Mindarie Regional Council Bin Collection Summary ReportBin Summary Report

Prepared for: Mindarie Regional CouncilCity of Joondalup

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EXECUTIVE SUMMARY

One of the key decisions to be made with the introduction of resource recovery is which bin collection system to employ. A draft report titled *Waste Management and Collection Systems in the MRC* has been prepared that undertakes a technical analysis of the various bin collection systems available. This report concludes that there is not a system that is clearly better than the others but the best system is dependent on which issues are seen to be a priority.

In order to determine which issues are the most important when assessing the bin collection systems it was decided that a telephone survey of community attitudes should be undertaken. The survey of community attitudes indicates that the community is very supportive of the concept of recycling. They are also prepared to pay an additional cost to maximise recycling. The concepts of the wet / dry bin and the one bin system are not supported by the community. It is recommended that these systems are not pursued with the introduction of resource recovery.

It is recommended that the facility be commissioned processing waste from the current collection systems. Retaining the status quo will enable the RRF to focus on providing high quality outputs from the organic fraction of waste. It will also ensure that the recovery rates of recyclables will not decrease with the commissioning of the RRF. The member councils will continue to be responsible for undertaking the traditional kerbside recycling collection services. The individual member councils will have discretion as to how they provide this service.

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1. INTRODUCTION

The Mindarie Regional Council (MRC) is proposing to construct a Resource Recovery Facility (RRF) in the Neerabup Industrial Area. The RRF will treat household waste, which is currently sent to landfill. The RRF will convert waste into a valuable resource (compost and possibly energy) and it has a number of benefits. The RRF will include waste separation technologies that can effectively extract recyclables from the waste stream.

One of the key decisions to be made with the introduction of resource recovery is which bin collection system to employ. There are many different waste collection systems that are used in Australia and internationally. The optimal waste collection system varies for each local council because each organisation accords a different weighting to the importance of issues such as the existing capital available to the Council, the financial cost of implementing and operating the system, community values, waste diversion targets and environmental benefits. The optimum bin collection system is further complicated by the introduction of resource recovery. The quality of the outputs (organics and recyclables) and the costs for treatment through the RRF are likely to vary depending on the bin collection system used.

This report summarises the previous work completed on bin collection systems and documents the results of the community survey that was undertaken to assess community attitudes towards the bin collection system.

2. PREVIOUS WORK

A draft report titled *Waste Management and Collection Systems in the MRC* has previously been submitted to the MRC and distributed to the member councils. The report aims to identify the optimal waste management and collection system for the MRC Member Councils following the development of a RRF. The financial implications, the impact on the outputs from the RRF (recyclables and compost) and the advantages and disadvantages of different collection systems were assessed. Three collection systems were analysed: one bin, two bin (recyclables and municipal solid waste {MSW}) and two bin (wet bin / dry bin).

The “one bin” collection system, which is currently being implemented by the City of Stirling, involves residents placing all of the waste into a single bin. The single bin can be serviced by one collection truck and the waste is sorted and recyclables extracted using mechanical separation at the Atlas treatment facility.

The “two bin” option that is currently operated by a number of the Member Councils is based on a bin for recyclables and a bin for other waste. The general refuse bin is emptied weekly through a kerbside collection service. A separate receptacle (bin, bag or crate) is serviced (usually fortnightly) from the kerbside with recyclable packaging such as paper, glass, plastics, aluminium and steel being collected.

Another two bin system has also been considered which is predicated on a bin for ‘organic’ waste and a bin for ‘other’ waste. This is also known as a wet and dry bin system. Each household is allotted two bins, with the ‘organics’ bin collected weekly and the dry bin (inorganic materials including recyclables) collected fortnightly. All of the organic waste such as garden waste, kitchen waste and food waste is placed in wet bin and all of the

traditional recyclables (glass, plastics, aluminium, steel, paper products) and inert materials (such as sand, rubble, ceramics, textiles, rubber) are placed in the dry bin. This system has the advantage of providing a relatively clean source of waste for composting.

Ideally the technical analysis would have provided the MRC with a clear direction in terms of the optimum collection system to use with the introduction of resource recovery. However the analysis has indicated that there are advantages and disadvantage to all of the systems and the optimum collection system will be dependent on the priorities of the member councils. The RRF and the collection system could have a number of different objectives such as maximizing the quantities of traditional recyclables extracted from the waste, diverting waste from landfill or producing a compost that can have an unrestricted application.

At a MRC workshop held at the Town of Cambridge on the 12th of March 2004, the results from the *Waste Management and Collection Systems* report were discussed. The report provided information on the technical and environmental impacts of the bin collection system. Discussion at the workshop noted that the preferred solution would depend on the priorities of the individual councils, and these would be influenced by community attitudes. Therefore it was decided that the community attitude regarding the bin collection system needed to be assessed. The community attitude towards the various systems could be surveyed to determine the relative importance of the bin collection issues. The MRC and the member councils would use the results of the survey so that community values could be factored into the decision regarding the optimal bin collection system to be operated with the introduction of resource recovery.

3. COMMUNITY SURVEY

Community consultation has been a key component of the Resource Recovery Facility project to date, with the community being informed regarding developments of the project and assisting in the decision making process. The community has assisted in the selection of the site for the construction of the RRF, assisted in narrowing the choice of technologies to composting and digestion and formulated the Community Partnership Agreement. The community engagement activities have not requested that the community nominate their preferred site or technology but indicate which issues the MRC should consider when making this decision.

In order to determine which collection system should be introduced in the region to compliment the introduction of resource recovery the relative importance of the outcomes of the collection systems need to be defined. The issues that the bin collection service will influence include:

- The ability to produce a consistent mix of waste materials that can be processed in the resource recovery facility;
- The diversion of waste from landfill;
- The overall reduction of greenhouse gas emissions;

- The principles of the waste hierarchy being adhered to (ie paper fibre is recycled and not composted);
- The number of trucks needed to undertake the collections;
- Convenience for households;
- The capacity of the bin being sufficient to meet the requirements of households;
- Direct community participation in recycling;
- Employment opportunities; and
- Cost of the collection system to ratepayers.

BSD liaised with Patterson Market Research to prepare a telephone survey to determine which of the issues are more important to the community in regards to the bin collection system. A copy of the telephone survey is included in the Patterson report, which is shown as Appendix A of this report.

A survey of 600 households was undertaken (100 households in each of the member councils excluding the City of Stirling) over the period from the 29/4/04 to the 5/6/04. The results for each of the member councils can be viewed in isolation and the overall results for the MRC can also be assessed. The overall results for the MRC are weighted to reflect the population of the member councils.

4. SURVEY RESULTS

The first question asked related to the awareness of the RRF project. The survey indicated that 29% of respondents were aware of the project. For the individual member councils this ranges from 11% in the Town of Victoria Park to 38% in the City of Wanneroo.

The second question relates to the importance of reducing waste to landfill and increasing recycling. The survey indicates that the community sees both of these issues as important with the overall results indicating that over 90% of participants see the issues as at least "tending to be important".

The third question assesses the relative importance of each of the issues that were identified as being influenced by the bin collection system. It was envisaged that this question would allow for the relative merits of the collection systems to be assessed. The overall results are indicated in the Table 1 below.

Table 1 – Issues Influencing Collection Systems

Issue	Relative Importance (%)
Reduce overall Greenhouse gases	90
Ensure adequate bin capacity	87
Maximise diversion from landfill	86
Allow high value recycling	85

Provide employment in recycling	84
Give consistent materials mix	83
Minimise cost of collection system	83
Involves community in recycling	81
Most convenient for households	78
Minimise road traffic	71
Not have too many bins to clutter smaller homes	69

The results indicate quite clearly that the community places a high value on the environmental impacts of the waste management system. The most important issue relates to the overall reduction in greenhouse gases. Similarly the diversion rates from landfill and allowing high value recycling indicate that the community continue to support the environmental ideals of recycling. Bin capacity is also an important issue to residents. The results are also reasonably consistent across each of the member councils.

Question five was prepared to assess what cost the community were prepared to pay to recycle and contribute to environmental benefits. The question is framed to get an indication of whether the community is prepared to pay slightly more in order to recover more recyclables in conjunction with the development of resource recovery. While 34% of the community favoured the diversion of waste to landfill at the minimum cost 60% favoured an additional cost that also involved maximising recycling.

Question six asks the community which bin collection system they prefer. It is acknowledged the community is not well enough informed to know the advantages and disadvantages of each of the systems. However the question was asked so that it was possible to determine the community's instinctive reaction to each of the collection systems. It provides a measure of the likely community reaction to changes in the collection system, in the absence of comprehensive community education.

The results indicate that 70% of the community prefers the traditional two bin system with waste sorted into traditional recyclables and the residual waste. 19% of people surveyed indicated that the wet / dry bin system was preferred. During the survey the respondents were told that the wet/dry bin scenario would produce a better compost and cost 10% more than a single bin. Only 10% of the people surveyed indicated that they preferred a single bin which would be the least expensive, divert 70% of waste from landfill but did not produce high volumes of recyclables.

A copy of the final report prepared by Patterson Market Research and summarising the bin collection survey results is included as **Appendix A**.

5. OUTCOMES AND WAY FORWARD

The results of the community survey give a clear indication that the community is very supportive of a separate recycling service. Recycling has been promoted over the last 20 years as being good for the environment and this message is entrenched in the community. The survey results indicate that if member councils did not provide a separate recycling

service there is a strong likelihood that there will be a negative reaction from the community. This would need to be addressed through a comprehensive community education programme.

The survey results indicate that environmental issues such as minimising greenhouse gases, diverting waste from landfill and creating higher order products (ie paper fibre is recycled back into paper and not composted) are the most important. The other issue that is very important to the community is bin capacity. The results also indicate that the community is prepared to pay a little bit extra in order to maximize the amount of recycling. As with previous surveys it has been determined that the community are very supportive of resource recovery.

Although a RRF could be constructed that diverts recyclables from a one bin system, it is unlikely to enjoy full community support. The survey results indicate that there is very low public support for a one-bin collection system. The *Waste Management and Collection Systems* report found that a one bin collection system:

- Will increase the materials sorting required to achieve a high quality compost;
- Reduce the amount of recyclables recovered;
- Have a lower diversion rate for waste from landfill than the other systems; and
- Have a lower cost than other systems.

There is a strong likelihood that introducing a one bin collection system in conjunction with the introduction of the RRF, would undermine public support for the RRF. The community is likely to assume that the introduction of the RRF has caused the removal of the recycling collection service; a service that they strongly support. Removal of the recycling collection system is likely to attract criticism from community and environmental groups such as Greenpeace.

Based on these findings it is recommended that the MRC does not require the member councils to introduce one bin collection system with the introduction of the first stage of resource recovery.

From the survey results it is also apparent that the community did not support the concept of a wet bin and dry bin. Although the question was framed to indicate that the quality of the compost could be improved with the introduction of a wet bin, only 19% of the community surveyed supported this system. It has previously been surmised that the introduction of a wet bin / dry bin system would need to involve a significant education campaign. The community is not familiar with the concept and would need to be educated to distinguish between a wet and a dry waste. This system would require most householders to change the way kitchen waste is managed so that plastics are not placed in the wet bin. Kitchen waste would need to be wrapped in paper in most instances.

In summary the community does not support the wet bin / dry bin system and a significant education campaign would be required to educate them about the benefits and how to use the system. There is also uncertainty regarding the technical feasibility of a facility to sort and treat the recyclables from a dry bin. It is recommended that the MRC does not introduce a wet bin / dry bin system with the introduction of the first stage of resource recovery. As a consequence, it is also recommended that the MRC not provide within the RRF, a materials recovery facility capable of separating packaging material from other dry waste.

It is known that not every household will use a recycling bin and separate out all of the recyclables. The *Waste Management and Collection Systems* report found that even with a separate kerbside recycling collection service there is still is a significant amount of recyclables that are present in the "other" waste bin. Therefore the RRF will be required to separate out materials from the organic waste irrespective of the bin collection system used. The materials that need to be separated out through the process will include traditional packaging recyclables.

The inclusion of magnets and eddy current separators in the RRF will allow the steel and aluminum cans to be readily separated and recycled. The separation of other traditional packaging recyclables from the organic waste is more difficult. Glass is a problematic material to treat due to its propensity to break during transport. Broken glass is a contaminant in compost and sophisticated screening equipment at the end of the composting process is often incorporated into RRF's to reduce glass and stone contamination.

Plastics are also problematic because although PET and HDPE are recyclable there are a lot of other plastics in the waste stream (with similar physical properties) that are not. The audit of waste undertaken in the City of Stirling in 1999 indicated that 1.4% of the waste by weight is HDPE and PET, while 6.4% is non-recyclable plastics.

Sorting technologies will be included in the RRF however these technologies have a limited ability to recover the recyclable packaging materials such as glass, plastics and paper products. Maintaining a separate recyclable collection service will complement the materials extracted by the RRF and ensure that the quantity of packaging materials recycled does not decrease with the introduction of resource recovery.

The community supports recycling and the survey indicates that the community is prepared to pay an additional fee for the service. Member councils may chose to alter their recycling collection service in line with their community's wishes and willingness to pay, either now or in the future. If the member councils wish to increase the amount of recycling, they have the option of introducing a second bin. Alternatively they could retain the status quo with the introduction of resource recovery and undertake a review of the recycling methods once the RRF is operational and the full costs and capabilities of the facility are better understood. One of the key tender requirements for the RRF will be the flexibility of the facility to treat a heterogeneous waste stream that may also change over time.

