing (no energy recovery)	240 L *fully commingled* recycling bin collected fortnightly	No service
Option 4	240 L bins collected weekly,	MBT processing (with energy recovery and sorting of containers)	120 L *paper only* recycling bin collected fortnightly	No service	240 L bins collected weekly	MBT processing (with energy recovery and sorting of containers	240 L *paper only* recycling bin collected fortnightly	No service

Option	Single Unit Dwellings				Multi Unit Dwellings			
	Garbage		Kerbside Recycling	Organics	Garbage		Kerbside Recycling	Organics
	Collection	Disposal or Treatment Type			Collection	Disposal or Treatment Type		
Option 5	120 L bins collected weekly,	MBT processing (with energy recovery)	Containers: Fortnightly collection from 240 L bins Paper and Cardboard: Fortnightly collection from 120 L bins	No service	240 L bins collected weekly,	MBT processing (with energy recovery)	Containers: Fortnightly collection from 240 L bins Paper and Cardboard: Fortnightly collection from 240 L bins	No service
Option 6	240 L bins collected *twice* weekly,	MBT processing (with energy recovery and sorting of recyclables)	No service	No service	240 L bins collected weekly,	MBT processing (with energy recovery and sorting of recyclables)	No service	No service
Option 7	120 L bins collected weekly,	Landfill disposal with energy recovery	240 L *fully commingled* recycling bin collected fortnightly	240 L garden organics bin collected fortnightly	240 L bins collected weekly,	Landfill disposal with energy recovery	240 L *fully commingled* recycling bin collected fortnightly	No Service

Glossary

MBT – Mechanical Biological Treatment – a generic term for a family of waste treatment processes that incorporate mechanical sorting and separation of waste into predominantly biodegradable and "non-" biodegradable streams. The biodegradable stream is subject to a biological treatment process (e.g. composting and/or anaerobic digestion). When an anaerobic digestion process is included, biogas is produced and used to recover energy. The non-biodegradable stream can be further sorted to extract recyclable materials.

Fully commingled – recyclable containers (glass, plastics, aluminium and steel) and paper/cardboard are mixed together

A discussion of each option follows.

Existing

The existing system has been assessed against each of the potential future service provision options assuming current collection arrangements remain unchanged. For costing purposes, assumptions regarding future landfill disposal costs and the future costs for receival and processing of the recyclables and organics streams (refer Section 5.2) were applied to existing collection quantities.

Option 1

For this option, garbage bins for SUDs are assumed be of 120 L capacity compared to the current 240 L bins. All collected garbage is assumed to be processed in a Mechanical Biological Treatment (MBT) facility that produces an organic rich fraction for beneficial use. As has been observed in Councils elsewhere, a reduction in garbage bin capacity typically results in a reduction in garbage generation, with a corresponding increase in materials recovered through kerbside recycling and organics collections.

Concurrent with the reduced garbage bin size has been the introduction of new services for kerbside recyclables and garden organics. For kerbside recyclables, the existing crate based service has been assumed to be replaced by a 240 L mobile bin service, with recyclables assumed to be placed in the bin in commingled (mixed) form. The 240L bins are assumed to be collected fortnightly. Both SUDs and MUDs are assumed to be provided with this kerbside recycling service.

For Single Unit Dwellings, a new 240 L bin fortnightly service has been assumed for garden organics. The collected organics are assumed to be processed into a high value organic horticultural product. For Multi Unit Dwellings, owing to the low quantity of garden organics generated, no separate organics service is provided.

Option 2

For this option, garbage is assumed to be collected using 240 L bins collected weekly as per current arrangements. Collected garbage is assumed to be processed in a Mechanical Biological Treatment (MBT) facility, incorporating energy recovery from biogas as well as production of an organic rich fraction.

Kerbside recyclables are assumed to be collected fortnightly in commingled form as per Option 1. For garden organics, no collection service is provided, with a higher level of resource recovery (using biogas generation with energy recovery as well as organic rich fraction for beneficial use) assumed for the processing of the garbage stream than Option 1.

Option 3

This system is the same as Option 2 with the exception that the assumed Mechanical Biological Treatment (MBT) facility does include a biogas generation and energy recovery process component.

Option 4

For this option, garbage is assumed to be collected using 240 L bins collected weekly as per current arrangements. Collected garbage is assumed to be processed in a high-performing Mechanical Biological Treatment (MBT) facility as per Option 2. In addition, the facility is assumed to include process steps that separate containers (steel and aluminium cans, glass bottles and plastic containers) from the garbage stream prior to biological treatment. This sorting capability is provided in lieu of a separate kerbside recycling service for containers.

For paper and cardboard, a separate fortnightly kerbside collection is assumed to be provided using 120 L bins (SUDs) and 240 L bins (MUDs). No garden organics collection service is provided for this option.

Option 5

For this option, garbage bins for SUDs are assumed be of 120 L capacity compared to the current 240 L bins. Collected garbage is assumed to be processed in a high-performing Mechanical Biological Treatment (MBT) facility as per Option 2.

For kerbside recyclables a high level of service is assumed, with separate fortnightly collections provided both for commingled containers using 240 L bins and for paper and cardboard using 120 L bins (SUDs) and 240 L bins (MUDs). In providing such a high level of service, the total quantity of recyclables collected will likely be greater than all the other options considered, as has been the case for Councils employing such systems in Greater Sydney. No garden organics collection service is provided under this option.

Option 6

This option corresponds to a single bin system with all generated waste placed in the garbage bin for collection. To ensure that there is adequate capacity for SUDs, two collection per week will be required using 240 L MGBs (currently SUDs are provided with a waste capacity of 330 L per week: 240 L for garbage and 90 L for recyclables). A 240 L MGB weekly garbage service will be provided to MUDs as is currently the case.

Collected garbage is assumed to be processed in a high-performing Mechanical Biological Treatment (MBT) incorporating front end sorting process to separate recyclables prior to biological treatment.

Option 7

This system is the same as Option 1 with the exception that the collected garbage is sent to a fully engineered landfill incorporating an efficient landfill gas recovery and energy generation system.

Summary of Quantities

A summary of the likely quantities that will be collected for each of the service provision options investigated is provided in Table 5.2 and Figure 5.1. Quantities have been estimated based on the composition of Liverpool's garbage and recycling stream and diversion rates experienced by metropolitan Sydney Councils employing systems that match each of the respective options considered.

Table 5.2: Summary of Quantities – (kg/hhld/yr)

Option	Garbage [1]	Kerbside Recycling	Organics	Total
Single Unit Dwellings [2]				
Existing	1,022 (83%)	211 (17%)	0 (0%)	1,233 (100%)
Option 1	829 (67%)	250 (20%)	154 (13%)	1,233 (100%)
Option 2	983 (80%)	250 (20%)	0 (0%)	1,233 (100%)
Option 3	983 (80%)	250 (20%)	0 (0%)	1,233 (100%)
Option 3	1083 (88%)	150 (12%)	0 (0%)	1,233 (100%)
Option 4	953 (77%)	280 (23%)	0 (0%)	1,233 (100%)
Option 5	1,134 (92%)	99 (8%)	0 (0%)	1,233 (100%)
Option 6	829 (67%)	250 (20%)	154 (13%)	1,233 (100%)
Multi Unit Dwellings [2]				
Existing	447 (100%)	0 (0%)	0 (0%)	447 (100%)
Option 1	357 (80%)	91 (20%)	0 (0%)	447 (100%)
Option 2	357 (80%)	91 (20%)	0 (0%)	447 (100%)
Option 3	357 (80%)	91 (20%)	0 (0%)	447 (100%)
Option 4	393 (88%)	54 (12%)	0 (0%)	447 (100%)
Option 5	336 (75%)	112 (25%)	0 (0%)	447 (100%)
Option 6	408 (91%)	40 (9%)	0 (0%)	447 (100%)
Option 7	357 (80%)	91 (20%)	0 (0%)	447 (100%)

[1] The garbage quantity shown should not be used as a basis to estimate diversion from landfill for any of the options. The garbage quantity represents that collected prior to treatment and/or disposal, during which additional diversion takes place depending on the technology employed.

[2] No of Single Unit Dwellings = 45,100, No of Multi Unit Dwellings = 8,700

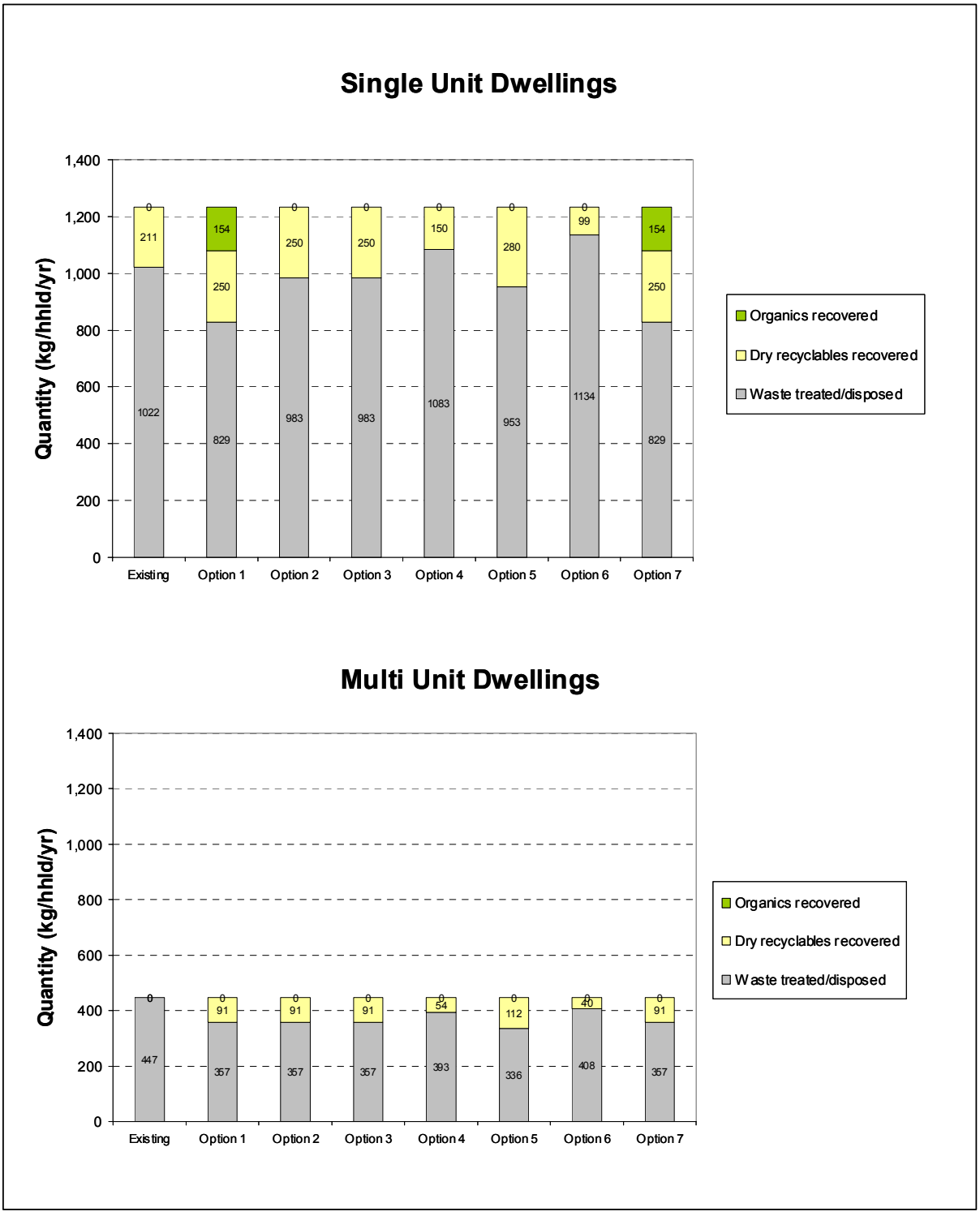


Figure 5.1: Summary of Quantities

5.2 Scenario Analysis Against a TBL Framework

5.2.1 Introduction

The investigation of short listed integrated service provision options has been undertaken using a proprietary Triple Bottom Line (TBL) software model developed by Nolan-ITU for the Western Australian Local Government Association. The model – IRIS Integrated Resource Recovery and Recycling Investigation System - has been designed as a user-friendly software package for local government and regional waste managers using a three streamed approach – domestic garbage, kerbside recycling and organics (Figure 5.2).