One of the principles of the resource recovery education strategy has been to build on the community's support of traditional recycling and expand that to include resource recovery. The community survey undertaken as part of this study has highlighted the requirement to broaden the community's views of recycling to extend beyond packaging materials.

The RRF has been promoted as being capable of capturing more recyclables. The expectations of the community and the member councils are that the RRF will be able to recycle more of the traditional packaging recyclables. Retaining the status quo in regards to the separate recyclable collection system will ensure that recycling rates are not worse than at present and will potentially improve with increased awareness of waste management through the introduction of resource recovery. The MRC will also be able to show that they are diverting organic waste from landfill and therefore increasing the amount of recycling undertaken in the region.

It is recommended that the MRC advises the member councils that:

- A unified waste collection service is not a requirement for the RRF;
- That the member councils should continue to provide a separate collection service for recyclable packaging, and sorting of this material should continue to be undertaken by parties other than the MRC;
- A separate materials recovery facility will not be provided in the RRF as part of stage one; and
- The flexibility of the RRF to process a variable waste stream and recover recyclable packaging material will be a key tender requirement.

Simplified Table for Strategy Session 24 May 2005

Options assessed to achieve the Statement of Intent with estimated costs/kerbside recovery rates/waste diversion rates

Option	Domestic Waste - Disposal / Treatment	Recycling Service – Collection Method & Frequency	Bulk Service - Collection Method & Frequency	Cost per household	Kerbside Recovery Factor compared to option B**	Diversion Rate
B	RRF Stage 1	Bag & voluntary MGB at cost to resident, fortnightly	Green & General, 9 monthly	$175.54	1	50.5%
C	RRF Stage 1	Bag at cost to C of J, no MGB service, fortnightly	Green & General, 9 monthly	$177.61	0.72	49.9%
D	RRF Stage 1	Voluntary MGB at cost to C of J, no bag service, fortnightly	Green & General, 9 monthly	$181.06	1.25	50.7%
F	RRF Stage 1	Compulsory MGB at cost to C of J, no bag service, fortnightly	Green & General, 9 monthly	$184.96	1.65	51.5%
J	RRF Stage 1	One Bin System, No separate recycling service	Green & General, 6 monthly	$176.10	0	43.8%

Notes:

i) The costs for disposal of domestic waste to the RRF are assumed to be $85 / tonne with a separate recycling service and $ 90 / tonne for the one bin option

*** The kerbside recovery factor compared to B (the current level of service) – in terms of tonnes - if B collected a 1000 tonnes; C would collect 1720 and F would collect 1650 tonnes of recyclables. This table is only used for comparison between the kerbside collection options. It should not be used for retrieval of recyclables for the whole waste stream because the RRF will also retrieve recyclables e.g. Option J does not retrieve any kerbside recyclables but retrieves recyclables from the resource recovery process.*

ATTACHMENT B

City of Joondalup
Waste Management Strategy

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BSD Consultants Pty Ltd

EXECUTIVE SUMMARY

This report has been prepared to outline the waste management options for the City of Joondalup. A Vision for waste management for City of Joondalup has been developed that is compatible with the State Government Strategy and the Mindarie Regional Council's (MRC) objectives. The proposed Vision statement for waste management in the City of Joondalup is:

Towards zero waste while providing a comprehensive and sustainable waste service

It should be recognised that the initial State Government waste management strategy aimed for zero waste to landfill by 2020. Therefore the Vision of zero waste should be considered a long term goal. There are a number of legitimate waste management options that could be introduced, and there is adequate time to establish the waste management infrastructure in order to achieve the Vision

In the short term the City of Joondalup, as a participant in the MRC, will be involved in the important decision to develop a resource recovery facility (RRF) to treat the waste from domestic properties. The RRF can contribute to the sustainable management of waste by increasing recycling, diverting waste from landfill, reducing green house gases and turning the organic fraction of waste into a useful product such as compost.

In order to develop the RRF there will be an increase in costs to ratepayers. The current waste management costs are estimated to be approximately $131.57 per household per year. The introduction of Stage 1 of resource recovery, when 70% of the domestic waste from the City of Joondalup will be processed, is expected to increase this cost to approximately $175.54 per household per year. The diversion from landfill rate will increase from the current rate of approximately 14% to over 50% with the introduction of resource recovery.

It is recognised that there has been pressure from some residents to introduce a second bin for recycling in the City of Joondalup. Surveys of residents completed by the City of Joondalup and the MRC indicate that a two bin system is preferred. However, the surveys completed by the MRC also indicate that the knowledge of the RRF project is not high.

The proposed introduction of further stages of resource recovery in the medium term (5 to 15 years) will increase the waste diversion rates and the cost to ratepayers. There has been considerable development of resource recovery technologies in recent years. As the community becomes more familiar with resource recovery technology there is the potential to consider waste separation at source (by the households) as well as separation by mechanical means (at the RRF).

A number of options have been assessed in this report, including introduction of resource recovery, the introduction a second bin for recycling and variations to the frequency of the bulk verge collection. The following **Table ES1** summarises the options assessed and provides the estimated costs and waste diversion rates for these options.

Table ES1 – Options assessed to achieve the Vision with estimated costs and waste diversion rates

Option	Domestic Waste - Disposal / Treatment	Recycling Service – Collection Method & Frequency	Bulk Service - Collection Method & Frequency	Total Waste Disposal / Treatment Cost	Cost per household	Diversion Rate
A	Tamala Park (at $20.45/tonne)	Bag & voluntary MGB at cost to resident, fortnightly	Green & General, 9 monthly	$1,566,253	$120.35	13.9%
A1	Tamala Park (at $30/ tonne)	Bag & voluntary MGB at cost to resident, fortnightly	Green & General, 9 monthly	$2,178,922	$131.57	13.9%
B	RRF Stage 1	Bag & voluntary MGB at cost to resident, fortnightly	Green & General, 9 monthly	$4,583,920	$175.54	50.5%
C	RRF Stage 1	Bag at cost to C of J, no MGB service, fortnightly	Green & General, 9 monthly	$4,695,188	$177.61	49.9%
D	RRF Stage 1	Voluntary MGB at cost to C of J, no bag service, fortnightly	Green & General, 9 monthly	$4,567,162	$181.06	50.7%
E	RRF Stage 1	Voluntary MGB at cost to C of J, no bag service, fortnightly	Green & General, 6 monthly	$4,534,337	$184.87	50.6%
F	RRF Stage 1	Compulsory MGB at cost to C of J, no bag service, fortnightly	Green & General, 9 monthly	$4,438,452	$184.96	51.5%
G	RRF Stage 1	Compulsory MGB at cost to C of J, no bag service, fortnightly	Green & General, 6 monthly	$4,405,626	$188.78	51.4%
H	RRF Stage 2	Compulsory MGB at cost to C of J, no bag service, fortnightly	Green & General, 9 monthly	$5,713,029	$208.23	65.8%
I	RRF Stage 2	Compulsory MGB at cost to C of J, no bag service, fortnightly	Green & General, 6 monthly	$5,710,613	$212.61	65.4%
J	RRF Stage 1	One Bin System, No separate recycling service	Green & General, 6 monthly	$5,215,530	$176.10	43.8%
K	RRF Stage 2	One Bin System, No separate recycling service	Green & General, 6 monthly	$6,946,595	$207.78	59.2%

Notes:

i) The costs for disposal of domestic waste to the RRF are assumed to be $85 / tonne with a separate recycling service and $ 90 / tonne for the one bin option

ii) *To buy back the recycling bins from residents that have previously purchased them there is assumed to be a one off cost, (in the first year). Therefore for Options C, D and E there is an additional cost in the first year of implementation of $3.76 per household to purchase the bins.*

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1. INTRODUCTION

This report has been prepared to outline a waste management Vision for the City of Joondalup, which is compatible with the overall City of Joondalup direction, the State Government and Mindarie Regional Council (MRC) policies. In order to achieve the Vision there are a number of waste management options that could be introduced by the City of Joondalup. The Vision is considered as a long term goal with the potential to achieve zero waste to landfill through a number of potential steps.

The City of Joondalup is a member council of the MRC and the MRC are committed to developing a Resource Recovery Facility (RRF). The facility will treat household waste and turn the organic fraction of the waste into useful products such as compost or electricity. The RRF has many environmental benefits in comparison to landfilling waste.

The introduction of resource recovery and new waste technologies will have a significant impact on waste management in the City of Joondalup and this report investigates these implications. Other options have also been considered investigated including variations to the recyclable collection methods and the frequency of the bulk verge collection.

2. WASTE DIRECTIVES

The following section outlines some of the Strategic Directions for waste management that may influence the City of Joondalup waste strategy. This includes the State Government and Mindarie Regional Council (MRC) strategies. These have been considered when developing the City of Joondalup waste management strategy and vision.

2.1 WESTERN AUSTRALIA

The State Government has paid increasing attention to waste management issues in recent years. This has been a response to public pressure and the growing realisation that Perth is heavily reliant on landfill for waste disposal. A number of policy documents relating to waste management and sustainability have been published with the aim of reducing the amount of waste going to landfill by maximising waste recycling, reuse and recovery. A summary of the State Government policies is provided in the Sections below.

2.1.1 WAste 2020

The *WAste 2020* policy document outlines the Government of Western Australia's vision of moving towards zero waste to landfill by 2020, with all waste being recycled, reused or recovered. The first of five goals in the *WAste 2020* policy document relates to sustainability and states: *"*to achieve waste reduction, re-use and recycling outcomes which are environmentally, socially and economically sustainable". The resource recovery goal seeks "to maximise the recovery and recycling of resources from waste", while the integration goal aims "to establish effective frameworks and structures to coordinate and facilitate waste reduction, re-use and recycling, the recovery of resources and the safe management of remaining wastes.*"*

WAste 2020 therefore provides a framework for the reduction (and ultimate elimination) of waste being sent to landfill and the establishment of operations (such as Resource Recovery Facilities) to recycle, reuse or recover waste materials. Indeed, the *WAste 2020* policy document has as a key outcome the development of "a thriving industry based on the recovery and re-use of resources from all of the community's waste streams" (WAste 2020, 2001: 9). The accompanying *WAste 2020* Taskforce Recommendations document also has as a key outcome the establishment of "facilities which process the community's waste streams securely located in dedicated resource recovery precincts" (WAste 2020, 2001: 7) and notes that "for Western Australia as a whole, and Perth in particular, it would be preferable if a range of [resource recovery] technologies were adopted" (WAste 2020, 2001: 3). Overall, the WAste 2020 document and the accompanying WAste Taskforce Recommendations document both recognise the need to establish facilities to recover and re-use municipal solid waste (MSW).

2.1.2 Strategic Direction for Waste Management

The State Government's *Strategic Direction for Waste Management* (2003) was released in August 2003 and represents the first step towards an action plan for achieving the *WAste 2020* vision. This document was essentially released for comments and consultation. The original document identified the main outcomes to be accomplished during the 2003 to 2005 period. Following the comments and consultation period the document was finalised and released as the *Statement of Strategic Direction for Waste Management in WA*.

2.1.3 Statement of Strategic Direction

In September 2004, the State Government released the *Statement of Strategic Direction for Waste Management in WA; Vision and Priorities*. This document draws on previous documents (State Recycling Blueprint, Waste 2020 and Strategic Direction for Waste Mnagement in WA) and sets out the framework and priorities for waste management in WA. It provides the strategic framework, priorities and fundamental principles to guide the Waste Management Board's vision that as a community we move **Towards Zero Waste in Western Australia**.

To realise this ambitious vision for waste management in Western Australia three principles for strategic waste management were proposed, (listed in order of preference):

1) Prevention – avoidance of waste generation ;
2) Recovery – re-use of generated waste through recycling and re-processing; and
3) Disposal – responsible disposal of waste.

The vision anticipates that resources available for waste management from 2005 will be predominantly directed towards managing the impacts of the waste by broadening the percentage of resources recovered from the solid waste stream and the disposal of non-recyclable waste in an environmentally acceptable method. Efforts to minimise waste at the generation stage will initially form a secondary priority based on allocation of resources. The focus will shift towards waste

management with some avoidance towards 2008 with approximately half of the waste management effort focussed on prevention rather than management by 2012.

The report promotes management of the whole life cycle of a product and the wastes from its creation, and advocates the adoption of a strategic approach to drive the transition from management of waste to a waste free society. To be effective waste management projects should intervene at the point in a product lifecycle where it will have the most impact and have an emphasis on actions that increase recovery or prevent waste generation. In the meantime, projects are still likely to involve the responsible disposal of waste.

It was recognised that greater effort is required to encourage and support waste reduction in business and industry, especially in small to medium sized enterprises. Efforts directed at business and industry includes: waste prevention through product design and production; opportunities for extended producer responsibility; and, encourage and support improvements in recovery of resources in waste and improvements to markets for recyclables.

Local Government has been acknowledged as taking significant steps towards resource recovery through its kerbside recycling services and the development of secondary processing facilities. It is the intention of the WMB to encourage and support improvements to markets for recyclables, improvements to kerbside recycling and secondary processing and an extension of kerbside recycling into commercial precincts where possible.

The waste management board also recognised the efforts being made by the community towards recycling. Part of the community approach endorsed by the statement involves continuous improvement in waste prevention and resource recovery in schools and the wider community.

The new approach to waste management and essential to achieving Zero Waste, is to encourage behavioural change for significantly greater efforts in waste reduction with a focus on individual responsibility. The cornerstone of this approach is the provision of broad community access to useful information about waste reduction.