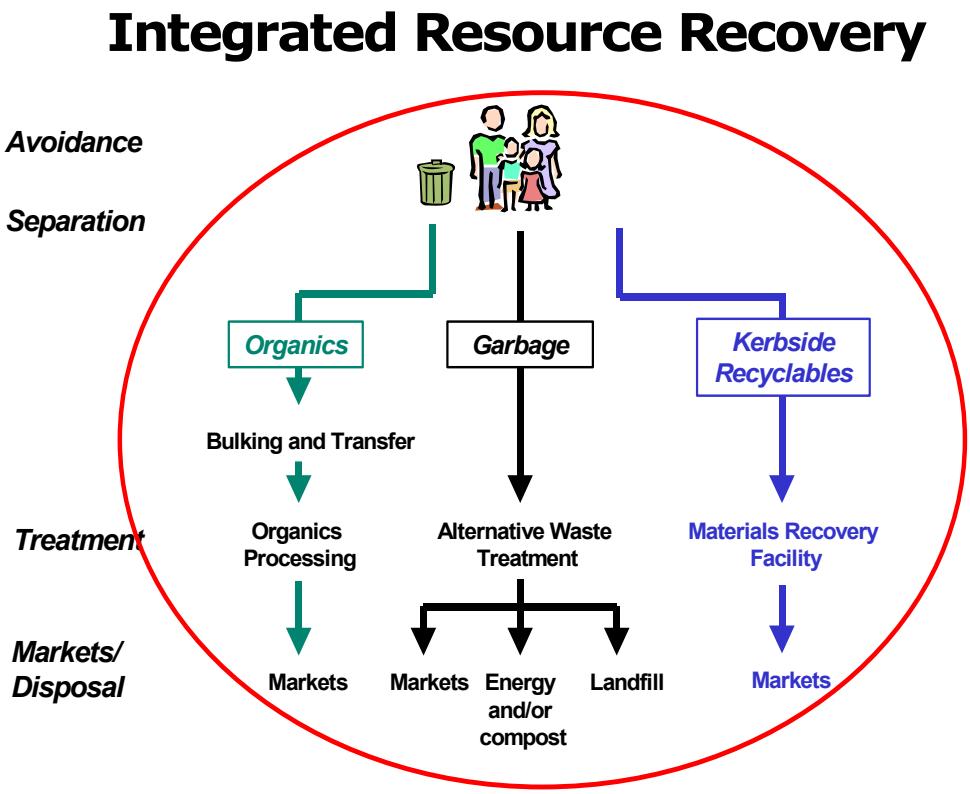


Figure 5.2: IRIS Integrated Resource Recovery and Recycling Investigation System

The model incorporates the following features:

- Assessment of different options for kerbside recycling including provision for variable rates of recycling;
- Assessment of different options for organics recycling, including containerised and non containerised collection systems as well as provision for variable rates of recycling and optional inclusion of domestic food waste in the organics stream; and

- Assessment of alternative waste treatment technologies for collected domestic garbage, including composting/aerobic stabilisation, anaerobic digestion, and thermal treatment.

The options assessment is undertaken using a multi-criteria analysis of system performance against a range of criteria grouped under the key Ecologically Sustainable Development (ESD) indicators of Financial, Environmental, Social as well as Technical.

The assessment has been conducted for domestic kerbside services only (except household clean-up collections).

5.2.2 Assumptions

To conduct the TBL assessment a number of assumptions have been made which are outlined below:

a) Kerbside Recycling

Where a kerbside recycling service has been provided the service has been assumed to change from the existing crate based system to mobile bin systems. The shift away from crates is consistent with industry trends Mobile bin systems employ automated equipment for bin lifting and are easier to keep enclosed and to manoeuvre for residents.

Within Liverpool, kerbside recycling is currently only provided to Single Unit Dwellings. The costs for kerbside recycling collection, transport are estimated at $45/hhld/yr. Receival / processing costs are estimated at $28/tonne for mixed containers and -$10/tonne for paper and cardboard (a negative value means that an income stream is generated for collected paper and cardboard).

The cost of introducing bin-based collection systems for the options investigated are estimated using the following assumptions:

Collection costs for kerbside recycling are assumed to be similar to those currently charged for collection of garbage using mobile bins (excluding disposal).

Assumed processing costs for collected kerbside recyclables are shown in Table 5.3.

Table 5.3: Assumed Receival / Processing Costs for Collected Kerbside Recyclables

Stream	Applicable Option	Receival / Processing Cost ($/tonne)
Fully commingled recyclables (containers and paper/cardboard)	Option 1 Option 2 Option 3 Option 7	$25/tonne
Containers Only	Existing Option 5	$28/tonne
Paper/Cardboard Only	Existing Option 4 Option 5	$-10/tonne

Kerbside recycling recovery rates have been estimated based on those observed by Sydney Metropolitan Councils employing similar systems. These also take into account Liverpool's domestic waste and recyclables composition (McGregor; 2003).

b) Landfill Disposal Costs

At present Council landfill disposal to Eastern Creek Waste Management Facility costs $79/tonne for collected domestic garbage. This will increase in coming years to account for scheduled increases in disposal levies and other increases at the discretion of the current landfill operator WSN Environmental Solutions. The levy, currently (2004-2005) $21.20/tonne is scheduled to increase to $25/tonne (at 2002 values) by 2009. For the existing system and Option 7, each of which involve landfill disposal of garbage, a disposal cost of $85/tonne has been assumed for cost modelling purposes.

c) MBT Processing

Options 1 to 6 inclusive each involve processing of garbage in a Mechanical Biological Treatment Facility. The extent of operations at the facility has been assumed to vary by option depending on the ancillary collection systems in place for dry recyclables and garden organics. The assumed extent of operations at the MBT facility for each option, which impacts both on environmental performance as well as processing cost (such as the gate fee), is shown in Table 5.4.

Table 5.4: Assumed Extent of Processing at MBT Facility

Option	Waste Stabilisation Through Biological Treatment	Production of Organic Rich Fraction for Beneficial Use	Production of Biogas with Energy Recovery	Sorting of Wastes to Recover Dry Recyclable Materials	Assumed Facility Gate Fee
Option 1 & 3	Yes	Yes	No	No	$90/t
Option 2 & 5	Yes	Yes	Yes	No	$100/t
Option 4 & 6	Yes	Yes	Yes	Yes	$110/t

d) Garden Organics Recovery

For Options 1 and 7, a separate garden organics recovery system is provided for Single Unit Dwellings in Liverpool. Recovery rates and costs have been estimated based on recent cost modelling and survey work undertaken on behalf of DEC for garden organics recovery programs in Greater Sydney (DEC, 2003b and DEC, 2005), while taking account the proportion of garden organics present in Liverpool's waste stream.

5.2.3 Results

a) Financial Performance

The financial performance of each option is summarised in Table 5.5 and Figure 5.3.

Single Unit Dwellings

Of the eight systems assessed, the lowest cost systems for Single Unit Dwellings are Option 3 ($179/hhld/yr), and the Existing System and Option 2 (each $189/hhld/yr).

Option 3 achieves cost savings over the projected Existing System costs mainly from the introduction of a fortnightly, commingled MGB kerbside recycling service compared to the current kerbside recycling service.

The estimated cost for Option 2 is equivalent to the projected Existing System costs. For this option, which includes a fortnightly commingled MGB kerbside recycling service and processing of garbage in an MBT facility (with energy recovery), the increased cost of garbage treatment compared to landfill disposal is offset by the cheaper kerbside recycling service cost compared to the Existing System.

Options 1 and 7, which include kerbside collection programs for garden organics, are the next most expensive options, some $7/hhld/yr and $2/hhld/yr dearer than the Existing System respectively.

The highest cost option is Option 6, which comprises a single bin twice-weekly garbage collection service with processing of garbage at a high performing MBT (with energy recovery and recovery of dry recyclable materials). The estimated total system cost for Option 6 is $248/hhld/y, some $59 hhld/yr higher than the projected Existing System cost of $189/hhld/yr.

Multi Unit Dwellings

For Multi Unit Dwellings, each of the alternatives modelled are more expensive than the Existing System. This is because the Existing System does not include any resource recovery, with currently all waste collected as garbage and disposed to landfill. Of the seven options investigated, the cheapest is Option 6, a single bin system collected weekly (same as present) with processing of garbage at a high performing MBT (with energy recovery and recovery of dry recyclable materials). Costs for Options 1, 2, 3, 4 and 7, which each include a fortnightly commingled MGB kerbside recycling service for MUDs, are of the same order (i.e. $143 - $155/hhld/yr). The highest cost option is Option 5 ($183/hhld/yr), which provides separate fortnightly kerbside recycling collections for commingled containers and for paper.

Table 5.5: System Costs

Option	Cost per Household Per Year			
	Garbage	Kerbside Recycling	Organics	Total
Single Unit Dwellings				
Existing	$143	$46	$-	$189
Option 1	$131	$34	$31	$196
Option 2	$154	$34	$-	$189
Option 3	$144	$34	$-	$179
Option 4	$175	$27	$-	$202
Option 5	$151	$58	$-	$209
Option 6	$248	$-	$-	$248
Option 7	$126	$34	$31	$191
Multi Unit Dwellings				
Existing	$112	$-	$-	$112
Option 1	$107	$38	$-	$144
Option 2	$110	$38	$-	$148
Option 3	$107	$38	$-	$144
Option 4	$118	$37	$-	$154
Option 5	$108	$75	$-	$183
Option 6	$124	$-	$-	$124
Option 7	$105	$38	$-	$143
No of Single Unit Dwellings = 45,100, No of Multi Unit Dwellings = 8,700				

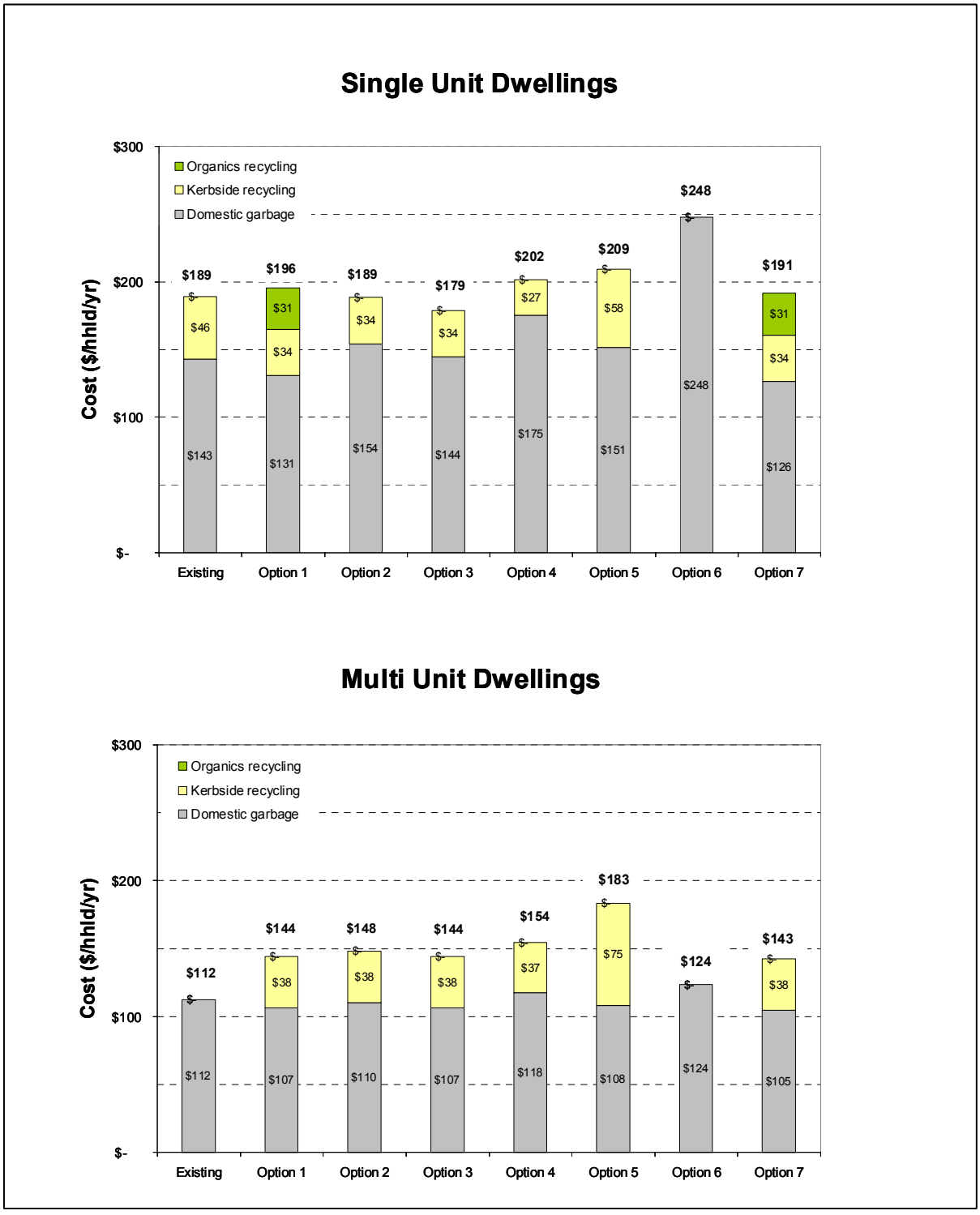


Figure 5.3: System Costs

b) Environmental Performance

The environmental performance of the various service options have been assessed using the four environmental indicators of Global Warming Potential, Air Emissions, Water Emissions, and Resource Conservation. System performance against each indicator is determined in the following terms:

Global Warming Potential:	**Measured as CO_2 equivalents**
Air Emissions:	Measured as the volume of air required to dilute pollutant loads to regulatory standards (that is, the critical volume)
Water Emissions:	Measured as the volume of water required to dilute pollutant loads to regulatory standards (that is, the critical volume)
Resource Conservation:	Measured in eco dollars and based on environment economic valuations of the land use and resource scarcity effects of resource use

Results are summarised in Figure 5.4 to Figure 5.7. In the figures, results have been benchmarked against the Existing System performance. For example, the implementation of Option 1 would result in an estimated greenhouse gas saving of 1.06 tonne of CO_2 equivalents per SUD per year compared to the Existing System (Figure 5.4).

Single Unit Dwellings

For Single Unit Dwellings, Option 6 is the highest performing option from the perspective of greenhouse gases for the six options assessed, with Option 5 the highest performing for water pollution. For the environmental criteria of air pollution and resource conservation, Options 5 and 1 perform equally well due to the high quantities of resource recovery involved with these options together with MBT processing of garbage. Almost without exception, the environmental performance of each option modelled is superior to that of the existing system across each environmental criterion.

Multi Unit Dwellings

For Multi Unit Dwellings, Option 1 to 6 are the highest performing options from the perspective of greenhouse gases and air pollution compared with the Existing System. Option 5, with its high level of recovery of kerbside recyclables (see Figure 5.1) is the highest performing option from the perspective of water pollution and resource conservation.

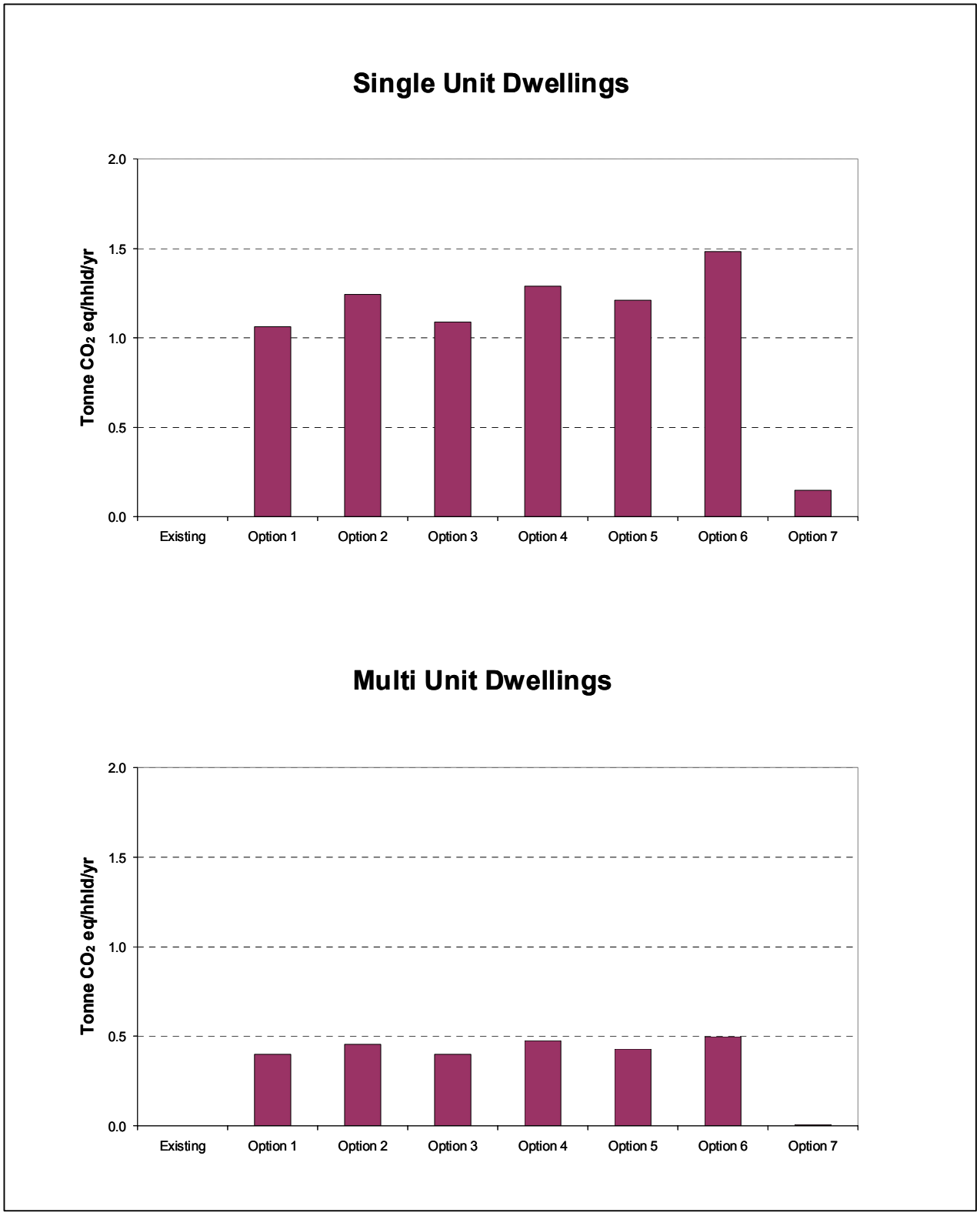
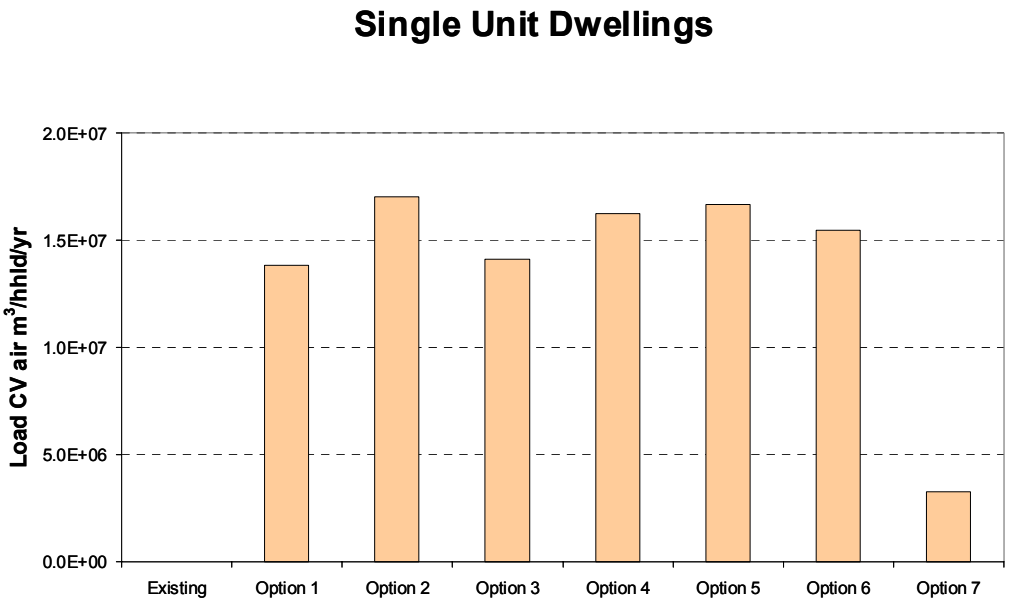


Figure 5.4: Relative Environmental Savings - Greenhouse Gases (tonne CO_2 eq/hhld/yr)



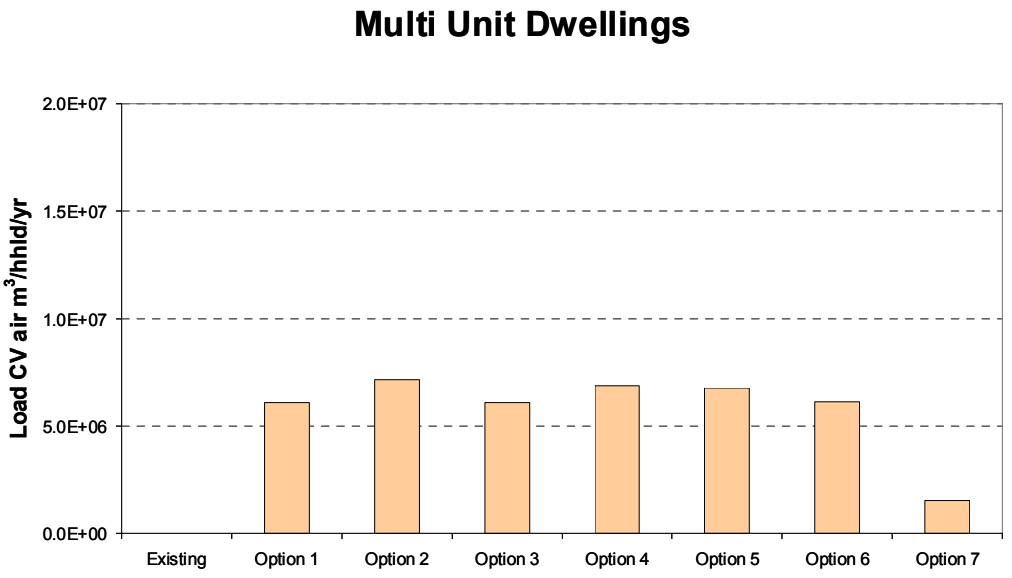


Figure 5.5: Relative Environmental Savings - Air Pollution (Load CV air m^3/hhld/yr)

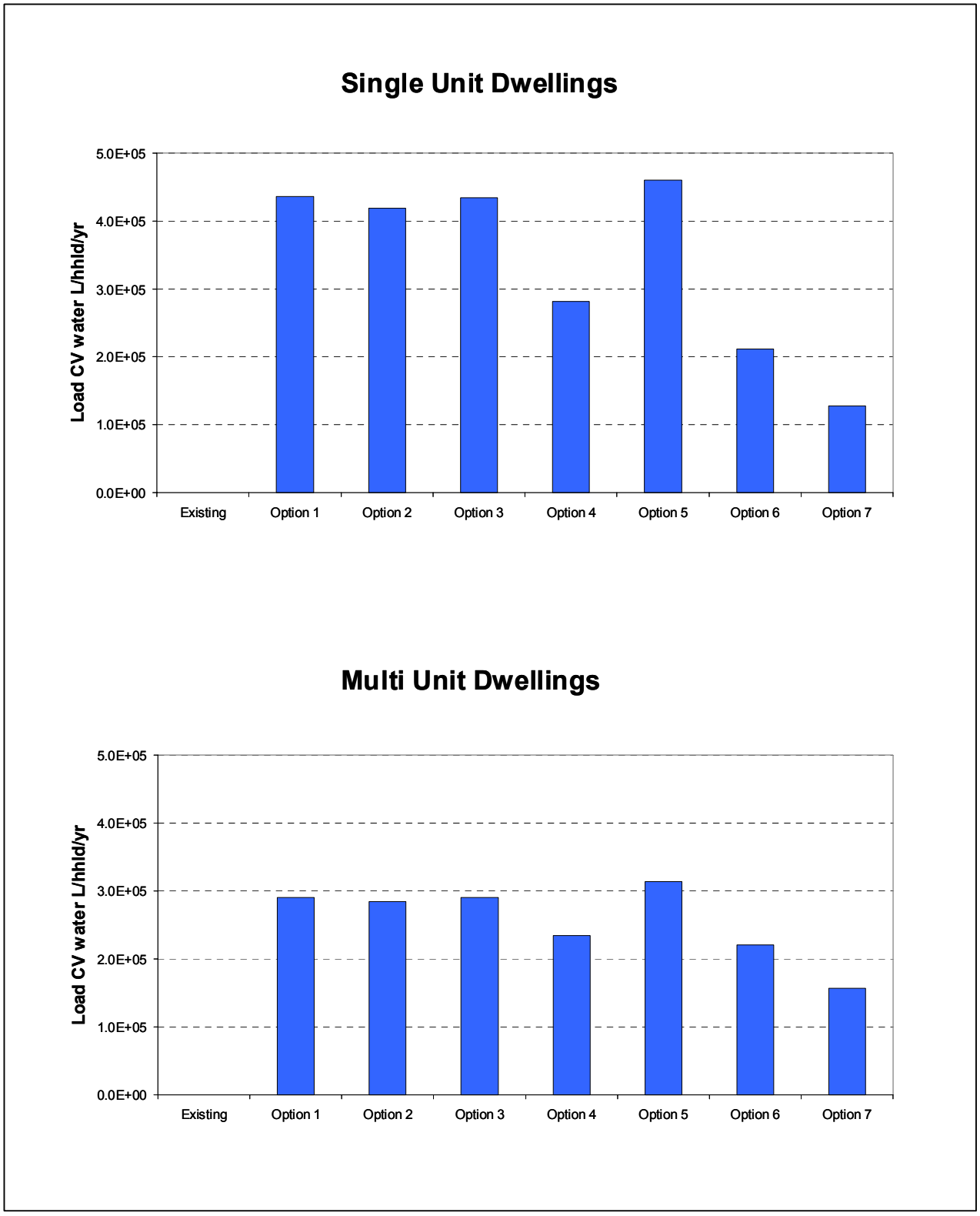


Figure 5.6: Relative Environmental Savings - Water Pollution (Load CV water L/hhld/yr)