In summary, the *WAste 2020* and *Statement of Strategic Direction for Waste Management* documents present a pathway for achieving zero waste to landfill by 2020. Both documents place emphasis on the principles of ‘reuse’, ‘recycle’ and ‘recover’, and encourage the establishment of facilities to maximise the recovery and re-use of MSW.

2.2 MINDARIE REGIONAL COUNCIL

The Mindarie Regional Council (MRC) are a formally constituted Regional Council under the Local Government Act. The MRC have seven local government member councils which includes the City of Joondalup.

The Regional Council was formally approved in 1987 and the designated function of the MRC, as stated in the existing Constitution, is:

"The orderly and efficient treatment and or disposal of waste delivered to a building or place provided managed or controlled for those purposes by the Regional Council".

This is transferred into a Mission Statement:

"The Mission of the Mindarie Regional Council is to provide effective and cost efficient waste disposal consistent with safe guarding all environmental elements for the benefit of the constituent local governments and their residents which form the regional district."

The MRC is essentially responsible for the disposal of waste generated by the residents of the member councils and delivered to the MRC by the member councils.

The MRC's administration centre is located at Tamala Park, some 30 kilometres north of Perth. The MRC currently employs eighteen staff, including the Chief Executive Officer, and has an annual budget in excess of $6 million. The primary business of the MRC is the disposal of MSW at the Tamala Park landfill facility, which is operated under a prescribed premises licence pursuant to Part V of the Environmental Protection Act and Ministerial Approval pursuant to Part IV of the Act.

The population in the MRC district is approximately 500,000 people and this is expected to grow to 740,000 by the year 2026. Waste quantities generated in the region are predicted to rise from 305,000 to 406,000 tonnes per annum by the year 2026.

The Mindarie Regional Council supports the principle of zero waste to landfill by 2020, and have been progressing towards the development of resource recovery for the treatment of household waste for a number of years. The MRC has as an objective *"To reduce waste to landfill by implementation of appropriate waste treatment methods, for at least that domestic waste generated within the Region."*

It is proposed that the MRC will construct resource recovery facilities in a number of stages. The MRC called for Expressions of Interest to build, own and operate the first stage of resource recovery in 2001. The companies shortlisted through the Expressions of Interest will be invited to tender in early 2005. It is proposed that the facility will be constructed in 2005/2006 and commissioned in mid to late 2006.

2.3 CITY OF JOONDALUP

2.3.1 Strategic Direction

The City of Joondalup have formulated on overarching mission and value statement to govern their activities. The following information is taken form the City's Principal Activities Plan for 2004/05 to 2008/09. The vision statement is for the City of Joondalup to be:*"A sustainable City and community that are recognised as innovative, unique and diverse."* The mission statement of the City of

Joondalup is: *"Plan, develop and enhance a range of community lifestyles to meet community expectation."*

2.3.2 Environmental Waste Management Policy

As indicated in the City of Joondalup's policy manual the waste management objective is: *"To provide a comprehensive waste disposal service to the City."*

2.3.3 Previous City of Joondalup Waste Management Strategy

The previous waste management strategy identified opportunities for waste management for all of the waste streams generated within the City of Joondalup within the broader framework of options and recommendations for regional waste management. A core function of the waste management strategy was the collection and management of domestic waste with one of the key issues being the collection systems for recyclables including current and future options. The report concluded that the final waste management strategy to be adopted by the City was to be dependent upon the final waste management option selected by the MRC.

Several recommendations contained in the MRC Waste Management Plan were considered in the development of the City of Joondalup Waste Management Strategy. These included:

- Joint regionally based green waste shredding facilities;
- Support for the City of Stirling trial incorporating a "one bin: resource recovery encompassing waste separation technology at a secondary processing facility;
- Diversion of inert waste from Tamala Park to the Atlas Mirrabooka site to maximise the available landfill volume at Tamala Park, the only Class II facility in the region;
- Maximising the capacity of the Tamala Park landfill site;
- Review and optimisation of the operations at Tamala Park;
- MRC securing the future use of Tamala Park through negotiations with the owners of Lot 17;
- MRC resolving to implement secondary waste treatment as an alternative to sanitary landfill.

It was recognised in this previous report that at a local council/regional level the proposed waste management diversion targets could not be met with a continuation of sanitary landfill as the preferred waste disposal option. Secondary waste treatment (resource recovery) options utilising organic materials for composting or waste to energy conversion are required. Operational cost savings are a potential benefit for a secondary treatment process incorporating recyclable waste separation for a "one bin" domestic waste collection strategy.

Community attitude indicated a preference towards kerbside recycling incorporating a second mobile garbage bin (MGB) over bag collections. Segregated waste collection services are consistent with public perceptions and awareness campaigns that supported source separation recycling. A "one bin" collection service incorporating putrescible and recyclable waste is likely to be viewed, at least initially, by the community as a backward step. However, under an appropriate regional waste management strategy, a one bin system has potential benefits including; reduced costs due to the

discontinuation of the recyclables collection service; added convenience; and it would require no additional capital expenditure by the City of Joondalup for the purchase of bins.

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The report questions whether a second bin collection system for recyclables is the most appropriate method of collection for the City of Joondalup beyond the short term, considering the significant recent progress in waste treatment and separation technology.

It was acknowledged that as far as local council/regional responsibilities for waste management were concerned, the MRC would be responsible for the safe and orderly disposal of waste, and the responsibility for collection of waste will remain with the individual councils. The collection of recyclables was considered fundamental to the long term management of waste for the City of Joondalup.

The City of Joondalup Waste Management Strategy recommended the following interim measures:

- Retain the bag service collection for recyclables for those currently using this service;
- Retain the two MGB service for those residents who participated in the trial charging an annual fee for the service;
- Enable additional resident to utilise the two MGB service charging the full service cost;
- Extend the current contract with the City of Wanneroo for collection services;
- The long term strategy should be implemented following completion of the City of Stirling "one bin" trial and finalisation of the MRC waste management strategy.

Continuation of the current bag collection service was not recommended for the long term. Either a two bin collection service or a "one bin" service were seen as the most appropriate long term options.

Selection of either the one bin or two bin options is a critical issue almost entirely dependent upon MRC waste management options. If disposal to landfill is selected as the preferred regional waste management option, a two bin system would be appropriate to ensure maximum resource recovery. If a secondary waste processing facility incorporating waste separation is selected, the most appropriate long term option for the City of Joondalup in terms of efficiency and resource recovery could be a one bin collection service.

It was acknowledged that should a one bin service be implemented an appropriate public awareness campaign would be required to reinforce to residents that resources recycling under the new system would equal that of the old.

The report concluded that the collection and disposal of other waste streams such as public litter bins, commercial waste, inert waste and bulk collections should remain unaltered as they are consistent with waste management planning for the region.

2.4 SUMMARY AND VISION STATEMENT

This section summarises the previous Sections 2.1 to 2.3 and concludes with the proposed approach for the City of Joondalup's Waste Management Strategy.

For a number of years the State Government has set the goal and vision for waste management in WA as being towards a waste free society. This essentially means that no waste should be sent to landfill. This vision is supported by federal government policies and is a formalised goal for most of the States and Territories in Australia.

The State Government Policy provides a number of principles to achieve the goal of a waste free society. These three principles are:

1) Prevention – avoidance of waste generation;
2) Recovery – re-use of generated waste through recycling and re-processing; and
3) Disposal – responsible disposal of waste.

As a Local Government the City of Joondalup has a role to play in each of the three principles, however the primary function of the City of Joondalup is to provide waste collection services. The State Government has acknowledged its role in setting the framework for waste prevention and minimisation. The State Government indicates that they will work with business and industry to look at product design, production processes and producer responsibility to reduce and where possible eliminate the creation of waste.

The primary role of the MRC is the responsible disposal of waste. The MRC are progressing towards the introduction of resource recovery and the creation of lined landfill cells at Tamala Park. As a member of the MRC, the City of Joondalup are taking the required steps to ensure the responsible disposal of waste. The primary responsibility of the City of Joondalup therefore is the provision of services to the households, which is the focus of the vision and this waste management strategy.

The vision and mission statements for the City of Joondalup and the waste management policy indicate the need for sustainability, meeting community expectations and providing a comprehensive service. The vision statement should also be compatible with the City of Joondalup's existing vision for the overall functions of the council.

The vision for waste management in the City of Joondalup, also needs to be compatible with the strategic direction of the State Government and the MRC. In conclusion the vision should include elements of the MRC, the State Government strategy and the City of Joondalup's desired outcomes. The proposed vision statement is

Towards zero waste while providing a comprehensive and sustainable waste service.

The vision should be considered a long term goal, remembering the initial State government strategy aims for zero waste by 2020.

There are many legitimate steps that can be taken in order to achieve the vision and the ultimate goal of zero waste to landfill. The introduction of resource recovery by the MRC is an important step and will increase the diversion rates for the City of Joondalup considerably. The responsibility of

introducing resource recovery rests with the MRC. The City of Joondalup can contribute to the introduction of resource recovery through their ongoing participation with the MRC.

The City of Joondalup focus is therefore on the provision of services to residents. The extent of services provided will be based on the requirements of residents, the charges the residents are willing to incur for the services and the ultimate vision that the City is working towards in terms of the reduction of waste to landfill.

3. CITY OF JOONDALUP SERVICES AND STATISTICS

The following section outlines the current waste management situation at the City of Joondalup. It provides some background information regarding the characteristics of the council and the waste generated.

3.1 CITY OF JOONDALUP STATISTICS

The most recent census undertaken by the Australian Bureau of Statistics was in 2001. The census is undertaken every 5 years and therefore the statistics for the City of Joondalup were also undertaken in 1991 and1996. The population estimates from the last threes census's are shown in **Table 3.1** below.

Table 3.1 – Population of the City of Joondalup from the Australian Bureau of Statistics

	1991	1996	2001
City of Joondalup (North)	22,665	37,300	45,884
City of Joondalup (South)	100,036	103,736	102,384
City of Joondalup (Total)	**122,701**	**141,036**	**148,268**

Table 3.2 indicates the number and types of dwellings that exist in the City of Joondalup as published by the ABS from the last three census's.

Table 3.2 – Number of dwellings from ABS census

	Separate Houses	Semi detached, townhouses etc.	Flats, apartments etc.	Other dwellings	TOTAL
	1991				
City of Joondalup (Total)	34,980	2,244	109	109	37,442
	1996				
City of Joondalup (Total)	42,332	2,820	457	154	45,763
	2001				
City of Joondalup (Total)	46,381	3,450	734	123	50,688

The Local Government directory for 2003/04 indicates that the City of Joondalup population in 2001/02 was 157,431 and the number of households was 51,982, which are slightly higher than the census data.

City of Joondalup has also provided information in a questionnaire sent out by BSD Consultants in late 2003 for a MRC project. The City of Joondalup indicated that there was approximately 54,000 households in the City and a population of approximately 167,0000 people. It is assumed for the purposes of this report, that this is an accurate reflection of the current population and number of households within the City.

3.2 POPULATION PROJECTIONS

Population estimates from 1996 to 2031 are provided by the Western Australian Planning Commission (WAPC) in their *WA Tomorrow* report. The population figures are estimated every five years. The WA Tomorrow report indicates three scenarios for population expansion: high, medium and low. The medium scenario has been used to determine the population projections for the MRC.

Table 3.3 provides the population estimates for each of the three scenarios for the City of Joondalup.

Table 3.3 – Population projections for the City of Joondalup

	1996	2001	2006	2011	2016	2021	2026	2031
Low Scenario	148,369	158,800	160,500	160,900	161,200	158,700	158,300	158,100
Medium Scenario	148,369	160,900	164,900	163,700	166,800	165,900	165,800	166,300
High Scenario	148,369	161,700	165,900	163,800	167,700	167,100	167,600	169,500

Table 3.3 indicates that while the population of the City of Joondalup had a large increase in population from 1996 to 2001, the expected increase in population for the next 25 years is not as significant. The expected population increase over the 2006 to 2031 period is –2400, 1400 and 3600 for the low, medium and high scenarios respectively. The percentage change in population in this period based on the 2006 population is –1.3%, 0.8% and 2.2% respectively. These are relatively low changes to the population and based on this information it can be assumed that the population in the City of Joondalup is likely to be steady over the next 25 years. As a result the current quantities of waste generated are not likely to increase due to an increasing population. The volumes of waste generated will potentially decrease as the community becomes more aware of waste generation.

3.3 CURRENT SERVICES

The current domestic waste collection services provided by the City of Joondalup includes:

- 240L MGB for municipal solid waste, collected weekly;
- Recycling – 60L bag, collected fortnightly, plus voluntary 240L bin (residents may volunteer to use 240L bin instead of a bag, provided the resident pay the difference in the cost of the recycling bin service);
- Bulk verge collection – one collection, with two services (green waste & furniture/white goods) once every nine months; and
- Four entry vouchers to Badgerup Greens Processing Facility – weekends and public holidays only.

Public services provided by the City of Joondalup include:

- Litter bins – 240L bins; street and park litter bins collected weekly.

Hazardous waste services include:

- Drop-off point at Tamala Park landfill site for domestic quantities.

The City of Wanneroo provides the collection of domestic waste, public litter bins, green waste and bulk verge collection under a contract arrangement. The collection of recyclable material within the City of Joondalup is undertaken by a private contractor, Cleansweep.

It should be noted that the City of Joondalup does not provide a collection service to commercial properties. Commercial properties must make other arrangements to dispose of their waste and this is likely to be undertaken by contractors such as Sita, Cleanaway, and the City of Wanneroo Environmental Waste Services.

3.4 CURRENT WASTE GENERATION

The quantities of waste produced by the City of Joondalup in 2002/03 was calculated from responses to a questionnaire sent out by BSD in late 2003 for a MRC project. The City of Joondalup was asked to provide information on the different waste streams that their residents and operations generated.

Other information regarding waste quantities has also been sourced from the Tamala Park gatehouse records, the MRC annual reports and invoices from contractors such as the City of Wanneroo. The quantities of waste from both sources are provided below in **Table 3.4**. For all of the waste quantities indicated in **Table 3.4**, the waste stream is assumed to have been generated in one year. It is assumed that the waste quantities indicated in **Table 3.4** coincide with the current quantities of waste generated.

Table 3.4 – Current waste generation

	2002/03 Quantities from Questionaire	From Badgerup MRF records	To Tamala Park from MRC Annual Report	To Tamala Park from Gatehouse records	To Tamala Park from City of Joondalup receipts
Time frame	2002/03	2002/03	2002/03	February 2003 to January 2004	2003/04
Domestic	53,000			56,443	53,245
Commingled Recyclables	4,661	5,789			
Bulk Verge Collection - General Waste	10,700			10,683	11,106
Bulk Verge Collection - Green Waste	4,500				
Green Waste from Trailer Brigade	1,800				
Depot Waste from council works				1,201	
Green Waste from council works				582	594
Total Waste to Tamala Park	**64,400**		**67,290**	**67,708**	**64,945**

3.5 CURRENT PARTICIPATION RATES AND GENERATION

The following section investigates the collection services provided by the City of Joondalup to determine the participation and waste generation rates per household.

3.5.1 Domestic Waste Collection Service

The residents of the City are provided with a weekly collection of a 240L MGB. It is anticipated that this service is utilised by all residents with only a small number of household's not putting their bins out on a weekly basis because of a low generation of waste.

From **Table 3.4** the quantity of domestic waste generated is estimated to be 53,000 tonnes. The number of households in the City of Joondalup is estimated to be 54,000 and therefore the generation rate for households is estimated to be 981 kg per household per year. Given the population of the City is estimated to be 167,000 the generation rate per person is estimated to be 317.4 kg per person per year.

3.5.2 Recycling Collection Service

The City of Joondalup provides residents with a fortnightly collection for recyclables. The recyclables are then sorted at the Badgerup materials recovery facility (MRF). The Badgerup MRF is owned by the City of Wanneroo and operated by the Recycling Company of WA on behalf of the City of

Wanneroo. The City of Joondalup have an agreement with the City of Wanneroo for the recyclables collected from the City of Joondalup's kerbside collection to be processed at the Badgerup MRF.

From information previously provided by the City of Joondalup there are approximately 5,500 residents that use the voluntary bin service for the collection of their recyclables. The remaining 48,500 households are provided with a bag for recyclables. It is estimated that in undertaking the recyclables collection service the contractor (Cleansweep) does approximately 1,300,000 drive-bys in a year.

The participation rates are estimated to be approximately 33% for the recycling bags and 76% for the recycling bins. **Table 3.5** indicates the participation rates for the various recycling collection services and indicates the number of participants.

Table 3.5 – Number of households that participate in recycling in the City of Joondalup

	Bag	Bin	Total
Number of recycling receptacles	48,500	5,500	54,000
Participation Rate	33%	76%	37%
Number of participants	16,005	4,180	20,185

From **Table 3.5** it is estimated that 20,185 households participate in recycling which is approximately 37% of the total number of households in the City of Joondalup.

The following **Table 3.6** indicates the quantity of recyclables disposed at the Badgerup MRF over the last 5 years

Table 3.6 – Recyclables generated by the City of Joondalup in a year

	Cart (tonnes)s	Bags (tonnes)	Total (tonnes)	Annual Increase (%)
2000/01			4,335.7	
2001/02	1,511.0	3,854.7	5,365.7	24%
2002/03	1,752.1	4,036.7	5,788.8	8%
2003/04	1,950.8	4,430.9	6,381.8	10%
2004/05	75.3	149.0	224.3	

It is apparent that the quantity of recyclables disposed at the Badgerup MRF has increased over the last 5 years.

By combining the information in **Tables 3.5** and **3.6** it is possible to determine the yield of recyclables from the two collection systems operated within the City of Joondalup. The population figures and the participation rates are assumed to stay constant in the period from 2001/02 to 2003/04. **Table 3.7** indicates the expected quantity of recyclables generated from the two systems.

Table 3.7 – Quantity of recyclables generated from recycling systems

	Number of participants		Quantity of Recyclables		Yield	
	MGBs	**Bags**	**MGBs**	**Bags**	**MGBs**	**Bags**
	Tonnes	Tonnes	Tonnes	Tonnes	kg/hh	kg/hh
2001/02	4,180	16,005	1,511.0	3,854.7	361.5	240.8
2002/03	4,180	16,005	1,752.1	4,036.7	419.2	252.2
2003/04	4,180	16,005	1,950.8	4,430.9	466.7	276.8
Average					**415.8**	**256.6**

Note: kg/hh equates to kilograms per household

Table 3.7 indicates that the MGB collection system has a higher yield than the bag collection system.

3.5.3 Bulk Verge Collection Services

The bulk verge collection services are provided to residents every 9 months. The collection services include both green waste and general waste. **Table 3.8** indicates the quantity of waste generated from the bulk verge collection services from various sources.

Table 3.8 – Annual quantity of waste generated from bulk verge collections

Source of Information	From Response to Questionnaire	To Tamala Park from Gatehouse records	To Tamala Park from City of Joondalup receipts
Year	2002/03	February 2003 to January 2004	2003/04
General Waste	10,700	10,683	11,106
Green Waste	4,500		
Total	15,200		

The green waste from the bulk verge collection services are disposed to the Badgerup waste facility and not Tamala Park and therefore the quantity of green waste is not provided within the Tamala Park sources in **Table 3.8**.

The quantity of general waste has been consistent from the three sources. However the quantity of waste indicated in **Table 3.8** has been generated over a one year period. The following table indicates the information provided by the contractor (City of Wanneroo) regarding the quantity of waste from one collection.

Table 3.9 - Quantity of waste generated from a bulk verge collection

	Collection: June 2001 to January 2002	Collection: April 2002 to October 2002	Collection: February 2003 to August 2003	Collection: November 2003 to June 2004
General Waste	7,437	7,373	8,617	8,026
Green Waste	1,795	3,814	2,995	2,435
Total	**9,232**	**11,187**	**11,612**	**10,461**

3.5.4 Trailer Waste

The City of Joondalup provides their residents with four tip passes a year to dispose of clean green waste to the Badgerup green waste processing facility located adjacent to the MRF. Information provided from the City for the 2002/03 year indicates that approximately 1,800 tonnes of green waste is disposed to the Badgerup facility. The percentage of passes that are used relative to the number that are sent out is approximately 7%.

3.6 CURRENT COST OF WASTE MANAGEMENT SERVICES

As described above in **Sections 3.4** and **3.5** there are currently four main services provided to residents in the City. These are:

- Domestic waste collection;
- Recyclables collection;
- Bulk verge collection (green and general); and
- Trailer passes for Badgerup greens facility.

The current costs of providing these services are investigated below. The costs are based on the modelling undertaken for the MRC and are derived from information provided by the City of Joondalup in 2003/04 and the questionnaire completed by the City of Joondalup for the 2002/03 financial year.

For each of the services there is a cost associated with collecting the waste or recyclables and for disposing (or processing) the waste once it has been collected. The collection costs and the disposal costs are described below for each of the services and a total cost for undertaking the service is also provided. These base costs are then used in **Section 5.0** to indicate the costs that are likely to be incurred by the City of Joondalup for the various options assessed as part of the strategy formulation process.

3.6.1 Domestic Waste Collection Service

3.6.1.1 Collection Costs

The collections of domestic waste from each of the residents in the City are undertaken by contract. The contractor (the City of Wanneroo) charges the City of Joondalup $0.76 per collection. The collection cost also includes the cost of bin repairs and replacements and special and late collections. For the 2003/04 financial year these costs were approximately $85,000. The collections occur once a week for 54,000 households and therefore the actual cost of collection is estimated to be $0.79 per collection (which includes the provision for the additional $85,000 for bin replacements etc.).

There are also overheads associated with staff supervision, communications and administration. The proportional cost of overheads for the domestic waste collection system is estimated to be $80,000 per annum. This cost was indicated in the questionnaire response from the City of Joondalup and is included as part of the domestic waste collection cost.

The cost of providing the 240L mobile garbage bin (MGB) also needs to be included as part of the domestic waste collection cost. The cost of the bin is $43 and the life expectancy is 10 to 15 years. Assuming the life of the bin is 12.5 years and the interest rate for amortisation is 8.5%, the annual cost of the bin is $5.72.

The cost of providing the domestic collection service is therefore assumed to be $0.929 per collection. There are assumed to be 54,000 households in the City of Joondalup and therefore the cost of undertaking the domestic collection service is approximately $2,608,082 per year.

3.6.1.2 Disposal / Treatment Costs

The waste that is collected by the domestic waste collection contractor is currently sent to the Tamala Park landfill for disposal. As indicated in **Section 3.5.1** the quantity of waste disposed from this eservice is estimated to be 53,000 tonnes per annum. The disposal rate at Tamala Park for member council in (2003/04) was $20.45 per tonne. Therefore the disposal cost is estimated to be $1,083,850.

3.6.1.3 Overall Costs

The following table summarises the costs to provide the domestic waste collection costs.

Table 3.10– Total Cost of Domestic Waste Collection Service

Activity	Cost	% of Domestic Waste Cost Total
Collection Costs	$2,608,082	70.2%
Disposal Costs	$1,083,850	29.2%
Total	$3,716,510	100.0%

3.6.2 Recyclables collection service

3.6.2.1 Collection Costs

The collections of recyclables from each of the residents in the City are undertaken by contract. The contractor (Cleansweep) charges the City of Joondalup $0.57 per collection. The collection cost is the same for the collection of the 240L MGB's or the 60L polypropylene bags. The cost is charged per drive by and therefore the cost is incurred by the City of Joondalup irrespective of the number of actual pick ups undertaken.

The cost of providing the 240L MGB is not included as part of the recyclables collection cost. The residents incur the cost of the bin and the household is charged $84.70 for the purchase and delivery of the bin and an annual service charge of $35.20. Therefore any additional cost of providing a recycling service using a MGB is borne by the resident.

The cost of the providing the recycling bag is minimal and the bags are written off on delivery. Therefore there is no bag capital servicing cost.

There are also overheads associated with staff supervision, communications and administration. The proportional cost of overheads for the recyclables collection system is estimated to be $37,000 per annum. This cost was indicated in the questionnaire response from the City of Joondalup and is included as part of the recyclable collection cost.

The cost of providing the recyclables collection service is therefore assumed to be $0.57x 54,000 x 26 = $800,280 per year +$37,000 = $837,280. It is assumed that there are 54,000 households in the City of Joondalup and the recyclables collections occur every fortnight.

3.6.2.2 Disposal / Treatment Costs

The recyclables that are collected by the recyclables collection contractor are currently sent to the Badgerup MRF for processing. Considering the cost of providing the MRF, the operational costs, the amount of contamination in the recyclables and the income generated for the recyclables, there was a net processing cost incurred by the City of Joondalup of $11.28 per tonne in 2002/03. The processing cost of $11.28 per tonne is used as the base cost, however this cost varies considerably depending on the recyclables market and the rate of contamination in the raw recyclable material received.

Considering the number of tonnes processed at the Badgerup MRF as indicated in **Section 3.5.2**, the current estimated cost of processing the recyclables is 6,380 tonnes x $11.28 per tonne = $ 71,966

3.6.2.3 Overall Costs

The following table indicates the costs to provide the recyclables collection and treatment services.

Table 3.11 – Total Cost of Recyclables Collection Service

Activity	Cost	% of Recyclables Cost Total
Collection Costs	$837,280	92.3%
Treatment Costs	$71,966	7.9%
Total	$907,460	100.0%

As indicated in **Table 3.11** the collection of the recyclables is the most significant cost while the treatment of the recyclables is much less. The income generated from the sale of recyclables makes a significant contribution towards covering the capital and operating costs of the Badgerup MRF. The pricing system at the Badgerup MRF penalises contamination of the incoming recyclables. In the quarter from July to September 2003, the City of Joondalup's contamination rate was approximately 24%, while the City of Swan's contamination rate was 41% and the City of Wanneroo's approximately 26%.

3.6.3 Bulk Verge Collection Service

3.6.3.1 Collection Costs

The collections of bulk verge waste from each of the residents in the City are undertaken by contract. The bulk waste collection service is for both general and green waste.

The collections are undertaken every 9 months and as indicated in **Section 3.5.3** they usually generate approximately 7,860 tonnes of general waste and 2,760 tonnes of green waste. Over the previous three financial years (2001/02, 2002/03, 2003/04) the cost to provide the bulk verge has been $20.31, $22.94 and $21.58 per household respectively. The average cost of providing the bulk verge collection and the cost used as the base is therefore $21.61 per household. Assuming that there are 54,000 households the annual cost of undertaking the bulk verge collection service is estimated to be $1,166,940.

There are also overheads associated with staff supervision, communications and administration. The proportional cost of overheads for the recyclables collection system is estimated to be $27,600 per annum. This cost was indicated in the questionnaire response from the City of Joondalup and is included as part of the bulk verge collection cost.