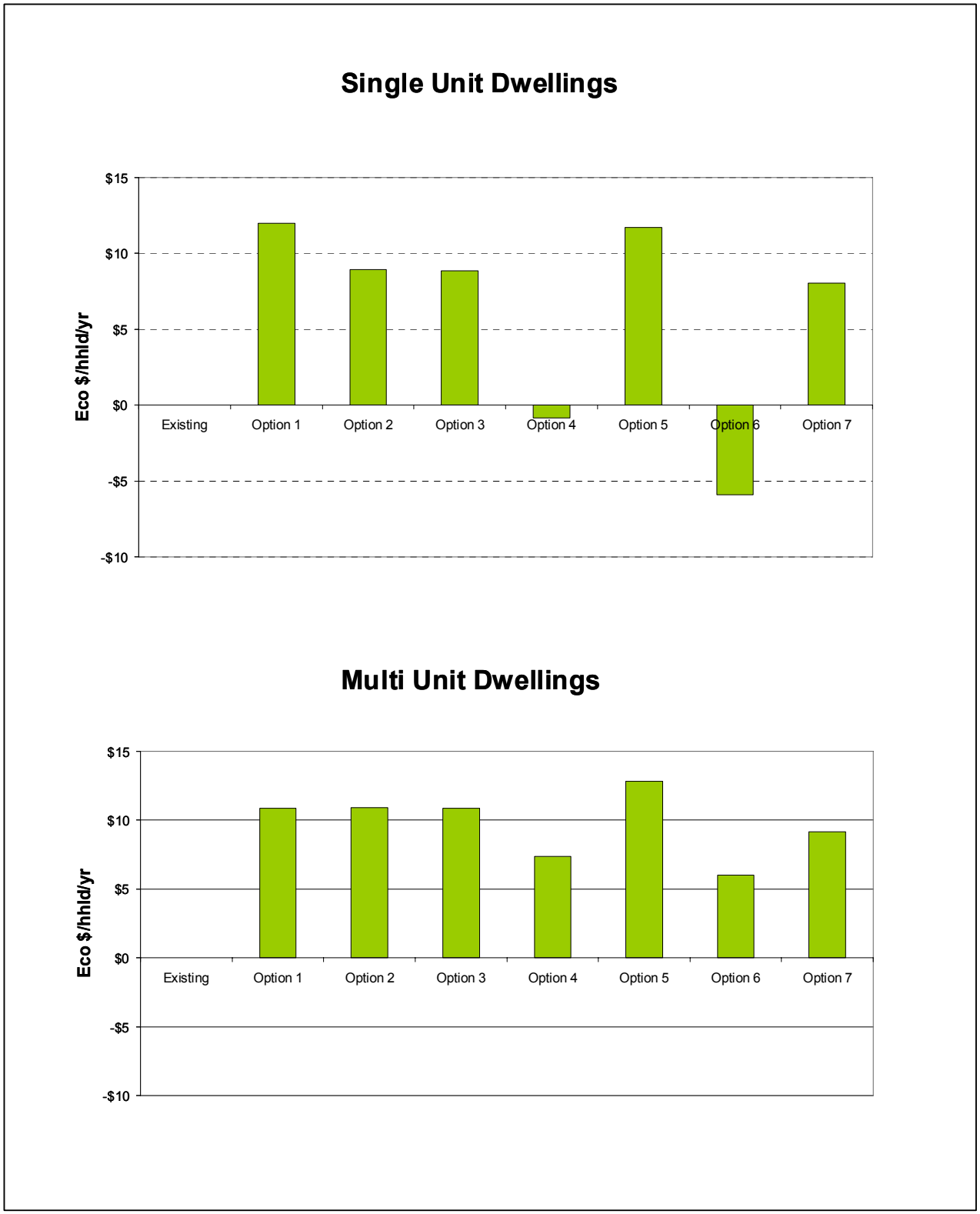


Figure 5.7: Relative Environmental Savings - Resource Conservation (Eco$/hhld/yr)

c) Technical Performance

In IRIS the technical assessment of alternative systems focuses on the performance of landfilling of garbage versus alternative waste treatment. The existing system, together with Option 7, involves landfilling of domestic garbage hence their technical performance is the same. For Options 1 to 6, garbage is processed using an MBT process. Its technical performance differs to that of landfilling.

In assessing relative technical performance, eight criteria are used. Results are summarised graphically in Figure 5.8. Landfills outperform MBT technologies for the following three criteria:

- Flexibility in Feedstock Quality: Landfill technical performance is not impacted by the composition of incoming wastes. MBT technologies may require quality control, removal of contaminants and some blending for optimal processing.
- Staffing: For landfilling, relatively small numbers of staff are required and the technical skills required from staff are relatively low and are readily available locally.
- Operational Reliability: Landfills have high operational reliability, reference facility data indicates high availability over long periods of continuous operation.

MBT processing outperforms landfilling for the technical criteria of System Modularity; Process Control; Efficiency in Waste Reduction; and Area Requirements. Both technologies perform equally under the technical criterion of Proven Technology.

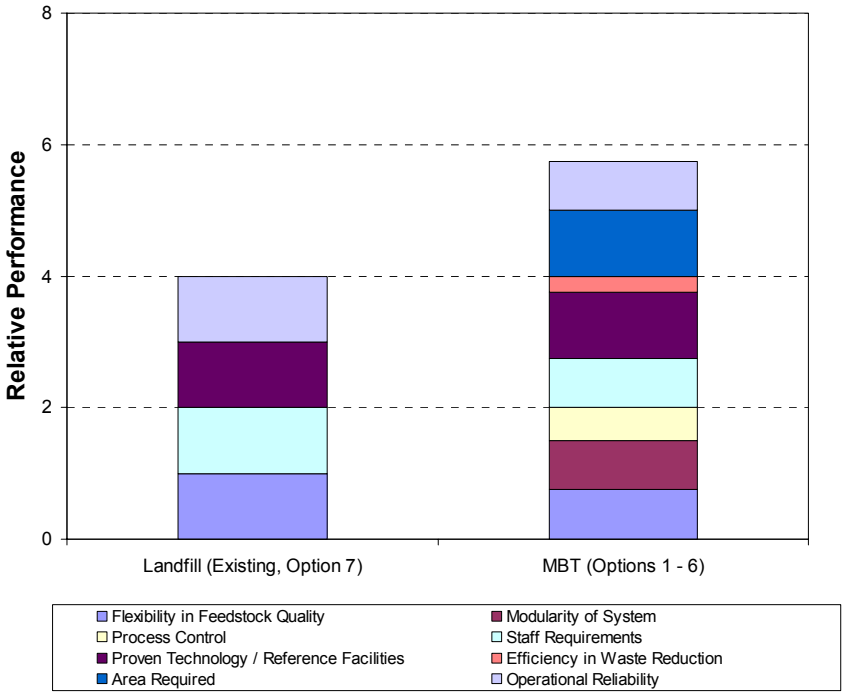


Figure 5.8: Relative Technical Performance

5.2.4 Conclusions

On the basis of this TBL assessment of alternative core service provision options for domestic garbage and recycling, it would appear that Liverpool would be best served by either of Options 1, 2 or 3. The reasons for this are:

- Each of the options can be provided to residents at a cost similar to or lower than the projected Existing System cost (for SUDs);
- The environmental performance of the options are similar, as well as being significantly superior to that of the Existing System; and
- The collection systems and infrastructure associated with each option are readily available.

The options conform to the good practise standards established by DEC and accommodate the aggressive secondary resource recovery target for Municipal wastes set within the NSW Waste Avoidance and Resource Recovery Strategy 2003 (Resource NSW; 2003).

Services provided are summarised in Table 5.6.

Table 5.6: Summary of Services – Options 1, 2 and 3

Option	Dwelling Type	Garbage Service	Kerbside Recycling Service	Organics Recycling Service
Option 1	SUDs	120 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly	240 L garden organics bin collected fortnightly
	MUDs	240 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly	No service
Option 2 & 3 [(1)]	SUDs	240 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly	No service
	MUDs	240 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly	No service

[(1)] The assumed MBT facility configuration for Option 3 differs from Options 1 and 2 only in that it includes a biogas generation and energy recovery process step

While Option 4 is perhaps the best option overall from an environmental perspective, its higher cost, some $20/hhld/yr and $71/hhld/yr more expensive than the Existing System for SUDS and MUDs respectively, may be prohibitively expensive.

From an implementation perspective Council may choose to implement a system similar to that assumed for Option 2 or 3 (depending on the responses received through Council's residual waste processing/disposal – see Section 6.2). Following implementation and assessment of (financial and environmental) performance, Council may choose to expand its service provision through the introduction of garden organics collection service.

6 ACTION AND IMPLEMENTATION PROGRAM

This section outlines the action and implementation program that Council will consider for recommendation as part of the Waste Avoidance and Resource Recovery Strategy. The program has been developed following:

- A comprehensive review of Council's waste management systems and data;
- Planning discussions held with Council representatives including staff from the following areas: Waste Avoidance and Resource Recovery; City Works; Contracts and Procurement; Illegal Waste Management; Finance; and Education;
- Input from Council's *Waste and Resource Recovery Reference Group* (WR3G) which included a review and assessment of options for Waste Avoidance and Resource Recovery;
- Meetings with Council's Waste Avoidance & Resource Recovery Coordinator; and
- A Triple Bottom Line assessment of core service provision options (presented in Section 5).

The program has been designed to provide enhanced sustainability outcomes to the Liverpool community. It has been separated under the following key areas:

1) Waste Avoidance and Re-use
2) Residual Waste Reprocessing and Disposal
3) Waste and Recycling Collection Services Architecture
4) Charging for Waste Management Services
5) Education and Behaviour Change
6) Data Collection and Monitoring
7) Development Controls for Waste Avoidance and Resource Recovery
8) Commercial and Industrial Waste Management
9) Household Clean-up
10) Multi Unit Dwellings
11) Illegal Dumping
12) Problem Wastes
13) Recovery and Disposal of Council Wastes
14) Public Place and Event Waste Management

Each of the areas are presented in the following sections separately using the following subheadings:

Strategic Objective: A statement outlining Council's key objective for the area in question.

Current Practices: A discussion of Council's existing management practices is presented for the area.

Information sources: A list of available in-house and external information of relevance is provided.

Action Matrix: Description of each action, timeframe for implementation, and groups involved in delivery of the action.

Implementation timeframes for each action have been designated as either:

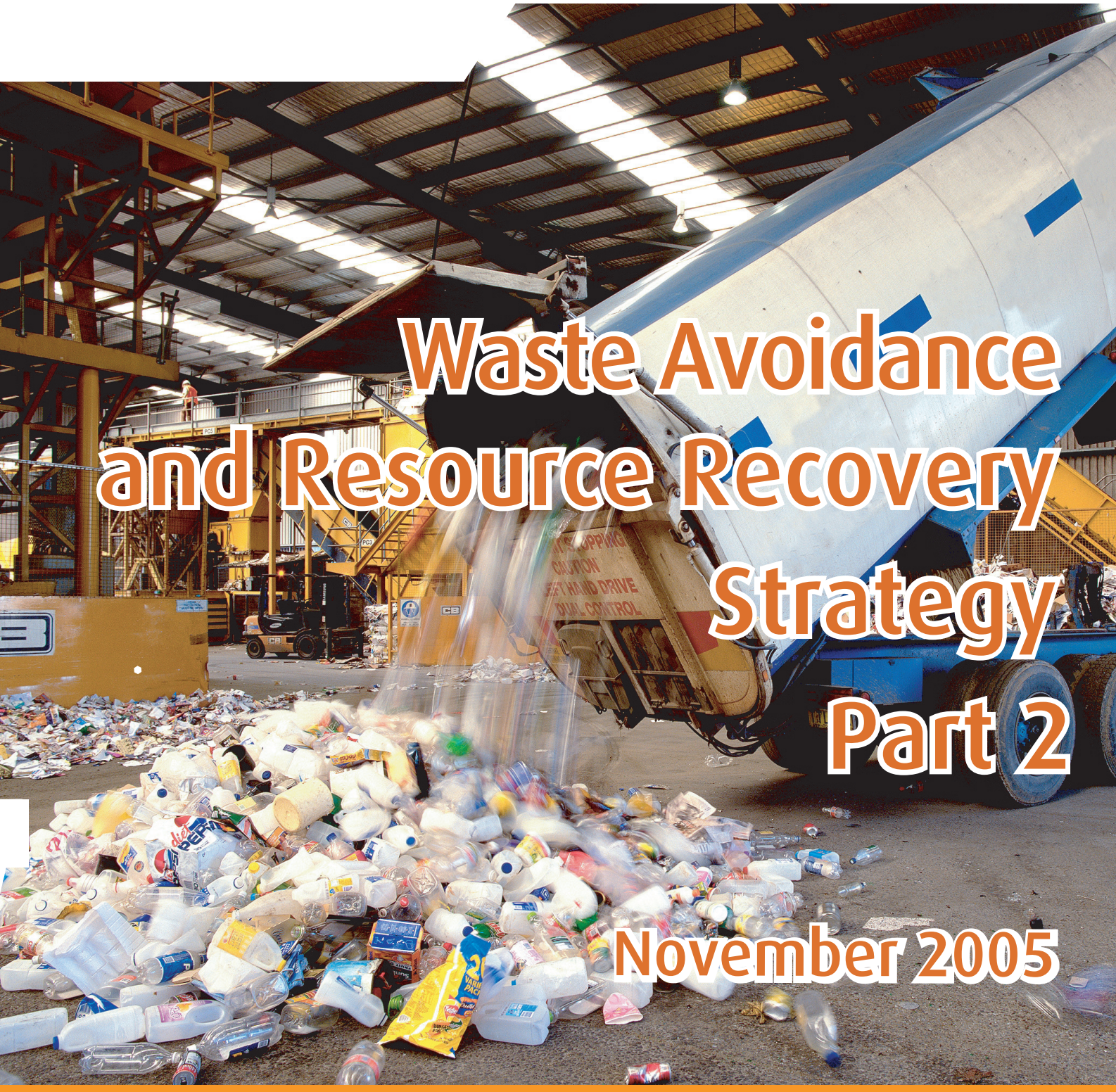
Short Term (to be implemented during Years 1 to 3 following adoption of the Strategy by Council),

Medium Term (Years 4-7); and

Long Term (Years 8+).

sustaining Liverpool

Liverpool city council
creating our future together



Waste Avoidance and Resource Recovery Strategy Part 2

November 2005

Playing our part in Sustaining Liverpool

Waste Avoidance and Re-use

a) Strategic Objective

To develop and implement more sophisticated measures for waste avoidance and re-use for Liverpool's community, supported by targeted education and promotion measures.

b) Current Practices

As part of Council's website, separate dedicated sections on avoidance and re-use have been developed, with each section providing suggestions for residents to adopt avoidance / re-use practices.

A separate section is also included on the website for Composting and Worm farming, but content is under development. Council has recently developed a *Worm Farm and Composting Plan.* Under the plan, Council has approved the provision of a $15 rebate to Liverpool residents that provide proof of purchase of a compost bins or worm farm.

Council also promotes avoidance through providing promotional calico bags at events.