3.6.3.2 Disposal / Treatment Costs

The general waste that is collected by the City of Wanneroo is currently sent to the Tamala Park landfill for disposal. As indicated in **Section 3.5.1** the quantity of general waste disposed from this service is estimated to be 7,860 tonnes per collection. The collections currently occur on a nine monthly cycle and therefore four collections occur over a three year period. All of the costs have been calculated over a one year period and therefore the disposal cost in a year is estimated as 7,860 x 1.33 = 10,454 tonnes. The disposal rate at Tamala Park for member council for 2003/04 was $20.45 per tonne. Therefore the disposal cost for the general waste is estimated to be $213,780 per year.

The green waste is disposed to the Badgerup facility where there is a $33.33 per tonne treatment cost. The quantity of waste generated in a collection is estimated to be 2,760 tonnes and therefore the annual cost of disposal is estimated to be $122,348.

3.6.3.3 Overall Costs

The following table indicates the costs to provide the bulk verge waste collection costs. The overhead costs are included in the collection costs.

Table 3.12 – Total Cost of Bulk Verge Waste Collection Service

Activity	Cost	% of Bulk Verge Waste Cost Total
Collection Costs	$1,194,540	78.0%
Disposal Costs	$336,127	22.0%
Total	$1,530,667	100.0%

3.6.4 Trailer Passes

3.6.4.1 Collection Costs

Although there is not really a collection undertaken, there is a cost to the City of Joondalup to provide the trailer passes and operate the Badgerup greenwaste facility. Each resident is given four passes per

year for the disposal of green waste. Costs have been provided by the City of Wanneroo for the operation of the Badgerup greenwaste facility during weekends. The City of Joondalup was charged $13,501 per month for the facility, which gives an annual cost of $162,012. As indicated in **Section 3.5.4** the usage rate of the trailer passes is low and there is estimated to be 15,120 passes used. The cost to process the green waste is indicated in **Section 3.6.4.2.** The remaining cost is therefore assumed to be the collection cost. The cost per trailer pass is estimated to be $6.75 per trailer pass used and the estimated collection cost is $102,018.

3.6.4.2 Disposal / Treatment Costs

The costs are primarily the costs of processing the green waste at the Badgerup MRF. The City of Joondalup has provided information in the questionnaire response (form the MRC modelling exercise) that the cost of processing the green waste at the Badgerup MRF is $33.33 per tonne. The number of tonnes disposed to the facility by residents was estimated to be 1,800 tonnes per year. Therefore the disposal cost is estimated to be $59,994 per year.

3.6.4.3 Overall Costs

The following table indicates the costs to provide the Badgerup greenwaste facility on weekends and trailer passes to the City of Joondalup residents.

Table 3.13 – Total Cost of Bulk Verge Waste Collection Service

Activity	Cost	% of Bulk Verge Waste Cost Total
Collection Costs	$102,018	63.0%
Disposal Costs	$59,994	37.0%
Total	$162,012	100.0%

3.6.5 Total Costs for All Services

Table 3.14 provides a summary of the total waste management costs incurred by the City of Joondalup. The cost of collecting and disposing of public litter bin waste is also included, although this service is primarily undertaken as part of the parks and gardens maintenance and is not part of the waste management budget for domestic properties.

Table 3.14 – Current Total Cost of Waste Management for the City of Joondalup

Service	Cost component	Cost	% of Domestic Waste Cost Total
Domestic waste	Collection Costs	$2,608,082	39.57%
Domestic waste	Disposal/Treatment Costs	$1,083,850	16.44%
Recyclables	Collection Costs	$837,280	12.70%
Recyclables	Disposal/Treatment Costs	$71,966	1.09%
Bulk Waste	Collection Costs	$1,194,540	18.12%
Bulk Waste	Disposal/Treatment Costs	$336,128	5.10%
Trailer Passes	Collection Costs	$102,015	1.55%
Trailer Passes	Disposal/Treatment Costs	$59,994	0.91%
Litter Bins	Collection Costs	$77,946	1.18%
Litter Bins	Disposal/Treatment Costs	$14,315	0.22%
Other Costs		$205,000	3.11%
Total		$6,591,116	100.00%
Total Domestic Waste Cost (excludes public litter bin)		$6,498,855	98.60%
Waste management cost per household		$120.35	

Table 3.14 provides the estimated cost of the current waste management services provided by the City of Joondalup using figures from 2003/03 and he 2003/04 financial year. The disposal rate at the Tamala Park during this period was $20.45 per tonne.

The waste management costs indicated in **Table 3.14**, provide an estimate of the costs of the waste management services provided by the City of Joondalup. Comparing this to the City of Joondalup budget for 2004/05 indicates that there are additional costs associated with waste management activities. The budget indicates that there are corporate overheads of approximately $205,000. To ensure that the model accurately reflects the City of Joondalup waste budget other costs of $205,000 have been included in the model and allocated to overheads. These other costs are included in the waste management cost per household.

There is also a reserve fund and the budget indicates that in 2003/04 there was approximately $512,000 transferred to reserve. This amount is not included in the model or reflected in the waste management cost per household.

4. OPTIONS TO ACHIEVE THE VISION

The options to achieve the Vision outlined in **Section 2.4** focuses on the provision of services to households. As indicated in **Section 2.4** there are a number of options that could be selected to achieve the Vision.

In order to get to zero waste there will be a series of steps required. The following section discusses some of the waste streams and outlines some of the general benefits of the collection, disposal or treatment of the wastes. **Section 5.0** then describes in detail the estimated change to cost and waste diversion rates for a number of proposed options.

4.1 DOMESTIC WASTE SERVICE

4.1.1 Domestic Waste Collection

It is assumed that the collection service will continue in its current format. The weekly collection of a 240L MGB is a standard collection service offered by Local Governments throughout Perth and WA. There is a potential opportunity to change the capacity of the bin to encourage waste minimisation. This may increase awareness of waste minimisation and psychologically change the waste generation habits of residents. However given the demographics of the City of Joondalup, the likely opposition by residents to a reduction in bin capacity, and the capital outlay in providing all of the residents with a new bin, this has not been considered as a viable option for the City as part of this strategy.

4.1.2 Domestic Waste Disposal / Treatment

The majority of the City of Joondalup's waste is from the domestic service and this waste is currently disposed at the Tamala Park landfill. Audits of the composition of domestic waste in Perth, indicate that approximately 70% of the waste is organic (consisting of items such as food, paper products and garden waste).

Domestic waste is currently sent to landfill and buried where it biodegrades over many years (decades) and releases pollutants (leachate) into the groundwater and greenhouse gases (methane and carbon dioxide) into the atmosphere. Landfills limit the future use of land, because they continue to emit gases long after they are closed and the land is not stable due to settlement of the waste as it degrades.

Resource recovery targets the organic waste, which can now be considered as a resource. With the present landfill operations vast amounts of this resource are simply buried. Resource recovery can turn the organic fraction of the waste into a useful product such as compost or green energy. Resource recovery can also separate additional recyclables from the waste stream.

Within the RRF, the organic waste is biodegraded in a controlled environment, which limits the generation of greenhouse gases. A composting facility will ensure that the organic waste is broken down in an aerobic environment ensuring no methane is generated. In the case of a digestion facility the generation of methane is encouraged but the methane is captured within an enclosed vessel and then used in reciprocating engines to produce electricity.

The RRF will be a totally enclosed facility and therefore no leachate will be generated that can infiltrate into the groundwater. The buildings will be under negative pressure and the air sent through biofilters in order to prevent odours. The impacts and emissions from a RRF will be significantly less than landfill and the RRF has considerable environmental benefits which can be quantified in terms of greenhouse gas emissions

Resource Recovery will divert significant amounts of waste from landfill and will process today's waste today and will not leave a problem for future generations.

As well as the significant environmental and social benefits involved in introducing resource recovery, there is also a political imperative that needs to be considered. The Minster for the Environment has stated that the Stage 2 of the Tamala Park landfill can not be constructed unless the MRC are taking significant steps to introduce resource recovery. The Department of the Environment issues an annual prescribed premises licence for the operation of the Tamala Park landfill and could potentially include conditions that make the landfilling operations more onerous or specify that resource recovery must be introduced. The State Government has also committed to the reduction of waste to landfill and the introduction of resource recovery is seen as a key focus area.

The MRC are currently responsible for the disposal (or treatment) of domestic waste from the member councils which includes the City of Joondalup. The current constitution of the MRC requires the member councils to dispose of waste at the direction of the MRC. There is currently a new establishment agreement being considered by the member councils that would replace the existing constitution. The establishment agreement would give the MRC similar powers regarding the member councils waste. The MRC are committed to developing the RRF and as a member council the City of Joondalup are compelled to deliver their waste as directed by the MRC.

The introduction of resource recovery will be the most significant step in the City of Joondalup achieving its vision. There are demonstrated social and environmental benefits of introducing resource recovery, a State Government that supports the move and statutory regulations in place that could force its introduction. In this report it is assumed that the City of Joondalup will support the MRC and move towards treating the household waste through resource recovery.

4.2 RECYCLING SERVICE

4.2.1 Collection

The collection of recyclables is one of the primary services that could vary in the City of Joondalup in the future. The current collection of recyclables is undertaken with householders using both MGB's and bags. Households that use the MGB for recycling are required to pay for the bin and an annual service charge. It could be argued that this is imposing a cost penalty on households that recycle and rewards the households that do not. A number of options for the recyclable collection service are available and these have been investigated.

A draft report titled *Waste Management and Collection Systems in the MRC* (BSD Consultants, 2004) was submitted to the MRC and distributed to the member councils in February 2004. The report aims to identify the optimal waste management and collection system for the MRC Member Councils following the development of a RRF. The financial implications, the impact on the outputs from the RRF (recyclables and compost), and the advantages and disadvantages of different collection systems were assessed. Three collection systems were analysed involving: one bin; two bin (recyclables and municipal solid waste (MSW)); and two bin (wet bin / dry bin).

The "one bin" collection system, which is currently being implemented by the City of Stirling, involves residents placing all of the waste into a single bin. The single bin can be serviced by one collection truck and the waste is sorted and recyclables extracted using mechanical separation at the Atlas treatment facility.

The "two bin" option that is currently operated by a number of the Member Councils is based on a bin for recyclables and a bin for other waste. The general refuse bin is emptied weekly through a kerbside collection service. A separate receptacle (bin, bag or crate) is serviced (usually fortnightly) from the kerbside with recyclable packaging such as paper, glass, plastics, aluminium and steel being collected.

Another two bin system was also considered which is predicated on a bin for 'organic' waste and a bin for 'other' waste. This is also known as a 'wet bin / dry bin' system. It was concluded in the MRC report that this was not a viable option and therefore it is not considered further in this report.

A technical analysis of the bin collection systems was undertaken and ideally this would have provided the MRC with a clear direction in terms of the optimum collection system to use with the introduction of resource recovery. However the analysis indicated that there are advantages and disadvantage to all of the systems and the optimum collection system will be dependent on the priorities of the Member Councils. The RRF and the collection system could have a number of different objectives such as maximizing the quantities of traditional recyclables extracted from the waste, diverting waste from landfill, or producing a compost that can have an unrestricted application.

The report concluded that the community attitude and perceptions regarding the bin collection system needed to be assessed further. The community attitude towards the various systems was surveyed to determine the relative importance of the bin collection issues. The survey results are summarised in **Section 6.0**.

Following the inclusion of the community survey data, the report and recommendations were provided to the MRC. The following recommendations were endorsed:

- A unified waste collection service is not a requirement for the RRF;
- That the member councils should continue to provide a separate collection service for recyclable packaging, and sorting of this material should continue to be undertaken by parties other than the MRC;
- A separate materials recovery facility will not be provided in the RRF as part of stage one; and

- The flexibility of the RRF to process a variable waste stream and recover recyclable packaging material will be a key tender requirement.

Although the RRF will recover recyclables through its sorting technology, it is likely that the recyclables produced will have some contamination from the organic wastes and this would reduce the quantity of materials available for recycling. The sorting process at Atlas extracts a similar amount of recyclables to a kerbside bag collection service. Audits of waste for Perth suggests that packaging recyclables make up 10 to 15% of the domestic waste stream, with paper and cardboard contributing another 15 to 25%. Therefore between 25% and 40% of the domestic waste could be diverted from the domestic waste MGB to the recycling receptacle. It is not likely that everyone participate in recycling, however there are potential savings if the City of Joondalup residents have a greater participation in recycling compared to disposing in the domestic waste MGB. MGB. A separate kerbside recycling system will capture a larger quantity of recyclables and increase diversion rates.

There are also significant environmental benefits in providing recycling services. Quantifying the environmental benefits of recycling and comparing these to the actual costs is beyond the scope of this study. However there have been studies undertaken that do quantify the benefits of recycling, and the environmental benefits are seen to outweigh the actual costs incurred. The environmental benefits are primarily based on the reduced energy required to produce the product from a recyclable compared to manufacture form raw materials. The energy savings correlate to greenhouse gas savings and minimising the use of additional raw materials.

The environmental benefits of recycling paper products rather than composting them can also be debated. Paper products make up a significant proportion of the domestic waste stream (15% to 25%) and these can be recycled back into paper products. Paper products can also be classified as organic wastes and therefore it would be a good feedstock for the RRF. From a waste hierarchy viewpoint it is preferable that paper fibres are recycled back into paper products rather than being composted.

4.2.2 Treatment / Disposal

The recyclables collected from the City of Joondalup are disposed to the Badgerup MRF in Wangara. This facility was initially developed by the City of Wanneroo, however there is now an agreement in place with the City of Joondalup and the City of Swan to share the costs and risk of operating this facility. With the exception of the “one bin” options it is assumed in this report that the recyclables from the City of Joondalup will continue to be processed through the Badgerup MRF.

4.3 BULK VERGE COLLECTION SERVICE

4.3.1 Collection

The collection of bulk verge waste is currently undertaken every 9 months. This involves residents placing both green waste and general bulk waste on the verge for collection. In this report increasing the frequency of the collection to once every 6 months is assessed. It has been assumed that the collection will continue to involve residents placing both green and general waste on the verge.

4.3.2 Treatment / Disposal

At present the green waste from the bulk verge collection is processed at the Badgerup facility. A contractor shreds the green waste and on sells this as mulch. There is a cost for the City of Joondalup to dispose of the green waste to this facility for treatment. It has been assumed that the green waste will continue to be collected separately and shredded / mulched at the Badgerup facility.

The general waste collected is currently sent to the Tamala Park landfill. It has been assumed that this waste is not suitable for the RRF and will continue to be disposed to Tamala Park following the development of Stage 1 and Stage 2 of the RRF. The general waste is not expected to have a high organic component and be a relatively inert type of waste. This waste could potentially be treated with a thermal waste treatment technology or alternatively improved sorting technologies could make treating this waste through a resource recovery process more viable.

4.4 TRAILER PASSES

4.4.1 Collection

The City of Joondalup provides residents with trailer passes to dispose of waste to the Badgerup green waste processing facility. Residents currently use 7% of the passes that are issued by the City. It has been assumed that the trailer passes will continue to be provided by the City.

4.4.2 Treatment / Disposal

The green waste is disposed at the Badgerup facility. The facility is open on weekends for residents to dispose of their clean green waste. It has been assumed that the current service will continue and for each of the options identified in **Section 4.6** the trailer pass service is retained.

4.5 HOUSEHOLD HAZARDOUS WASTE

Hazardous wastes are defined as those having physical, chemical or other properties that pose a threat to public health, safety and the environment (including substances that are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive) (DEP, 2001).

Examples of household hazardous wastes include cleaners, disinfectants, bleaches, nail polish remover, prescription drugs, pharmaceuticals, sharps (syringes and razors), oven cleaners, polishers, fire extinguishers, pesticides, insecticides, rodent poisons, herbicides, paints, thinners, varnishes, strippers, petrol, motor oils, glue, asbestos, pool chemicals, batteries and gas cylinders.

The City of Joondalup residents are able to access the drop-off point at Tamala Park landfill site for domestic quantities of household hazardous waste. With the introduction of the RRF it may be beneficial to investigate the provision of more drop off facilities for residents to dispose of hazardous household waste. This will provide residents with more opportunity to remove potential contaminants from the waste that will ultimately produce compost. This is likely to be more effective if it is

undertaken across the region and it is therefore an initiative that could be investigated and coordinated by the MRC.

4.6 OPTIONS AND SUMMARY

The previous sections have reviewed the potential changes to the collection and disposal systems for the waste streams generated by City of Joondalup residents. As a result there are a number of options that can be investigated to facilitate the City of Joondalup achieving its waste management Vision. **Table 4.1** summarises these options that have been investigated as part of this waste management strategy.

Table 4.1- Options Assessed to Achieve the Vision

	Domestic Waste		Recycling Service		Bulk Verge Collection Service		Trailer Passes
Option	**Collection Method & Frequency**	**Disposal / Treatment**	**Collection Method & Frequency**	**Disposal / Treatment**	**Collection Method & Frequency**	**Disposal / Treatment**	**Disposal / Treatment**
A	240L MGB weekly	Tamala Park	Bag & voluntary MGB at cost to resident, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
B	240L MGB weekly	RRF Stage 1	Bag & voluntary MGB at cost to resident, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
C	240L MGB weekly	RRF Stage 1	Bag & voluntary MGB at cost to C of J, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
D	240L MGB weekly	RRF Stage 1	Voluntary MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
E	240L MGB weekly	RRF Stage 1	Voluntary MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 6 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
F	240L MGB weekly	RRF Stage 1	Complusory MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
G	240L MGB weekly	RRF Stage 1	Complusory MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 6 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
H	240L MGB weekly	RRF Stage 2	Complusory MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 9 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
I	240L MGB weekly	RRF Stage 2	Complusory MGB at cost to C of J, no bag service, fortnightly	Badgerup MRF	Green & General, 6 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
J	240L MGB weekly	RRF Stage 1	One Bin System, No separate recycling service	Badgerup MRF	Green & General, 6 monthly	Tamala Park & Badgerup MRF	Badgerup MRF
K	240L MGB weekly	RRF Stage 2	One Bin System, No separate recycling service	Badgerup MRF	Green & General, 6 monthly	Tamala Park & Badgerup MRF	Badgerup MRF

5. FUTURE WASTE MANAGEMENT OPTIONS

The costs, impacts and diversion rates for each of the options indicated in **Section 4.5** (and summarised in **Table 4.1**) are investigated below. For each of the options there will be change in costs from the current situation and a change in the amount of waste diverted from landfill. A number of assumptions are also clarified.

5.1 OPTION A

The following section provides information on the cost and diversion rates of the current waste management services. Option A reflects the current situation, and the costs and diversion rates, if none of the collection services or disposal / treatment facilities change.

5.1.1 Costs

The costs of the current waste management system (Option A) has previously been outlined in **Table 3.14** in **Section 3.6.5**.

The disposal costs at Tamala Park in 2003/04 were $20.45 per tonne (excluding GST). This is a relatively low disposal rate and the disposal rate needs to increase to fund the development and lining of Stage 2 at Tamala Park. As the "base cost" to compare other options, a landfill disposal rate of $30 per tonne (rather than $20.45 per tonne has been used) which reflects the likely 2004/05 disposal rate. **Table 5.1** summarises the total waste management costs with an increased landfill disposal cost.

Table 5.1 Summary of Costs for Option A1

Additional disposal cost of $30 per tonne at Tamala Park

Service	Cost component	Cost	% of Domestic Waste Cost Total
Domestic waste	Collection Costs	$2,608,082	36.20%
Domestic waste	Disposal/Treatment Costs	$1,590,000	22.07%
Recyclables	Collection Costs	$837,280	11.62%
Recyclables	Disposal/Treatment Costs	$71,966	1.00%
Bulk Waste	Collection Costs	$1,194,540	16.58%
Bulk Waste	Disposal/Treatment Costs	$435,962	6.05%
Trailer Passes	Collection Costs	$102,015	1.42%
Trailer Passes	Disposal/Treatment Costs	$59,994	0.83%
Litter Bins	Collection Costs	$77,946	1.08%
Litter Bins	Disposal/Treatment Costs	$21,000	0.29%
Other Costs		$205,000	2.85%
Total Waste Management Cost		$7,203,785	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	98.63%
Waste Management Cost per Household		$131.57	

The costs indicated in **Table 5.1** have been assumed to be the base cost, which have then been compared to the other options in preceding sections for comparison.

5.1.2 Diversion Rates

The following table indicates the quantity of waste (and recyclables) generated at present. The destination of these wastes is also indicated and therefore it is possible to determine a waste diversion rate. The waste diversion rate indicates the quantity of waste that is diverted from landfill and is recycled or re used rather than landfilled.

It is assumed that the contamination rate of the recyclables is 20%. The other wastes that are currently diverted are the clean green waste streams, which are generated through the bulk verge collection or through the disposal of greenwaste to the Badgerup facility. These green wastes are shredded or mulched and then reused.

Table 5.2 - Waste Quantities Generated and Diverted for Option A

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	53,000	53,000			-	0%
Commingled Recyclables	6,380	1,276	5,104		5,104	80%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection - Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**65,430**	**10,575**	**-**	**10,575**	**13.9%**
Total Waste	**69,625**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.28**					

As indicated in **Table 5.2,** households in the City of Joondalup generated over 1,280 kg of waste per household per year. With the current collection and disposal / treatment options in place approximately 14% of the waste is diverted.

5.1.3 Summary

Option A1 is used as the base cost and waste diversion rate, which can be compared to all of the other options. The cost per household of $131.57 is expected to be the cost for the 2004/05 financial year. The current waste disposal situation also indicates that approximately 14% of the waste generated by the City of Joondalup residents is recovered, reused or recycled, with the remainder being sent to the Tamala Park landfill.

5.2 OPTION B

The following section provides information on the cost and diversion rates of Option B. In Option B the current collection services continue however approximately 70% of the domestic waste is sent to the RRF. The RRF stage 1 is likely to have a capacity of 100,000 tonnes per annum and it is assumed that only 70% of the domestic waste for each of the member councils will be disposed to the RRF in Stage 1. The remaining domestic waste and the other wastes generated will be disposed to Tamala Park.

5.2.1 Costs

A gate fee for the disposal of waste has been calculated using assumptions for the development of Lot 505, the disposal fee to be paid at the RRF, the quantity of residue from the RRF and the transport costs for residue. A model has been developed by the MRC's financial consultants (Deloitte), that provides a gate fee for processable and non-processable waste. Processable waste can be processed through biological resource recovery technologies, while non-processable can not.

To allow for the cost of processing 70% of the waste through the RRF, the cost of the land (Lot 505) conditionally purchased by the MRC to construct the RRF, development of the infrastructure on Lot 505 and ongoing landfill operations including the construction of lined landfill cells, the Deloittes model indicates that the gate fee for disposal of processable waste by the member councils would need to be $73.17 per tonne. This is based on a disposal fee at the RRF of $85 per tonne. The cost to dispose of non-processable waste as calculated by the Deloittes model was $38.24 per tonne.

In order to determine the change in the waste management costs the increased disposal rates were input into the model for Option B. The following table summarises the waste management costs for the City of Joondalup for Option B. The full calculations are shown as **Table B – Option B** in **Appendix A**.

Table 5.3 - Summary of Costs for Option B

Service	Cost component	Base Cost Option A1	Cost Option B	% of Total Waste Cost (Option B)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	27.14%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$3,878,010	40.36%
Recyclables	Collection Costs	$837,280	$837,280	8.71%
Recyclables	Disposal/Treatment Costs	$71,966	$71,966	0.75%
Bulk Waste	Collection Costs	$1,194,540	$1,194,540	12.43%
Bulk Waste	Disposal/Treatment Costs	$435,962	$522,101	5.43%
Trailer Passes	Collection Costs	$102,015	$102,015	1.06%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.62%
Litter Bins	Collection Costs	$77,946	$77,946	0.81%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.53%
Other Costs		$205,000	$205,000	2.13%
Total Waste Management Cost		$7,203,785	$9,608,153	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$9,478,988	98.66%
Waste Management Cost per Household		$131.57	$175.54	

As indicated in **Table 5.3** the cost of the collection services does not vary, however the disposal costs rise significantly to contribute the cost of the development RRF. The disposal costs increase by over $2,400,000, which equates to an increase to a household for waste management cost of $43.97 per year in comparison to Option A1.

5.2.2 Diversion rates

The following table indicates the estimated quantity of waste (and recyclables) generated (and diverted) following the introduction of Stage 1 of the RRF. One of the main consequences from the introduction of the RRF is that it diverts a significant quantity of waste away from landfill. It has been assumed that 70% of the domestic waste from the City of Joondalup will be sent to the RRF, and 25% of the incoming waste becomes residue that requires landfill. The remainder of the domestic waste becomes a recovered product (such as compost, glass, metals, plastics or as a biogas that can generate electricity). The following table indicates the quantity of waste generated, the destination of the waste and the diversion rate for Option B.

Table 5.4 - Waste Quantities Generated and Diverted for Option B

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	53,000	25,175		27,825	27,825	53%
Commingled Recyclables	6,380	1,276	5,104		5,104	80%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection – Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins – reserves	700	700				0%
Total Waste and recyclables	**76,005**	**37,605**	**10,575**	**27,825**	**38,400**	**50.5%**
Total Waste	**69,625**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.28**					

As indicated in **Table 5.4** the introduction of resource recovery as modelled through Option B results in over 50% of the City of Joondalup's waste being diverted from landfill. This is compared to the current scenario where only 14% is diverted.

5.2.3 Summary

The introduction of resource recovery and in particular the construction of the RRF Stage 1 will result in increase in the cost per household of approximately $44. However as a result of the introduction of the RRF Stage 1, the City of Joondalup is able to demonstrate that they are diverting from landfill over half of the waste that residents generate.

5.3 OPTION C

The following section provides information on the cost and diversion rates of the Option C. Option C costs assume that the RRF is developed and approximately 70% of the domestic waste is disposed to the RRF. In this option it is the recycling collection service that would change.

As described in **Section 3.6** there has been a voluntary MGB recycling service in place in the City of Joondalup. Residents have paid for the cost of the bin if they prefer this system to the bag recycling system. For Option C it has been assumed that the bag recyclable collection service would continue,

however, the bin system would not. In order for this to happen, the City of Joondalup, is likely to have to offer to buy back the MBG from the residents who have previously paid for the bin.

To justify this decision to residents/ratepayers it may need to be highlighted that the City of Joondalup are part of the MRC proposal to construct a RRF. The RRF will be able to increase the quantity of recyclables that can be extracted from the waste stream through upfront sorting machinery. There are currently around 2,400 households that have paid for the voluntary MGB. These residents are likely to be reluctant to give up their bin and it is likely that there will be a need for some consultation and education to indicate to residents that their recyclables are still going to be managed sustainably.

5.3.1 Costs

The current costs charged to the resident for supplying and delivering the bin is $84.70 per bin. There are 2,400 bins that have been delivered to residents throughout the City and it is assumed that each of these residents will be reimbursed $ 84.70 per bin. The cost of this buy back would be approximately $203,280. There is also an annual service charge to collect the MGB's of $35.20, and it has been assumed that this would not be reimbursed.