Social research conducted by Liverpool City Council has indicated that over 60% of residents didn't currently make purchasing decisions on the basis of recycled content or ability to recycle packaging of product.

c) Information Sources

DEC (2004), *Producing and consuming efficiently to conserve our resources*, February 2004

"Easy Guide" brochures for a range of waste avoidance, re-use and recycling activities have been prepared by DEC including guides for: Composting, Mulching, Natural Cleaning, Worm Farming, and Recycling. DEC encourages organisations to reprint these brochures with their own logo. Guides have been prepared in nine languages (English, Arabic, Chinese, Greek, Italian, Korean, Macedonian, Spanish, and Vietnamese)

Inner Sydney Waste Board (1999), *Re-use Facilities Enhancement Strategy*

IRIS Research (2004), *Social Research on Resource Recovery and Environmental Issues,* Report to Liverpool City Council

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
1.1	Develop a program to promote the elimination of the use of plastic shopping bags in the City, including seeking a commitment by Council to reduce its dependence on plastic bags	Medium Term	Businesses, Industry Associations, DEC, Council, Householders	This action is linked to the program areas *Public Place and Event Waste Management* and *Recovery and Disposal of Council Wastes*
1.2	Work together with the Western Sydney Regional Organisation (WESROC) of Councils to investigate the feasibility of a regional re-use centre within the region	Long Term	WESROC, DEC, Council	
1.3	Research and establish a directory of take-back and repair centres in Liverpool City Council area.	Short Term	Businesses, Council	Take back centres could include charities (for clothing and household items), scrap metal merchants, auto dismantlers, and building material recyclers. Repair centres could focus on electrical appliances (including computers, whitegoods, kitchen appliances, and home entertainment), cars, bicycles, lawn mowers, furniture, and clothing.
1.4	Obtain *Easy Guides* from DEC, add Liverpool City Council logo, print and distribute. Make *Easy Guides* available on Council website.	Short Term	DEC, Council	
1.5	Partner with local businesses, government and waste service providers to develop and implement waste avoidance and reuse programs.	Medium Term	Businesses, DEC, Waste Service Providers, Council	Outcomes from partnership arrangements would be collated and disseminated to other related organisations as case studies to demonstrate the benefits of re-use and avoidance.

Key Actions		Timeframe	Groups Involved in Delivery	Comment
1.6	Organise and coordinate community based re-use events on a precinct-by-precinct basis. A precinct (or street) is selected within Liverpool whereby residents are encouraged to participate in a garage sale/swap on a specified date. Following the garage sale, residents are encouraged to offer unsold items for donation to charity. Remaining items can then be collected via a hard waste collection organised by Council for the precinct.	Medium Term	Charities, Council, Householders	Such programs have been successfully implemented elsewhere. Examples include: "Second Hand Sunday" (ACT NO Waste) "Retail Your Rubbish" (Kogarah Council) This action is linked to the program area *Household Clean Up*
1.7	Investigate the feasibility of organising and coordinating regular re-use/swap events on Council premises (for example in car parks) whereby residents are able to bring re-use items for swap and/or re-sale	Medium Term	Council, Householders	Such events could be coordinated with other waste related activities such as Household Hazardous Waste collection days (see program area *Problem Wastes*)
1.8	Discuss with WSN Environmental Solutions their future options for re-use	Short Term	WSN Environmental Solutions, Council	WSN is understood to be investigating the establishment of a network of re-use centres at its waste management centres throughout the Sydney Metropolitan Area
1.9	Promote and support local reuse centres (for example, "Bartertown"), and consult with centres to establish what that support could entail.	Short Term	Charities, Businesses, Council	
1.10	Include within major residual waste processing contract options for reuse and or promotion of reuse	Short Term	Waste Service Providers, Council	This action is linked to the *Residual Waste Reprocessing and Disposal* program area

Key Actions		Timeframe	Groups Involved in Delivery	Comment
1.11	Investigate means to support computer reuse measures from Council and in general community	Medium Term	Businesses, Industry Associations, DEC, Council, Householders	This action is linked to the program area *Problem Wastes*
1.12	Examine the feasibility of developing controls to promote Used Clothing Bins as a re-use program	Medium Term	Charities, Council	
1.13	Explore the use of social marketing techniques to enhance behaviour change for more sustainable waste practices	Medium Term	Council, Householders	
1.14	Assist local resident volunteer organisations to promote actions aimed to increase sustainable waste behaviours	Short Term Medium Term	Council, Householders	
1.15	Investigate and if warranted promote the use of the internet as a tool for enhancing reuse programs	Short term	Council	

6.2 Residual Waste Reprocessing and Disposal

a) Strategic Objective

To improve source separated recovery systems and, in those areas where alternative waste technology systems are likely to prove viable in the future, limit any landfill disposal contracts to a period of not more than 5 years. To provide environmentally sustainable resource recovery or disposal of household or municipal residual waste for a range of identifiable waste streams.

b) Current Practices

Collected residual waste from residents and Council activities is currently transported to landfill and disposed. Much of this material contains resources that can be recovered through processing. To this end in early 2004 Liverpool City Council undertook a review of options for future processing and/or disposal of its residual wastes. As a result of the review Council is preparing to tender for reprocessing/disposal of its residual waste.

c) Information Sources

DEC (2003), *Alternative Waste Treatment Technologies, Assessment Methodology and Handbook*, Version 1, November 2003

Nolan-ITU (2004), *Strategic Responses to Waste and Recycling Disposal Technologies*, report for Liverpool City Council, April 2004

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
2.1	Undertake a staged tendering process for residual waste processing/disposal meeting all probity obligations and legislative requirements with regard to contesting services. Invite, review and award tender for service provision.	Short Term	Council, Waste Service Providers	Wastes suitable for processing include household garbage, Council putrescible wastes public place (litter bins) and event wastes
2.2	In developing tender documents and assessing tenders, refer to and apply the DEC's *Alternative Waste Treatment Technologies, Assessment Methodology and Handbook.*	Short Term	DEC, Council	
2.3	In developing and assessing tender documents, ensure that the proposed processing system is complementary to collection services provided by Council.	Short Term	DEC, Council	This action is linked to program area *Waste and Recycling Collection Service Architecture*

6.3 Future Waste and Recycling Collection Service Design

a) Strategic Objective

To develop and implement a suite of domestic waste and recycling services which balance economic constraints with environmental outcomes.

To complement resource recovery and residual disposal contracts where efficient and feasible.

b) Current Practices

A full description of Council's domestic waste and recycling service architecture is provided in Section 3 of this Strategy. In summary the waste and recycling services provided by Council to residents is shown in Table 6.1.

Table 6.1: Current Waste and Recycling Service - Liverpool

Service	Description	
	Single Unit Dwellings (includes townhouses and dual occupancy)	Multi Unit Dwellings
Garbage	Weekly collection from 240 L Mobile Garbage Bins (MGBs)	
Kerbside Recycling (commingled containers)	Fortnightly collection from 90 L black crates. Materials accepted include: – Glass bottles and containers; – PET (code 1 plastics) and HDPE (code 2) rigid packaging and rigid PVC containers (code 3); – Liquid paperboard; and – Aluminium and steel packaging.	No Service
Kerbside Recycling (paper/cardboard)	Fortnightly collection from 90 L blue crates. Materials accepted includes: – Cardboard packaging; and – Newspapers, magazines, paper and phone books.	No Service
Household Cleanup	Booked collection with general waste (two free collections provided per year) and whitegoods/metals separated at source (unlimited collections). See program area *Household Cleanup*.	

Council garbage and recycling collection services are provided under separate contracts. These contracts will expire in December 2007 (garbage) and April 2008 (recycling).

The materials currently recovered from kerbside recycling (Table 6.1) are consistent with DEC's preferred range of materials as outlined in their *Good practice performance measures for kerbside recycling systems.* It is noted that, as Council's kerbside recycling contract comes up for renewal, there may be scope to expand the range of materials (especially plastics) that can be collected and recovered. Other products that are non-toxic and could potentially be collected by kerbside systems include clothing, small appliances (toaster, kettles, irons, etc) other consumer recyclables (phones, compact discs, video cassettes, books, batteries). The inclusion of these materials is subject to price considerations, Extended Producer Responsibility schemes, as well as availability of reprocessing infrastructure and markets.

Council does not currently provide:

Garden organics collection service;

Commercial waste or recycling collection services.

In developing this Strategy a Triple Bottom line (TBL) assessment of different core service provision options, including estimate of costs and environmental effects for each option, was undertaken (see Section 5). On the basis of the assessment, the recommended future waste and recycling services comprised Options 1, 2 or 3 as detailed in Section 5.

On the basis of community feedback during consultation, assessments of separated organics collections by DEC, and in order to meet strategic objectives of maximising resource recovery, the three bin system identified as Option 1 in combination with AWT is the preferred collection system.

Table 6.2: Future Waste and Recycling Service Collection System

Option	Dwelling Type	Garbage Service	Kerbside Recycling Service	Organics Recycling Service
Option 1	SUDs	120 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly	240 L garden organics bin collected fortnightly
	MUDs	240 L bins collected weekly, *MBT processing*	240 L *fully commingled* recycling bin collected fortnightly[(1)]	Service only where organics level generated requires collection
[(1)] Dependent on recycling trials proposed under Section 6.10: Multi-unit dwellings				

From an implementation perspective Council may choose to implement a system similar to that assumed for Option 2 or 3 using AWT (depending on the outcome of future tenders for Council's residual waste processing/disposal – see Section 6.2). Following implementation and assessment of (financial and environmental) performance, Council may choose to expand its service provision through the introduction of a garden organics collection service.

c) Information Sources

Department of Environment and Conservation & NSW Jurisdictional Recycling Group (2004), *Getting more from our recycling systems. Good practice performance measures for kerbside recycling systems*, February 2004

DEC NSW (2005), *Getting more from our Resource Recovery systems: Model Waste Collection Contracts,* User Guide and Model specifications and clauses, May 2005

DEC NSW (2005), *Waste and Resource Recovery: Service Development Timeline,* May 2005

DEC NSW (2005), *Assessment of garden organics collection systems,* May 2005

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
3.1	Develop tender and contract for implementing Council's preferred collection arrangements for waste and kerbside recycling service provision.	Medium Term	Council	
3.2	In developing contract documents and designing and implementing new waste and recycling services: - Consider and incorporate elements from the *Model Waste Collection Contracts*, developed for Councils by NSW Department of Environment and Conservation. - Review and incorporate features of DEC's *Good practice performance measures for kerbside recycling systems*; and Assessment of Garden Organics collection systems (incorporating potential inclusion food waste) - Include specifications in future collection contracts to ensure recycled content waste and recycling containers are a preferred option. - Consult with community and investigate optimal bin sizes for mixed waste - Include provision for tenderers to offer collection and recovery of an expanded range of materials.	Medium Term	DEC, Waste Service Providers, Council	

Key Actions		Timeframe	Groups Involved in Delivery	Comment
3.3	Conduct ongoing review of EPR schemes and resource recovery industry developments and, if warranted, include an expanded range of products in recycling collections	Short Term, Medium Term, Long Term	Businesses, Industry Associations, DEC, Waste Service Providers, Council	The inclusion of other non – toxic product should complement (not replace) industry run schemes for specific wastes.

6.4 Charging for Waste Management Services

a) Strategic Objective

To develop, implement and/or maintain a transparent waste-charging scheme that provides for full cost recovery whilst encouraging sustainable waste practices amongst service users. To maintain service costs per household for recycling within good practice performance measures as published by DEC.

b) Current Practices

At present Council charges its residents an annual waste management charge, which appears as a separate item on rate, notices. The charge is levied on residential rate-paying properties as required by the *Local Government Act* 1993.

With the expiry of Council's garbage collection contract in December 2007 an opportunity exists to introduce a variable rate charging system that aims to provide financial incentives to residents to reduce waste, increase recycling and achieve cost savings.

In developing a variable rate charging system, an important part of encouraging waste reduction will be the linking of waste levels to charges. This can most practically be done with a different price for garbage bin capacity (volume based charging), for example, a $50 - $80 annual surcharge for a households opting for a 240L garbage bin over a standard 120L bin.

In introducing a variable rate charging system, Council may need to consider the potential impacts on low-income households and include measures to address these.