It has been assumed that the cost of buying back the bin would be incurred in one financial year, and this cost would be added to the recyclable collection cost for that year. In the following years this one off cost would not be incurred. The costs indicated in **Table 5.5** are the ongoing costs and not the one off costs in the first year to buy back the bin.

It is also assumed that the 5,500 households who previously used the MGB would then use the bag system. It has therefore been assumed that the number of collections would remain constant. The effect that this would have on the generation of the recyclables and waste is discussed in **Section 5.3.2**. The processing cost for recyclables is likely to be reduced because the overall quantity of recyclables generated would be reduced. However additional waste will be processed through the RRF.

Table 5.5 indicates the costs for Option C.

Table 5.5 - Summary of Costs for Option C

Service	Cost component	Base Cost Option A1	Cost Option C	% of Total Waste Cost (Option C)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	26.83%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$4,010,301	41.26%
Recyclables	Collection Costs	$837,280	$837,280	8.61%
Recyclables	Disposal/Treatment Costs	$71,966	$51,572	0.53%
Bulk Waste	Collection Costs	$1,194,540	$1,194,540	12.29%
Bulk Waste	Disposal/Treatment Costs	$435,962	$522,101	5.37%
Trailer Passes	Collection Costs	$102,015	$102,015	1.05%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.62%
Litter Bins	Collection Costs	$77,946	$77,946	0.80%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.53%
Other Costs		$205,000	$205,000	2.11%
Total Waste Management Cost		$7,203,785	$9,720,050	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$9,590,885	98.67%
Waste Management Cost per Household		$131.57	$177.61	

As shown in **Table 5.5**, the waste management cost increases by over $2,500,000, in comparison to OptionA1, which equates to an increase to a household for waste management cost of $46.04 per year. There are additional costs due to the increased amount of waste to be treated at the RRF at the higher cost compared to the lower cost to dispose of recyclables through the MRF. In the first year there is likely to be a one off cost incurred to buy back the bins which would be equivalent to an additional $3.76 per household.

5.3.2 Diversion rates

As indicated in **Table 3.7** in **Section 3.5.2**, the yield from the households that use MGB's for recycling is much higher than the households that use bags. The participation rate also decreases for bags. If it is assumed that the 5,500 households that currently use MGB's will now use bags and the average yields (256.6 kg/household) and participation rates (33%) for the bags are used, then the quantity of recyclables generated is estimated to be 4,572 tonnes. This is compared to the current estimate of the quantity of commingled recyclables of 6,380 tonnes.

It is assumed that these additional recyclables would end up as extra waste in the domestic stream. In **Table 5.6**, the quantity of waste generated through Option C is estimated. These quantities are also used in **Table 5.5** above to calculate the costs for Option C.

Table 5.6 - Waste Quantities Generated and Diverted for Option C

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	54,808	26,034		28,774	28,774	53%
Commingled Recyclables	4,572	914	3,658		3,658	80%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection - Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins – reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**38,102**	**9,129**	**28,774**	**37,903**	**49.9%**
Total Waste	**71,433**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.31**					

The total waste generated per household would increase slightly if the bag system continued and the voluntary MGB recycling system ceased. The diversion rate also decreases slightly in comparison to Option B.

5.3.3 Summary

If the City of Joondalup opted to cease the MGB recyclable collection service, there is likely to be a cost to buy back the bins from the residents. It is assumed that the cost to buy back the bins is incurred in one financial year and is not an ongoing cost. In comparison to Option A1, the waste management cost per household increase by $46.04 per household and the waste diversion rate increases to 49.9%.

5.4 OPTION D

The following section provides information on the cost and diversion rates of the Option D. In Option D it has been assumed that the RRF is developed and approximately 70% of the domestic waste is disposed to the RRF.

As described in **Section 3.5** there has been a voluntary MGB recycling service in place in the City of Joondalup. Residents have paid for the cost of the bin if they prefer this system to the bag recycling system. For Option D it has been assumed that the optional MGB recyclable collection service would continue and the bag service would be abolished. Option D has also assumed that the resident would not be required to pay for the MGB. The cost of purchasing the bin and any additional costs to provide the service would be included in the overall waste management costs incurred by the City. In order to be equitable to residents that have previously purchased the bin it is assumed that the City of Joondalup would have to offer to buy the MGB back from the residents.

If the bin was made available to residents at no charge, then in order to model the costs of the collection there needed to be some assumptions made regarding the number of households that would request an MGB. It was assumed that all of the residents that currently participate in the bag recycling would request a bin. As indicated in **Section 3.5.2**, the participation rate for bags is 33% and it was assumed that there are 16,005 households that participate in the collection service. There are also 5,500 households that have paid for MGB's and therefore the total number of participants that are currently recycling regularly was estimated to be 21,505 households. This is approximately 40% of the total number of households.

It could also be assumed that there would be an increased participation rate if the cost of the recycling cart was not incurred directly by the household. It has been demonstrated (*Before and After Waste Audit*, SMRC - Doherty, 2002) that participation rates generally increase when a bin is offered as a recycling receptacle compared to the bag system. It was therefore assumed in Option D that 50% of households would have an MGB for recycling. There may be some operational difficulties in introducing free recycling bins and this is discussed further in **Section 5.12.3.2.**

5.4.1 Costs

Recyclable collection costs are generally charged by contractors on a per drive by basis. The contractor bidding for the service has to consider among other things, the anticipated participation rate, the number of households, the density of the catchment and the destination of the disposal/ treatment facility. Currently there is a 37% participation rate and the contractor charges $0.57 per drive by. If the participation rate increases to 50% then there would be a higher number of collections to undertake and the contractor would have a much larger scope of work.

In December 2003, the South Eastern Metropolitan Regional Council (SEMRC), advertised for tenders to provide waste collection services for their member councils the Cities of Armadale, Gosnells and South Perth. Tenders for the provision of the fortnightly recyclable collection service were received from Collex, Roads and Robinson, and Cleanaway. There were a number of alternative tenders submitted because the tenderer could bid on servicing one or all of the member councils. The following table indicates the tendered rates received for the fortnightly collection of a 120L or a 240L MGB from the City of South Perth, the Cities of Gosnells and Armadale, and the total SEMRC. The City of South Perth has approximately 17,500 services, while there are approximately 63,000 services in the SEMRC.

Table 5.7 - Tendered recyclable collection rates for SEMRC

Tender submitted by:	City of South Perth	Cities of Gosnells and Armadale	SEMRC
Number of households	17,500	45,500	63,000
Cleanaway	$0.66	$0.64	$0.63
Roads and Robinson	$0.79	No bid submitted	No bid submitted
Collex	$1.02 (240L MGB) $2.64 (120L MGB)	No bid submitted	No bid submitted

Costs exclusive of GST

The South Western Metropolitan Regional Council (SWMRC) advertised and assessed tenders for the collection of recyclables in 2002. The SWMRC recyclable collection tender was for the collection and disposal of the material to the RRRC in Canning Vale. The contract to collect the recyclables did not involve processing the materials. Cleanaway offered a very low rate of $0.35 per drive by for the collection of recyclables and disposal at the RRRC. There are approximately 110,000 households that were offered this service.

The Town of Cambridge is the only member council of the MRC which provides a MGB for the recyclable collection service. Cleanaway currently charges the Town of Cambridge $0.71 per drive by. There are approximately 10,500 households in the Town of Cambridge.

It is assumed that a contractor would charge the City of Joondalup approximately $0.70 per drive by, given the tendered rates from other contracts and the uncertainty for the contractor regarding the number of collection that they would have to undertake.

The costs of providing the bin are assumed to be $45 per bin and these can be amortised over a 12 year period with an interest rate of 8.5%. The annual charge for MGB is therefore $6.13, which equates to $0.201 per collection. It is assumed that only 50% of the City of Joondalup households would participate in the recycling service and be provided with an MGB. It is therefore assumed that for the recyclable collection service the City of Joondalup would incur a cost of approximately $1.15 per drive by. The contractor costs for Option D are indicated in more detail in **Table D2** in **Appendix A**.

It is also assumed that the contamination rate of the recyclables will increase. The 240L MGB's are more likely to be used for convenience and could be seen by some residents as additional capacity, rather than as a recyclable receptacle. The cost of disposal at the Badgerup MRF is dependent on the contamination rate of the recyclables. If the contamination rate increases so to does the processing or sorting cost. The processing cost for 2002/03 averaged out to $11.28 per tonne. However it varied between $5.49 per tonne and $17.86 per tonne in 2002/03. For Option D it is assumed that the disposal rate at the Badregup MRF will be $25 per tonne.

There is also likely to be an effect on the quantity of recyclables generated and the quantity of domestic waste. This is discussed in **Section 5.4.2** and the quantities of waste to be disposed /treated is also used to determine the costs.

Table 5.8 summarises the estimated costs incurred by the City of Joondalup for Option D.

Table 5.8 – Summary of Costs for Option D

Service	Cost component	Base Cost Option A1	Cost Option D	% of Total Waste Cost (Option D)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	26.33%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$3,720,548	37.56%
Recyclables	Collection Costs	$837,280	$1,151,528	11.62%
Recyclables	Disposal/Treatment Costs	$71,966	$213,300	2.15%
Bulk Waste	Collection Costs	$1,194,540	$1,194,540	12.06%
Bulk Waste	Disposal/Treatment Costs	$435,962	$522,101	5.27%
Trailer Passes	Collection Costs	$102,015	$102,015	1.03%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.61%
Litter Bins	Collection Costs	$77,946	$77,946	0.79%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.52%
Other Costs		$205,000	$205,000	2.07%
Total Waste Management Cost		$7,203,785	$9,906,273	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$9777,108	98.70%
Waste Management Cost per Household		$131.57	$181.06	

As indicated in **Table 5.8**, the waste management cost is likely to rise to $ 181.61 per household (compared to Option A1). It should be noted that a one off cost to purchase the bins from some residents is likely to be incurred. If this cost was included in the first year, a cost of approximately $ 184.82 per household would be incurred.

5.4.2 Diversion Rates

As indicated in **Table 3.7** in **Section 3.5.2**, the yield from the households that use MGB's for recycling is much higher than the households that use bags. The participation rate also decreases for bags. If it is assumed that 27,000 households will now use MGB's for their recycling receptacle and the average yield (415.8 kg/household) and participation rates (76%) are used, then the quantity of recyclables generated is estimated to be 8,532 tonnes. This is compared to the current estimate of commingled recyclables of 6,380 tonnes. As a result of the quantity of recyclables increasing, there is likely to be a reduction in the quantity of waste in the domestic stream. The contamination rate of the recyclables is estimated to increase to 25% in comparison to the current rate of 20%.

Table 5.9 provides the quantity of waste estimated for Option D. These quantities are also used in **Table 5.8** (above) to calculate the costs associated with Option D.

Table 5.9 - Waste Quantities Generated and Diverted for Option D

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	50,848	24,153		26,695	26,695	53%
Commingled Recyclables	8,532	2,133	6,399		6,399	75%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection - Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**37,440**	**11,870**	**26,695**	**38,565**	**50.7%**
Total Waste	**67,473**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.24**					

5.4.3 Summary

As indicated in **Tables 5.8** and **5.9** above, it is estimated that the cost of Option D would be approximately $181.06 per household and would result in a diversion rate of 50.7%. It should be noted that this does not include the cost to buy back the bins which would be incurred in the first financial year. The cost for Option D once in the first year when the bins need to be bought back from the residents was estimated to be $184.82 per household.

5.5 OPTION E

The following section provides information on the cost and diversion rates of Option E. In Option E the costs assumed that Stage 1 of the RRF is developed and approximately 70% of the domestic waste is disposed to the RRF.

As described in **Section 3.6** there has been a voluntary MGB recycling service in place in the City of Joondalup. Residents have paid for the cost of the bin if they prefer this system to the bag recycling system. Similar to Option D, Option E has assumed that the optional MGB recyclable collection service would continue and the bag service is abolished.

The change for Option E in comparison to Option D, is the increased frequency of the bulk verge collections. The current service is for the bulk verge collections to be undertaken every 9 months. In

Option E the cost and diversion rates of undertaking the bulk verge collections every 6 months has been investigated.

5.5.1 Costs

The recycling cost assumptions indicated for Option D in **Section 5.4.1** above have been used to determine the costs of this service. It has been assumed that the contractors would charge at rate of $0.70 per drive by to undertake the recyclable collection service using a 240L MGB. If all the costs of providing the service are included in the collection cost (including the cost of buying back the bins from residents) the cost per drive by is $0.96. If this cost was not incurred the estimated cost per collection is $0.82 per collection which includes the provision of 21,500 MGB's amortised over 12 years.

For the bulk verge collection service it has been assumed that the collection frequency would increase from once every 9 months to once every 6 months. The current combined collection of both the green waste and the general waste takes approximately 7 months to complete. If the service was to increase to a 6 monthly service it is assumed that additional plant and/or resources would be required to allow for a collection every 6 months. It is therefore assumed that to undertake one collection in 6 months rather than 7 months will increase the current collection cost by 20%.

The quantities of waste generated through the bulk verge collection are assumed to increase sightly due to the frequency increasing to 6 monthly. This is because residents are unlikely to make alternative arrangements to dispose of green or general waste through options other than the bulk verge collection. The amount of green waste generated in a year is estimated to increase by 10% per annum, while the quantity of general waste is estimated to increase by 5% per annum. The annual quantity of waste generated is expected to increase slightly, however the tonnes collected in each collection are assumed to decrease. The costs are calculated an on annual basis and therefore the following table and Table E1 in the Appendix indicate the annual cost and not the cost per collection round.