Alternative user pay systems include those based on frequency of lifts, weight-based systems, number of allocated waste bins and rate based charging systems (where the waste service charge is linked to the assessed value of each property).

c) Information Sources

Ekins P. and Dresner S. (2004), *Green Taxes and Charges - Reducing their Impact on Low-Income Households,* ISBN 1 85935 246 4, Joseph Rowntree Foundation (www.jrf.org.uk)

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
4.1	Review alternative variable rate charging systems for Council-provided waste management services with the objective of linking of waste (garbage) levels to charges. Consult the community on level of preference for charging system.	Short Term	Council, Householders	Charging systems can be linked to levels of household garbage can be measured in a variety of ways, examples include: – Number of lifts per year (number of times a bin is set out for collection) – Volume of the garbage bin; – Number of allocated waste bins; and – Weight of garbage collected
4.2	On the basis of the review, implement a variable rate charging system that coincides with the introduction of new garbage and recycling services following the expiry of existing contracts.	Medium Term	Council	
4.3	Provide education to residents on what the waste charge includes	Medium Term Long Term	Council	This action is linked to program area *Education and Behavioural Change.* Information on the waste charge could disseminated with reporting of performance on waste sustainability indicators. See program area *Data Collection and Monitoring.*

Key Actions		Timeframe	Groups Involved in Delivery	Comment
4.4	Subject to the outcomes of program area *Commercial Waste Avoidance and Resource Recovery Services*, derive annual waste service charges for businesses that participate in Council-provided garbage and kerbside recycling collection services	Medium Term	Council, Waste Service Providers	This action is linked to program area *Commercial Waste Avoidance and Resource Recovery Services* Charges should be set such that Council-provided services are run on a cost recovery basis Separate charges could be developed for different business types that reflect the quantity (weight) and nature of material collected

6.5 Education and Behaviour Change

a) Strategic Objective

To continually foster increased awareness of waste issues amongst residents, businesses and members of the community. To actively seek on an ongoing basis, stakeholder feedback on waste service provision, waste related issues, and improvement opportunities. To foster sustainable behaviour within the community in regard to resource recovery and waste disposal options.

b) Current Practices

Over the last three years Council has undertaken a number of education and behavioural change programs to address the various waste avoidance and resource recovery issues facing the Liverpool community. These include:

- Annual recycling calendar;
- Brochures for household and units for waste and recycling collection services;
- Translated paper sticker for paper crates;
- Free calico bags, supplied at events (9,000 given out in 2.5years);
- Promotion of key community events:
- Clean Up Australia Day
- Household Hazardous Waste Collection Days
- Recycle IT
- Presentations to schools and community groups on recycling, composting and worm farming;
- Staff training provided on Development Control Plan 46 (Waste Not);
- Promotion material developed and distributed for DCP 46;
- Bin bay signage developed for multi unit dwellings;
- Participated in Heathcote Road illegal dumping program in conjunction with Sutherland Shire Council and Roads and Traffic Authority;
- NESB Plastic bag campaign in conjunction with other Councils;
- Participated in radio station WSFM recycle drive; and
- Conducted a joint newspaper advertising campaign with recycling companies Visy and Rethmann AES (now Remondis) to promote Council's recycling services.

c) Information Sources

Department of Environment and Conservation NSW (2004), *Learning for Sustainability - Education About Waste: What Is Good Practice,* June 2004

Liverpool City Council (2004), *Social Research on Resource Recovery & Environmental Issues*, prepared by IRIS Research, January 2004

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
5.1	Develop a targeted education and behavioural change plan to promote the implementation of programs under this Strategy.	Short Term	Council	The program will foster the conditions for residents to avail themselves of the waste avoidance and resource recovery opportunities arising from the Strategy, as well as planned changes to garbage and recycling services, particularly the introduction of separate garden waste.
5.2	Maintain a database of the availability of other governmental and private sector (non-Council) recycling opportunities within Liverpool for specific waste types.	Short Term Medium Term Long Term	Businesses, Industry Associations, DEC, Council	Examples include: Return Unwanted Medicines (RUM) program, drumMuster program, and Mobile Phone Industry Recycling Program
5.3	Develop an action plan for diversity management to make participation in resource recovery inclusive of all groups within the community, integrating with the LEAPS plan	Medium Term	Council	
5.4	Review activities to foster inclusion of people with disabilities within waste and recycling programs, integrating with the Disability Access plan	Medium Term	Council	Currently a pull out-put back service for those with disabilities—need to develop further options

6.6 Data Collection and Monitoring

a) Strategic Objective

To collect comprehensive waste data with a view to measuring the performance of existing and new resource recovery systems and developing protocols for reporting achievements against predefined targets.

b) Current Practices

Information on quantities of materials collected and recovered through Council-provided services is included in regular reports prepared by Council's Environment Advisory Panel. These reports are presented at Council meetings and are included within the minutes.

Additional collated historical information is published in Council's State of the Environment report, which is also publicly available.

One-off data collection activities are also periodically undertaken, such as compositional audits of waste and recyclables. These provide important information on the potential for increased resource recovery from the residual waste stream, as well as quantities of hazardous and other materials present.

c) Information Sources

Council records on waste and recycling quantities

Department of Environment and Conservation (to be published), *Characterisation of recycling benefits*

Department of Environment and Conservation (2003), *Local Government Action Plan – Consultation Paper*

Lanzen, Manfred and Murray, Shauna A (2001), *A modified ecological footprint method and its application to Australia*, Ecological Economics 37 (2001) 229–255

McGregor Environmental Services (2003), *Characterisation of Domestic Waste*, prepared for Liverpool City Council, July 2003

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
6.1	Report the contribution of waste related activities to Liverpool's environmental footprint, and how changes over time.	Short Term Medium Term Long Term	Council	
6.2	Develop waste sustainability indicators that can be used to communicate trends along with the environmental footprint.	Short Term	Council	Examples of such indicators are: – Quantities of waste and recyclables collected; – Environmental benefits from recycling in terms of commonly understood indicators (such as greenhouse, energy and water savings)
6.3	Disseminate performance information to Liverpool residents against the waste sustainability indicators and how these change over time.	Short Term Medium Term Long Term	Householders	This action is linked to program area *Education and Behavioural Change*. Means of information dissemination could include via: – Council rate notices (similar to consumption charts commonly included with telephone and electricity invoices) – Regular Council periodicals – An annual letter from the Mayor to residents
6.4	Undertake regular (two year intervals) audits of Municipal waste streams to identify materials, nominate substitutes, rationalise disposal or recovery	Medium Term Long Term	Council Waste Service Providers Householders	

Key Actions		Timeframe	Groups Involved in Delivery	Comment
6.5	Develop a set of Service Standards that demonstrate Council's commitment to waste avoidance and resource recovery from the perspective of: – The services provided to the community by Council; – Integrate Service Standards with Customer service programs – Council's own activities	Medium Term	Council	Through reporting on its own waste and resource recovery activities in a transparent manner, Council will be able to demonstrate Civic Leadership and show that it is "practicing what it is preaching" This action is linked with the program area *Recovery and Disposal of Council Wastes*
6.6	Centralise reporting of all waste disposal and recycling generated by Council to the waste unit to assess Council's own environmental footprint.	Medium Term	Council	
6.7	Report performance of Council activities against sustainability indicators that include waste as a component	Medium Term, Long Term		This action is linked to program area *Education and Behavioural Change*. Example indicators are: – Greenhouse, – Environmental footprint, and – Resource recovered

6.7 Development Controls for Waste Avoidance and Resource Recovery

a) Strategic Objective

To minimise the amount of construction and demolition waste through Council's development planning requirements with a view to fostering increased reuse and recycling of building materials.

b) Current Practices

The combined Sydney Regional Organisation of Councils initiated the 'Waste Not Development Control Plan' in 1994-95. It was later advanced by the (former) NSW Waste Boards. The document encourages Councils to use development control plans as a lever to reduce construction and demolition waste going to landfill.

Liverpool City Council has adopted the *Waste Not Development Control Plan* under which, a development application must include a waste management plan that provides details on the volume and types of waste that will be generated; how the waste will be stored, reused, recycled or treated on site; and how the residual waste will be disposed of.

Liverpool City Council's Development Control Plans 30 (CBD Development) and 46 (Waste Not) require a Waste Management Plan to be developed for all development applications that propose:

- Subdivision and excavation of land; and/ or
- Demolition of an existing building; and/ or
- Construction of any development including alterations and additions.

The DCPs include objectives and guidelines on waste avoidance and resource recovery for the following activities: demolition and excavation; construction; and design of facilities and on-going waste management. Some of the information included in DCPs requires updating, including:

- References to available *Resources: Waste and Recycling Facilities/ Directories*; and
- Incorporation of recently developed better practice measures for Multi Unit Dwellings (Resource NSW; 2002).

- DCP 4 (Environmentally Responsive Residential Development), which covers development in areas outside Liverpool CBD, is currently undergoing revision. The revisions will include waste management requirements similar to those in DCP 30 (CBD Development).

c) Information Sources

Resource NSW (2002), *Better Practice Guide for Waste Management in Multi-Unit Dwellings*, February 2002

Liverpool City Council Development Control Plans 4, 30 and 46

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
7.1	Update DCP guidelines as related to waste management to reflect currently available resources and better practice measures.	Short Term Medium term Long Term	Council	
7.2	Include information in the DCP guidelines on existing and potential future waste and recycling services to be provided to Multi Unit Dwellings by Council.	Short Term Medium Term Long Term	Council	This action is linked to the program area *Multi Unit Dwellings*
7.3	In conjunction with Council's planning section, develop Standard Conditions for construction, demolition and ongoing management of waste	Medium Term	Council	
7.4	Review the efficient application of Council resources towards the monitoring / following-up of waste management commitments contained within development applications	Medium Term	Council, DEC	

6.8 Commercial and Industrial Waste Management

a) Strategic Objectives

To streamline and promote more sustainable waste management services to businesses within the Local Government Area.

b) Current Practices

Presently, Council does not provide waste and resource recovery services to businesses within Liverpool. Such services are currently negotiated directly between the businesses and private waste service providers. This has resulted in businesses within Liverpool being serviced by a high number of competing waste service providers, with each business typically provided with a bin or skip. This situation has led to bin congestion, odour problems and traffic congestion in some areas, particularly in service ways located behind "strip" shopping areas in Liverpool CBD.

If a more coordinated waste and recycling service were provided to business (particularly within the Liverpool CBD), including the establishment of shared waste and recycling facilities between businesses in dedicated bays, considerable amenity improvements may be achievable. In addition, the associated space savings could be utilised for short-term customer parking and/or loading/unloading activities for the businesses concerned.

c) Information Sources

Resource NSW (Undated), *Local Government commercial recycling discussion paper*

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
8.1	Undertake a feasibility study for Council-provided waste and recycling collection services for commercial centres within Liverpool.	Short Term	Businesses, Waste Service Providers, Council	The service would be run on a cost recovery basis by Council, with businesses paying Council an annual charge for the service provision
8.2	Subject to the outcome of the study, incorporate commercial premises waste and recycling collection services in future contracts	Medium Term	Businesses, Waste Service Providers, Council	Commercial services would form part of the broader waste collection and kerbside recycling service provision within Liverpool.

6.9 Household Clean-up

a) Strategic Objective

To increase awareness amongst the community of the correct use and schedule / timetable for household clean-up services. To maximise the efficiency of collection services with a view to achieving best practice.

b) Current Practices

Council provides to its residents a booked household cleanup collection service for general waste and whitegoods/metals. For general waste two free collections are provided to each household per year. There is no limit on the number of whitegoods collections. The service is undertaken by Council operations staff. Quantities collected are in the order of 1,800 tonne/yr of general waste and 360 tonne/yr of whitegoods. Whitegoods and metals collected separately are recycled through a scrap metal service.

Table 6.3 outlines material currently accepted and not accepted by Council during clean up collections.

Table 6.3: Material Accepted and Not Accepted by Council During Household Cleanup Collections

Material Accepted During Household Clean–up Collections	Material Not Accepted During Household Clean Up Collections
Old furniture	Hazardous chemicals
Carpet	Recyclable materials
Garden organics	Gas bottles or cylinders
Whitegoods and metal	Building or demolition waste
Fence palings	Asbestos or fibro
General household repairs waste	Oil, paint or other liquids
Drums with lids or tops removed	Car parts including tyres
Loose materials	Stone, earth or concrete
	Broken window panes, sheet glass
	Household garbage
	Cuttings with thorns (for example, rose bushes)

Discussions with operations staff have found that there may be opportunities to increase the efficiency of this service.

c) Information Sources

Discussions with staff from Council's City Works division (3 February 2005).

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
9.1	Undertake a benchmarking study of household cleanup collections that: – Identifies industry best practice for conducting household cleanup collections, including Occupational Health and Safety practices; – Compares the efficiency of Liverpool's household clean up collection service with that of other Council's providing a similar service; – Identifies and assesses opportunities for increased resource recovery from household cleanup wastes. This could include for example providing a mobile chipping service for chipping household garden organics at source with residents re-applying the chipped organics to domestic gardens.	Short Term	Council	A mobile chipping service for garden organics has been successfully implemented in Blue Mountains Local Government Area
9.2	On the basis of the benchmarking study, implement recommendations and changes to the household cleanup program as appropriate	Medium Term	Council	
9.3	Develop an education and social marketing approach to encourage maximum responsible utilisation of the cleanup program	Short Term, Medium Term	Council	

6.10 Multi Unit Dwellings

a) Strategic Objective

To develop and implement resource recovery services tailored to Multi Unit Dwellings with a view to maximising resource recovery.

b) Current Practices

As at June 2004, there were some 8,700 Multi Unit Dwellings (MUDs) in Liverpool Local Government Area, representing 16% of the total dwellings. Council does not currently provide a dry recyclables collection service for the majority of these dwellings. However Council's DCP for such developments requires that space be provided in bin bays for storage of 240 L recycling bins for future kerbside recycling programs.

Should a kerbside service be introduced for MUDs, the education and behaviour change program should be further developed to include guidance to residents of MUDs on correct waste management and recycling practices. In developing educative materials, consideration should be given to demographic characteristics and the relatively higher turnover of residents in MUDs compared to Single Unit Dwellings.

In developing this Strategy, a Triple Bottom line (TBL) assessment of different service provision options for MUDs, including estimate of costs and environmental effects, was undertaken (see Section 5). This may be used, together with the outcomes of planned trial resource recovery programs, to support future decisions in relation to services for MUDs.

c) Information Sources

Resource NSW (2002), *Better Practice Guide for Waste Management in Multi-Unit Dwellings*, February 2002

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
10.1	Trial resource recovery systems for MUDs to determine effectiveness	Short Term	Council	Linked to
10.2	Together with the results of collection trials, undertake a cost/benefit analysis of separate recycling service versus AWT recovery from MUD waste stream	Short Term	Council	
10.3	Subject to the outcomes of trials and cost benefit analysis, either include kerbside recycling service as part of city wide recycling services contract from end of current contracts or promote inclusion in AWT as preferred environmental outcome	Medium Term Long Term	Council, Waste Service Providers, Householders	This action is linked to program areas *Development Controls for Waste Avoidance and Resource Recovery*, *Illegal Dumping* and *Education and Behavioural Change*
10.4	Develop and trial program for improving profile of and participation in legal waste collection programs (bulky, chemical, e-scrap such as computers and televisions)	Medium Term	Council	Aimed at reducing illegal dumping associated with MUDs. Linked to program areas *Household Cleanup, Illegal Dumping*

6.11 Illegal Dumping

a) Strategic Objective

To minimise with a view to eliminating, instances of illegal dumping within the LGA. To successfully identify and prosecute those persons responsible for the unauthorised disposal of waste.

b) Current Practices

Two full time officers are employed by Council to combat illegal dumping in Liverpool. Illegal dumping instances are identified by residents contacting Council and observations by officers on patrol. Offenders are identified by reviewing the dumped material and searching for clues, interviews with residents and, in some instances, witnessing of illegal dumping activity by officers waiting at 'hot spots'. Current penalties for illegal dumping range from $320 for a clean up notice to $750 for illegal dumping. Offenders are required to provide proof that the dumped material has been disposed of correctly through tipping receipts.

For legal liability reasons there are no permanent or temporary camera installations to record illegal dumping activity.

According to Council's illegal dumping officers, most of the dumped material (about 60-70%) comprises green organics, including branches, grass clippings, palm fronds, etc. This could be reduced if Council provided a garden organics collection service. In addition, illegal dumping activity is higher outside Multi Unit Dwellings and in streets that form the border with neighbouring Councils (for example, on days when clean up collections are offered by the neighbouring Council, residents living on the Liverpool side of the street place materials out for collection).

Liverpool's illegal dumping program operates separate to the Regional Illegal Dumping (RID) Squad, a regional program established to combat illegal dumping in Western Sydney.

The current public awareness of the illegality of dumping in Liverpool is low. At present education information and material is provided on Council's website and waste services guide. On Council's website, a dedicated section has been established to provide information on illegal dumping and littering. The section provides residents with some information and a contact number for residents to report illegal dumping incidents. Council's waste services guide also provides information to residents on how to report illegal dumping.

The service currently operates at a net cost to Council. There may however be an opportunity to improve the cost efficiency of the service if additional resources were provided (staffing, vehicles, etc). This would increase the number of prosecutions and hence revenue generated from fines. To confirm whether the efficiency could be improved however a detailed review and cost assessment would need to be undertaken.

In addition to Council's activities to combat illegal dumping, there may be scope to link with programs and strategies developed by the *NSW Litter & Illegal Dumping Alliance,* a cross sectoral alliance established in 2004 by the NSW Government under its National Packaging Covenant Action Plan commitments. The alliance was established through feedback from the DEC's Litter Reference Group and the former Resource NSW Board. One of the tasks of the alliance is to undertake a comprehensive review of programs and achievements to date, and an assessment of potential areas for future action.

c) Information Sources

Liverpool City Council Evaluation Report on Illegal Dumping

Department of Environment and Conservation (2004), *An assessment of attitudes and behaviour amongst multi unit dwelling residents in relation to illegal dumping,* May 2004

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
11.1	Develop an Illegal Waste Management Strategy for Liverpool that incorporates the following elements: – An internal review and cost assessment of expanding the illegal dumping response service – Providing an adequate response to litter and littering behaviours to reduce incidents – Assessment of options to expand community support for preventing illegal dumping and increasing awareness – Awareness raising and media campaign including a set of definitive responses / messages to illegal dumping that could be used in brochures and media releases alike – Investigates the potential to coordinate Liverpool illegal dumping program with RID squad activities – A program for responding to illegal dumping and litter issues specific to MUDs.	Short Term	Council	Examples include providing additional staffing or vehicles. For example, inclusion within the "Don't be a tosser" campaign Such as reporting on the number of cases of illegal dumping investigated, clean up notices and fines issued For example, the "dob in a dumper" campaign This would deal with raising the profile of illegality of dumping, special clean-out events, posters, bin bay signs promoting cleanups, no junk mail stickers and letters.
11.2	Seek Council approval to implement the recommendations of the Illegal Waste Management strategy, especially those relating to: – Expanding resources to combat illegal dumping – Development and dissemination of education	Medium Term Long Term	Council	Including brochures and website

Key Actions		Timeframe	Groups Involved in Delivery	Comment
	materials – Measures to expand community awareness and support – Media campaign			
11.3	Monitor the activities of the *Litter & Illegal Dumping Alliance* and participate in programs as appropriate.	Medium Term Long Term	DEC Council NSW Litter and Illegal Dumping Alliance	

6.12 Problem Wastes

a) Strategic Objective

Wherever possible, to promote and participate in National, State and Local programs for managing problem wastes. Where no programs exist, to seek stakeholder feedback on problem wastes with a view to lobbying for viable disposal pathways for this material.

b) Current Practices

Problem wastes are those waste with potential to damage human or environmental health if not properly disposed. Liverpool City Council currently provides services for the safe collection, recovery and disposal of the following three problem waste streams:

Sharps and Clinical Wastes Program

This program involves collection of clinical and sharps wastes from six participating pharmacies and 11 sharps collection bins at public facilities located within Liverpool. The clinical waste collection from pharmacies receives contaminated syringes and other sharps such as insulin pens, needles, lancets, cannulas, scalpels or blades, dental wires, blood-contaminated items (such as blood glucose test strips), and dressings. The sharps collection bins provide for safe disposal of contaminated syringes.

In accordance with NHMRC (1999) and NSW Health (1998) guidelines, the provision of waste management services for wastes from the health care industry, including sharps and clinical wastes, should aim to enhance and protect public health and safety; to provide a safer working environment; to minimise waste generation and the environmental impact of waste treatment and disposal and to facilitate compliance with regulatory requirements. The Australian and New Zealand Clinical Waste Management Industry Group (2004) has also recently issued a *Code of Practice for the Management of Clinical and Related Wastes* that provides advice and standards for all stakeholders involved in the generation, storage, transport, treatment and disposal of clinical and related waste.

Household Hazardous Wastes

Council currently participates in the DEC's program for collection of household hazardous wastes. Through this initiative residents are provided with free drop off facilities for disposal of hazardous wastes and chemicals at temporary centres set up specifically for the program at regular intervals. Council participates in the program by providing locations for establishment of temporary drop off centres within Liverpool, assisting with promotional activities, and developing traffic management plans for operation of the centres during drop-off days.

Council's waste services guide and website also provides contact information on available permanent disposal facilities for selected household hazardous wastes (such as oils, paints, vehicle batteries and gas bottles) at WSN Environmental Solutions centres at Lucas Heights, Jacks Gully and Eastern Creek.

Council has also promoted and run alternative household cleaning products workshops.

For disposal of household medicines that are out of date or no longer needed residents are advised via Council's website that these can be taken back to a participating chemist for disposal through the Return Unwanted Medicines (RUM) program.

drumMUSTER

drumMUSTER is a national program for the collection and recycling of empty, cleaned, non-returnable crop production and on-farm animal health chemical containers was established in 1999. The program was jointly developed by the National Farmers Federation, the National Association for Crop Production and Animal Health (Avcare), the Veterinary Manufacturers and Distributors Association, and the Australian Local Government Association. Liverpool City Council is one of over 120 NSW Councils participating in the program.

Computer Wastes

Computers are one 16 wastes of concern identified by DEC NSW as suitable for management by EPR schemes. Council has been approached by a computer recycling company to provide a collection and recycling service for computer wastes. The service would involve residents dropping off used computers and ancillary equipment at a central location. The dropped off equipment would then be transported to a facility for assessment, dismantling, re-use, and recycling. Such a program may be expanded to include electronic scrap at a future date.

c) Information Sources

Australian and New Zealand Clinical Waste Management Industry Group (2004), *Code of Practice for the Management of Clinical and Related Wastes*, 4th Edition 2004, ISBN 0-9580886-0-8, downloaded from http://www.wmaa.asn.au/anzcwmig/4th%20Edition%20Industry%20Code%20of%20Practice.pdf

Department of Environment and Conservation website (www.environment.nsw.gov.au)

DEC (2004), *Extended Producer Responsibility Priority Statement 2004*, DEC 2004/19, March 2004, downloaded from http://www.epa.nsw.gov.au/resources/eprps2004.pdf

drumMUSTER website (www.drummuster.com.au)

Liverpool City Council website (www.liverpool.nsw.gov.au)

National Health and Medical Research Council – NHMRC (1999), *National Guidelines for Waste Management in the Health Care Industry,* January 1999, downloaded from http://www.nhmrc.gov.au/publications/pdf/eh11.pdf

NSW Health (1998), *Waste Management Guidelines for Health Care Facilities*, Environmental Health Branch, NSW Health, ISBN No.: 0 7313 4060 4, downloaded from http://www.health.nsw.gov.au/public-health/ehb/general/waste/guide_clinical_waste.pdf

Return Unwanted Medicines (RUM) program website (www.returnmed.com.au)

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
12.1	Continued participation and support of regional and national programs for household hazardous waste collection, chemical containers (drumMUSTER), and return unwanted medicines (RUM)	Short Term Medium Term Long Term	Industry Associations, DEC, Council, Waste Service Providers	
12.2	Develop or promote programs that foster behaviours that avoid or reduce usage of hazardous waste within the household	Short Term	Council, DEC	
12.3	Assess viability and, where feasible, introduce dedicated additional collection services for other problem wastes, such as waste electrical and electronic equipment including computers	Short Term Medium Term Long Term	Business, Industry Associations, DEC, Council	This action is linked with program area *Waste Avoidance and Resource Recovery*. Additional collection services for other problem wastes could be done in conjunction with other drop off activities/days and waste management initiatives within Liverpool
12.4	Seek feedback from participating pharmacies on the effectiveness of Council's Sharps and Clinical Wastes Program	Short Term	Participating Pharmacies, Council	
12.5	Engage with other stakeholders in determining improvements to Council's Sharps and Clinical Wastes Program	Short Term	NSW Health, Council	
12.6	Continued and/or expanded provision of services for collection of clinical and sharps wastes.	Short Term Medium Term Long Term	Businesses, Waste Service Providers, Council	

Key Actions		Timeframe	Groups Involved in Delivery	Comment
12.7	Include details of programs for management of problem wastes in the targeted Education Plan that will be developed during implementation of this strategy	Short Term	Council	This action is linked with program area *Education and Behaviour Change*.
12.8	Explore ways to lobby for increased extended producer responsibility for products impacting on Council's waste collection and disposal costs	Short Term	Council	

6.13 Recovery and Disposal of Council Wastes

a) Strategic Objective

Through sustainable management of its own wastes, adopt a civic leadership role that will demonstrate effective solutions for avoiding waste, reusing economically valuable or viable items, eliminating or controlling hazardous waste, maximising resource recovery, and minimising environmental harm.

b) Current Practices

In addition to public place and event waste management services (see Section 6.14), Council generates and manages waste from its own activities. This includes Council construction spoil, waste from maintenance works and street sweepings. A summary is provided in Table 6.4. Some resource recovery takes place for these wastes in particular for storm debris (chipped and re-used by residents) and waste from concrete works, which are transported to a local reprocessor.

A (relatively) small amount of Council wastes are also generated in carrying out administrative functions, childcare facilities, library, and community facilities. The current contractual position for removal of these wastes currently makes no provision for effective resource recovery or improved sustainability outcomes.

Within individual facilities, Council staff have developed internal programs to improve sustainability in the office environment known (such as the ELF program (Environment Living Facilitators) at CBD). Council has also initiated a *Waste and Resource Recovery Reference Group* in anticipation of dealing with waste issues in broader Council context.

Table 6.4: Other Council Wastes - Liverpool

Stream	Approximate Quantity (tonne/yr)	Comment
Street Sweepings	2,100	Comprises road litter, leaf matter, sand, soil and inert materials
Storm Debris	Variable	Collected green organics from storms are stockpiled and chipped if possible then provided free to residents, other materials are landfilled
Drainage Works	700	Arises from clearing of pits and drains, contains noxious weeds unsuitable for chipping
Concrete Works	1,300	Includes maintenance and restoration work. The concrete component is separated and recycled where possible
Road Patching (Heavy Patch)	1,600	Comprises clean fill, currently disposed
Road Shoulder Works/Grading	600	Comprises mostly soil, currently disposed
Total	6 300	

At present Council does not have a formal waste reduction and purchasing policy. The development and implementation of such a policy, mandatory for State Government Agencies, is one opportunity for Council to demonstrate its commitment to avoiding the generation of waste, recovering resources and effectively "closing the loop" for materials not consigned to final disposal.

To help Councils in this area, a joint undertaking of the Local Government Association of NSW and Shires Association of NSW, together with the Department of Environment and Conservation has created the Local Government Buy Recycled Alliance (LGBRA). It seeks to encourage and assist local government with the purchase of Recycled Contents Products containing recycled material. Considerable resources and information on the alliance can be found at the LGBRA website (www.buyrecycled.org.au).

c) Information Sources

DEC (2004), *Know Your Paper - A Guide to Purchasing Recycled Content Office Paper*

EPA (1997), *Waste Reduction and Purchasing Policy – A Guide for Agencies*

NSW Local Government Buy Recycled Alliance (http://www.buyrecycled.org.au/index.php)

Resource NSW (2003), *Specification for Supply of Recycled Material for Pavements, Earthworks & Drainage* - this publication is intended as a guide for the supply of recycled materials for use in pavements, roads and related engineering works

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
13.1	Enhance and promote the internal program for identifying waste avoidance, reuse, and recycling opportunities within work areas	Short Term	Council	
13.2	Expand role of the current *Waste and Resource Recovery Reference Group* to assist implementing improvements to Council waste and resource recovery practices and assist developing waste minimisation policies	Short Term	Council, Waste and Resource Recovery Reference Group	Commitment from upper management to this option would be critical
13.3	Assess the implications and benefits to Council of joining the Local Government Buy Recycled Alliance (LGBRA). If warranted, become a member of the Alliance and implement a buy recycled program in accordance with the LGBRA guidelines.	Medium Term Long Term	Local Government Buy Recycled Alliance, Council	If this action is not financially warranted, Council should endeavour to adopt the principles the Alliance.
13.4	Investigate the feasibility of developing and implementing a waste reduction and purchasing policy (WRAPP) for Council wastes.	Short Term	Industry Associations, DEC, Council, Householders	
13.5	Subject to the outcomes of the WRAPP feasibility study, implement a waste reduction and purchasing policy for Council wastes	Medium Term	Council, Waste and Resource Recovery Reference Group	
13.6	In contracts for Council products and services, introduce contractual conditions related to waste reduction and purchasing consistent with the strategic objective for management of Council wastes	Medium Term	Council, Waste and Resource Recovery Reference Group, Procurement Services Area	

6.14 Public Place and Event Waste Management

a) Strategic Objective

To maximise resource recovery and minimise waste generation within public areas and during public place events. To foster increases in sustainable behaviour through public place events.

b) Current Practices

Public place and event waste management is undertaken by Council's City Works and Neighbourhood Services Divisions or external contractors for larger events. Annual quantities of waste collected by Council's City Works division are shown in Table 6.5.

Table 6.5: Public Place and Event Wastes Collected by Liverpool City Council City Works Division

Stream	Quantity (tonne/yr)
Litter Bins (parks and gardens)	210
Litter Bins (Central Business District)	200
Litter and rubbish crews (manual sweeping and pickup)	280
Total	690
Notes: Event wastes are included in the figures for litter bins shown above Wastes collected by Council's Neighbourhood services division not included in above quantities	

At present there are no public place recycling bins provided in Liverpool. The provision of such recycling facilities, although unlikely to have a major impact on overall diversion quantities, provides a message to the community of Council's commitment to resource recovery. Should such facilities be provided careful consideration will need to be given to their design as well as placement (recycling bins should always be located adjacent to general litter bins). The service could be provided by Council or form part of the future contract for kerbside recycling services.

Here it should be noted that the NSW DEC has developed a draft guide for Public Place Recycling that provides guidance on system development and implementation including bins, configuration, litter, signage, location, education and management.

c) Information Sources

Discussions with staff from Council's City Works division (3 February 2005).

NSW Department of Environment and Conservation (2003), *Draft Better Practice Guide for Public Place Recycling*, http://www.resource.nsw.gov.au/data/PPR%20guidelines.pdf

Waste Wise Events website: www.wastewiseevents.resource.nsw.gov.au

d) Action Matrix

Key Actions		Timeframe	Groups Involved in Delivery	Comment
14.1	Assess the feasibility of providing public place recycling facilities in Liverpool CBD including: - Audit of public place wastes; - Review of available bin designs for public place recycling; - Assess bin distribution/placement aspects and constraints in Liverpool CBD; and - Determine the most efficient collection system for public place recycling.	Medium Term	Council	
14.2	Propose a Council policy that all public place events incorporate messages on waste minimisation and correct disposal to foster sustainable behaviour amongst the community.	Short Term	Council	Examples include regular announcements over loud speakers / scoreboards or inclusion of messages within printed matter such as event programs.
14.3	Review opportunities for waste reduction and green purchasing at events.	Short Term	DEC, Council	DEC has a dedicated website for event waste management [3]
14.4	Based on the outcomes of Action 14.2, develop a policy regarding Council involvement in event waste management	Short Term	Council	

[3] www.wastewiseevents.resource.nsw.gov.au

Key Actions		Timeframe	Groups Involved in Delivery	Comment
14.5	Subject to Council's policy on event waste management (Action 14.2), develop and implement an education program for event wastes	Short Term	Council	This action is linked with program area *Education and Behavioural Change*
14.6	Subject to Council's policy on event waste management (Action 14.2), include public place event wastes in the future contracts for residual waste reprocessing / disposal	Short Term	Council, Waste Service Providers	This action is linked with program area *Residual Waste Reprocessing and Disposal*
14.7	Subject to Council's policy on event waste management (Action 14.2), examine the cost effectiveness of including waste collection at a set number of events into waste collection contracts (including supply of bins and signage)	Medium Term	Council, Waste Service Providers	This action is linked with program area *Waste and Recycling Collection Services Architecture*

7 CONCLUSIONS

From the assessment of different service alternatives, there exists potential for Liverpool City Council to achieve further gains in sustainable waste management. Here, the most significant potential lies in the additional recovery of resources from domestic premises, through service expansion and modification, in addition the treatment and/or processing of residual waste.

Following on from this, additional gains could be achieved through the implementation or upgrading of services to treat and/or dispose of other wastes, particularly those under Council's direct control, such as household cleanup waste. Here it is important to note that such efforts should be underpinned by ongoing waste education designed to foster and reinforce increasingly sustainable behaviour amongst the Liverpool community at large.

Notwithstanding the potential to achieve environmental gains, future service provision must be balanced with Council's financial and administrative resources. Therefore, it will be important that the services provided by Council achieve cost recovery through transparent charging mechanisms, designed to promote sustainable behaviour amongst the community.

For those wastes not under Council control (such as commercial / industrial waste and building / demolition waste) there exists potential to influence how these wastes are managed through medium to long term town planning and associated planning instruments.

7.1 Targets

The implementation of this Strategy is consistent with State Government objectives and targets for waste avoidance and resource recovery, in particular the NSW Department of Environment and Conservation's Local government Action Plan – Consultation Paper. As the Action Plan allows for Councils to adopt alternative approaches to increased resource recovery dependent upon on local circumstances, no specific targets have been set forth. Instead, specific actions spanning the short to long term have been formulated and are designed to help Council optimise and monitor its environmental performance.

7.2 Key Points

Key points arising from this Strategy include:

- Enhanced service provision designed to capture increased resources from both single unit dwelling and multi unit dwellings;
- Incorporating residual waste treatment that will greatly improve the sustainability performance of Liverpool's waste and recycling systems;
- Adopting of a Civic Leadership role by Council in relation to waste avoidance and resource recovery through enhanced management of its own wastes (the "practice what you preach" concept);

- within the community through programs developed to maximise desired behavioural changes.

By following key actions contained within this plan, Council will be able to enhance and optimise its environmental performance in relation to sustainable waste management. Recognising the need to balance service levels with resource constraints, in the long term, there is no impediment to Council achieving best practice in the area of waste management.

8 REFERENCES

DEC NSW & UNSW (2003), *Life Cycle Inventory and Life Cycle Assessment for Windrow Composting Systems*, October 2003

DEC NSW (2003a), *Local Government Action Plan contributing to waste reduction and resource recovery in NSW*, December 2003

DEC NSW (2003b), *Study on Local Government Management Costs for Garden Organics,* Final Report*,* December 2003

DEC NSW (2004), *An assessment of attitudes and behaviour amongst multi unit dwelling residents in relation to illegal dumping. Research Report*, May 2004

DEC NSW (2004), *Model Waste Collection Contracts Section C Conditions of Contract,* Consultation Draft, September 2004

DEC NSW (2004), *Model Waste Collection Contracts Section D Part 1 General Specification,* Consultation Draft, September 2004

DEC NSW (2004), *Extended Producer Responsibility Priority Statement 2004*, DEC 2004/19, March 2004, downloaded from http://www.epa.nsw.gov.au/resources/eprps2004.pdf

DEC NSW (2004), *Service Development Timeline,* Consultation Draft*,* September 2004

DEC NSW (2005), *Assessment of Garden Organics Collection Systems*, prepared by Nolan-ITU, May 2005

Department of Environment and Conservation & NSW Jurisdictional Recycling Group (2004), *Getting more from our recycling systems. Good practice performance measures for kerbside recycling systems*, February 2004

Inner Sydney Waste Boards (1999), *Re-use Facilities Enhancement Strategy*, prepared by The Reverse Garbage Co-operative

IRIS Research (2004), *Social Research on Resource Recovery & Environmental Issues*, prepared for Liverpool City Council, January 2004

Liverpool City Council (2004), *Sharps and Clinical Waste Collection PQ 495,* February 2003

Liverpool City Council (2004), *Social Research on Resource Recovery & Environmental Issues* prepared by IRIS Research, January 2004

Liverpool City Council (2004), *Statement of Affairs,* prepared in accordance with Section 14(1)(a) Freedom of Information Act (Agency No 2167), July 2004

Liverpool City Council (2004a), Liverpool Demographic Profile, produced by Strategic Research, Liverpool City Council, March 2004

Liverpool City Council (Undated), *Draft Liverpool Residential Area Development Plan (DCP 4)*

Liverpool City Council (Undated), *Liverpool CBD Development Plan (DCP 30)*

Liverpool City Council (Undated), *Sustaining Liverpool - A waste services guide for units*

Liverpool City Council (Undated), *Sustaining Liverpool – A waste services guide*

McGregor Environmental Services (2003), *Characterisation of Domestic Waste*, prepared for Liverpool City Council, July 2003

National Health and Medical Research Council – NHMRC (1999), *National Guidelines for Waste Management in the Health Care Industry,* January 1999, downloaded from http://www.nhmrc.gov.au/publications/pdf/eh11.pdf

NSW Government (2000), *Report of the Alternative Waste Management Technologies and Practices Inquiry*, April 2000

NSW Health (1998), *Waste Management Guidelines for Health Care Facilities*, Environmental Health Branch, NSW Health, ISBN No.: 0 7313 4060 4, downloaded from http://www.health.nsw.gov.au/public-health/ehb/general/waste/guide_clinical_waste.pdf

NSW JRG (2003), *Best Practice Kerbside Recycling Council Support Program, Achieving Best Practice - Draft Report*, prepared by Nolan-ITU Pty Ltd, July 2003, Unpublished

NSW JRG (2004), *Glass Compaction Study*, prepared by APrince Consulting Pty Ltd, June 2004

Resource NSW (2002), *Better Practice Guide For Waste Management in Multi-Unit Dwellings*, February 2002

Resource NSW (2003), *Waste Avoidance and Resource Recovery Strategy 2003*, ISBN 0-9580364-4-6

Resource NSW (Undated), *Local Government commercial recycling discussion paper*

Appendix A

Review of Waste-Related Legislation

Local Government Act 1993

Under Chapter 6 of the *Local Government Act 1993*, Council's non-regulatory functions include the provision, management or operation of "waste removal, treatment and disposal services and facilities". Significantly, s.504 of the Act prescribes not only how the cost of services are to be recovered, but also broadly, the level of these charges. Constraints imposed by Ministerial decision under s.510 may limit a Council's ability to pursue more expensive waste management options, which might result in a significant increase in their annual waste charges.

It is interesting to note that, while subsection (1) states that a Council must not apply income from an ordinary rate towards the cost of providing domestic waste managements services, subsection (1A) allows income from an ordinary rate to be lent (by way of internal loan) for use by Council in meeting the cost of providing domestic waste management services.

Other sections of the Act relate to Councils' authority to approve (or otherwise) management of waste (s.68, part C), and a requirement to include waste-related issues within the Environmental section of Annual Reports (s.428(2)(c)(v)).

Protection of the Environment Administration Act 1991

The objectives of the *Protection of the Environment Administration Act 1991* are:

a) to constitute the Environment Protection Authority (EPA);

b) to provide integrated administration for environment protection; and

c) to require the Authority to perform particular tasks in relation to the quality of the environment, environmental audit and reports on the state of the environment.

Within this Part 3 of this Act, the objectives of the EPA are stated as being:

6.(1)(a) to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development; and

6.(1)(b) to reduce the risks to human health and prevent the degradation of the environment . . . . .

Notably, Part 4 or the Act outlines the responsibilities and powers of the EPA including its responsibility for reporting on the state of the environment every 3 years. Of particular relevance to Councils is Part 4 Sections 12 in which the EPA is assigned the power of direction to any public authority. Specifically, the EPA may from time to time:

12.(1)(a) direct any public authority to do anything within the powers of the public authority which will, in the opinion of the Authority, contribute to environment protection; or

12.(1)(b) direct any public authority to cease doing anything, which, in the opinion of the Authority, adversely affects environment protection.

However, it should be noted that the power of direction is subject to a consultation process as laid out in the remainder of Section 12.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* is a key legislative instrument in the overall management of waste and its effects on the environment. This is evident from its direct reference to the *Waste Avoidance and Resource Recovery Act 2001* (s.3(g)). This Act forms a key instrument in the permitting and operating of waste facilities, specifying licences, operating documentation, operating standards, and remedies for waste-related activities, which may include remediation works.

The Act prescribes the licensing requirements and environmental standards to which facilities conducting scheduled activities should operate. Specifically, Schedule 1 of this Act lists solid waste landfills receiving over 5,000 tonnes per year of solid waste, or solid waste and inert waste, as EPA-licensed activities. The meaning of solid wastes is further defined in Schedule 1, Part 4.

A notable feature of this Act is the system of penalties ranging from Tier 1 offences for wilful or negligent (criminal) acts of environmental damage, through to Tier 3 offences against the Act or regulations referred to within the Act. Tier 2 and 3 offences are strict liability offences, often resulting in a monetary fine. This system of penalties reflects the seriousness with which the NSW EPA views acts of environmental pollution. Coupled with broad description of breaches (for example, a person must not pollute, cause or permit waters to be polluted (s.120)), the Act imposes a heavy responsibility on individuals and corporations to ensure that the environment is not harmed as a consequence of its activities.

In terms of ensuring adherence to relevant environmental standards and licence requirements, Chapter 7 of this Act details the investigative powers of the NSW Environment Protection Authority and its officers. Here, an authorised officer is may enter any premises at where the officer reasonably suspects that pollution has been, is being or is likely to be caused. In addition, evidentiary search powers are assigned to authorised officers in carrying out their investigations.

Protection of the Environment Operations (Waste) Regulation 1996

The *Protection of the Environment Operations (Waste) Regulation 1996* establishes requirements relating to non-licensed waste facilities, waste activities and transporters. These requirements relate primarily to operation and reporting. The regulation also details financial contributions by occupiers of scheduled waste facilities and monitoring requirements.