Table 5.10 indicates the estimated costs incurred to the City of Joondalup for Option E.

Table 5.10 - Summary of Costs for Option E

Service	Cost component	Base Cost Option A1	Cost Option E	% of Total Waste Cost (Option E)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	25.79%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$3,655,500	36.15%
Recyclables	Collection Costs	$837,280	$1151,128	11.39%
Recyclables	Disposal/Treatment Costs	$71,966	$213,300	2.11%
Bulk Waste	Collection Costs	$1,194,540	$1,433,448	14.18%
Bulk Waste	Disposal/Treatment Costs	$435,962	$554,324	5.48%
Trailer Passes	Collection Costs	$102,015	$102,015	1.01%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.59%
Litter Bins	Collection Costs	$77,946	$77,946	0.77%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.51%
Other Costs		$320,000	$205,000	2.03%
Total Waste Management Cost		$7,203,785	$9,112,355	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$9,983,190	98.72%
Waste Management Cost per Household		$131.57	$184.87	

As indicated in **Table 5.10** the annual cost for the service is expected to increase to $184.87 per household. Compared to Option D, it is estimated that Option E has an increased cost per household of $3.82 and this is a result of increasing the frequency of the bulk verge collection rate to once every 6 months. It should also be noted that similar to Option D, if in Option E the bins are bought back from the residents over one financial year, the cost to provide this service in the first year would be approximately $188.64 per household

5.5.2 Diversion Rates

Option E investigates a change to the bulk verge collection frequency. The assumptions made when changing the recycling service has been previously documented in **Section 5.4.2** for Option D**.** It is assumed that the quantity of waste that is generated from the bulk verge collection increases slightly because residents are less likely to make alternative arrangements to dispose of this waste. It is also assumed that the waste that was previously placed in the 240L MGB as part of the weekly collection will now be placed on the verge for this collection service. Therefore the quantity of domestic waste generated is reduced.

The following **Table 5.11** estimates the quantity of waste generated and the diversion rate for Option E.

Table 5.11 - Waste Quantities Generated and Diverted for Option E

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	49,959	23,731		26,228	26,228	53%
Commingled Recyclables	8,532	2,133	6,399		6,399	75%
Bulk Verge Collection - General Waste	10,976	10,976			-	0%
Bulk Verge Collection – Green Waste	4,038		4,038		4,038	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**37,540**	**12,237**	**26,228**	**38,465**	**50.6%**
Total Waste	**67,473**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.24**					

The waste generation rate and the diversion rate for Option E are very similar to Option D. There is estimated to be a slight increase in the overall amount of waste generated if the bulk verge collection frequency increases from 9 months to 6 months.

5.5.3 Summary

As indicated in **Tables 5.10** and **5.11** above it is estimated that the cost of Option E would be approximately $188.64 per household and would result in a diversion rate of 50.6%. It should however be noted that the cost to buy back the bins is also included in Option E and this cost would only be incurred over one financial year. The ongoing cost for Option E once the bins have been bought back from the residents is estimated to be approximately $184.87 per household. In comparison to Option D the increased frequency of the bulk verge collection is expected to increase the cost per household by approximately $4 per year.

5.6 OPTION F

The following section provides information on the cost and diversion rates of the Option F. In Option F the costs assume that Stage 1 of the RRF is developed and approximately 70% of the domestic waste is disposed to the RRF.

For Option F it has been assumed that the recycling service is a compulsory 240L MGB and this cost is borne by the City of Joondalup and on charged to the residents. The bulk verge collection is maintained on a 9 monthly cycle. The assumptions regarding the costs and waste diversion are explained in more detail in the following section.

5.6.1 Costs

For Option F, a 240L MGB needs to be purchased for each household within the City of Joondalup. Option F varies from Options D and E since the recycling MGB's are introduced to all households and not just the households that volunteer to receive the MGB and participate in recycling.

It is assumed that with the introduction of a compulsory MGB, a contract for the fortnightly collection of recyclables would be in the order of $0.80 per collection. The cost to provide a 240L MGB also needs to be factored into the cost. **Table F2** in **Appendix A**, indicates the costs required to generate a collection rate for the recycling service. The recyclable collection cost is assumed to be $1.06 and this is used as an input in **Table F1**.

Table 5.12 indicates the estimated costs incurred to the City of Joondalup for Option F.

Table 5.12 - Summary of Costs for Option F

Service	Cost component	Base Cost Option A1	Cost Option F	% of Total Waste Cost (Option F)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	25.78%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$3,525,038	34.84%
Recyclables	Collection Costs	$837,280	$1,491,051	14.74%
Recyclables	Disposal/Treatment Costs	$71,966	$280,100	2.77%
Bulk Waste	Collection Costs	$1,194,540	$1,194,540	11.81%
Bulk Waste	Disposal/Treatment Costs	$435,962	$522,101	5.16%
Trailer Passes	Collection Costs	$102,015	$102,015	1.01%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.59%
Litter Bins	Collection Costs	$77,946	$77,946	0.77%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.51%
Other Costs		$205,000	$205,000	2.03%
Total Waste Management Cost		$7,203,785	$10,117,086	100.00%
Total Domestic Waste Cost (excludes public litter bin)		$7,104,839	$9,987,921	98.72%
Waste management cost per household		$131.57	$184.96	

As indicated in **Table 5.12,** the annual cost for Option F is expected to increase to $184.96 per household.

5.6.2 Diversion Rates

As indicated in **Table 3.7** in **Section 3.5.2**, the yield from the households that use MGB's for recycling is much higher than the households that use bags. The participation rate is also likely to be

higher for MGB's than for bags. The data provided by the City of Joondalup indicates that the current participation rate is 33% for bags and 76% for bins. A study by the SMRC (*Before and After Waste Audit*, SMRC - Doherty, 2002) indicated that the participation rates for bags was 39% and this increased to 77% for recycling bins with the introduction of recycling bins in the region. The SMRC report also indicates that a change to a bin system for recycling also increases the quantity of recyclables generated per household to 273 kg per household. This is a lower yield than the figures indicates in **Table 3.7** in **Section 3.5.2** however the higher yields at present in the City of Joondalup are likely to be due to the commitment of the current recyclers. The households that currently recycle are willing to pay for the service and are expected to separate most of their recyclables. If an MGB was introduced to all households it is expected that they would not separate as much of their recyclable materials.

It is assumed that the participation rate for the MGB's will be 76% and the annual yield of recyclables will be 273 kg per household. Therefore it is assumed that the quantity of reyclables to be processed is in the order of 11,204 tonnes. This is compared to the current estimate of commingled recyclables of 6,380 tonnes. As a result the quantity of waste recycled is likely to increase and the additional recyclables would be diverted from the domestic waste.

The following **Table 5.13** estimates the quantity of waste generated and the diversion rate for Option F.

Table 5.13 - Waste Quantities Generated and Diverted for Option F

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	48,176	22,884		25,292	25,292	53%
Commingled Recyclables	11,204	2,801	8,403		8,403	75%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection – Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**36,839**	**13,874**	**25,292**	**39,166**	**51.5%**
Total Waste	**64,801**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.19**					

With Option F the total waste generated per household is expected to decrease because the households generate more recyclables, which are not considered as a waste. The diversion rate also increases to 51.5%.

5.6.3 Summary

For Option F a 240L MGB would be provided to all households in the City of Joondalup. As a result there would be an increase to the capital cost to provide the bins. There is also an assumed increase to the contract collection cost per household of $0.80 per drive by compared to $0.70 per drive by for Options D and E. There is, however, only a slight increase in the overall costs because the cost of processing the recyclables through the Badgerup MRF is assumed to be $25 per tonne compared to the cost of processing the waste through the RRF of $73.17 per tonne. The result is that the waste management cost per household for option F would be $184.96.

In comparison to Option D (assuming the ongoing cost of $181.06 and not the one off cost to buy back the bins), Option F would cost an additional $211,000 per year which corresponds to an increased cost of $3.90 per household.

The diversion rate increases to 51.5% due to the increased quantity of recyclables generated that can then be sorted at the Badgerup MRF.

5.7 OPTION G

The following section provides information on the cost and diversion rates of the Option G. For Option G the costs assume that Stage 1 of the RRF has been developed and approximately 70% of the domestic waste is disposed to the RRF.

For Option G it is assumed that the recycling service is a compulsory 240L MGB and this cost is borne by the City of Joondalup and on charged to the residents. The change in Option G (from Option F) is that the bulk verge collection would be undertaken on a 6 monthly cycle.

5.7.1 Costs

For Option G, the costs and assumptions for the recycling service were essentially the same as for Option F. The assumptions for the cost of the bulk verge collection were the same as for Option E.

Table 5.14 indicates the estimated costs incurred to the City of Joondalup for Option G.

Table 5.14 - Summary of Costs for Option G

Service	Cost component	Base Cost Option A1	Cost Option G	% of Total Waste Cost (Option G)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	25.26%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$3,459,990	33.52%
Recyclables	Collection Costs	$837,280	$1,491,051	14.44%
Recyclables	Disposal/Treatment Costs	$71,966	$280,100	2.71%
Bulk Waste	Collection Costs	$1,194,540	$1,433,448	13.89%
Bulk Waste	Disposal/Treatment Costs	$435,962	$554,324	5.37%
Trailer Passes	Collection Costs	$102,015	$102,015	0.99%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.58%
Litter Bins	Collection Costs	$77,946	$77,946	0.76%
Litter Bins	Disposal/Treatment Costs	$21,000	$51,219	0.50%
Other Costs		$205,000	$205,000	1.99%
Total Waste Management Cost		$7,203,785	$10,323,168	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$10,194,003	98.75%
Waste Management Cost per Household		$131.57	$188.78	

As indicated in **Table 5.14** the annual cost for Option G is expected to increase to $188.78 per household.

5.7.2 Diversion rates

Similar to the costs for Option G, the assumptions for the diversion rates are derived from Option E and Option F. The introduction of the compulsory MGB to all households is anticipated to increase the volume of recyclables generated and the introduction of the bulk verge collection on a 6 monthly cycle is also expected to slightly increase the volumes of waste generated from the bulk verge collections.

Table 5.15 estimates the quantity of waste generated and the diversion rate for Option G.

Table 5.15 - Waste Quantities Generated and Diverted for Option G

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	47,287	22,461		24,826	24,826	53%
Commingled Recyclables	11,204	2,801	8,403		8,403	75%
Bulk Verge Collection - General Waste	10,976	10,976			-	0%
Bulk Verge Collection - Green Waste	4,038		4,038		4,038	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins – reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**36,938**	**14,241**	**24,826**	**39,067**	**51.4%**
Total Waste	**64,801**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.19**					

For Option G the total waste generated per household is expected to decrease because the households would generate more recyclables, which are not considered to be a waste. The diversion rate for Option G is estimated to be 51.4%.

5.7.3 Summary

Option G provides a 240L MGB for all residents to undertake recycling collections. The frequency of the bulk verge collection is increased to a 6 monthly cycle. The estimated cost to provide these services is $188.78 per household. This is an increase from Option F of $3.82 per household, which reflects the change in cost to increase the bulk verge collections. Option G is estimated to divert 51.4% of the waste stream from landfill.

5.8 OPTION H

The following section provides information on the cost and diversion rates of the Option H. In Option H it has been assumed that Stage 2 of the RRF is developed and all of the domestic waste generated by the City of Joondalup is disposed to the RRF.

In Option H it has been assumed that the recycling service is a compulsory 240L MGB and this cost is borne by the City of Joondalup and on charged to the residents. The bulk verge collection is

maintained on a 9 monthly cycle. The assumptions regarding the costs and waste diversion are explained in more detail in the following section.

5.8.1 Costs

A gate fee for the disposal of processable waste has been calculated using assumptions for the development of Lot 505, the disposal fee to be paid at the RRF, the quantity of residue from the RRF, the transport costs of the residue and the development of the landfill cells at Tamala Park.. The Deloitte model does not provides a gate fee for Stage 2 of the RRF, however using the previous model developed by BSD (used in the report *Waste Management and Collection Systems in the MRC*, BSD, 2004) and assuming an annual cost of $532,000 for the development of the landfill, the BSD model and the Deloitte model are compatible. The processable waste gate fee following the development of Stage 2 is estimated to be $99.25. This is based on a disposal fee at the RRF of $85 per tonne. It has been assumed that the cost to dispose of non processable waste remains at $38.24 per tonne as calculated by the Deloittes model.

Table 5.16 indicates the estimated costs for Option H, which includes the costs of introducing the second stage of resource recovery.

Table 5.16 - Summary of Costs for Option H

Service	Cost component	Base Cost Option A1	Cost Option H	% of Total Waste Cost (Option H)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	22.89%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$4,781,360	41.97%
Recyclables	Collection Costs	$837,280	$1,491,051	13.09%
Recyclables	Disposal/Treatment Costs	$71,966	$280,100	2.46%
Bulk Waste	Collection Costs	$1,194,540	$1,194,540	10.49%
Bulk Waste	Disposal/Treatment Costs	$435,962	$522,101	4.58%
Trailer Passes	Collection Costs	$102,015	$102,015	0.90%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.53%
Litter Bins	Collection Costs	$77,946	$77,946	0.68%
Litter Bins	Disposal/Treatment Costs	$21,000	$69,473	0.61%
Other Costs		$205,000	$205,000	1.80%
Total Waste Management Cost		$7,203,785	$11,391,663	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$11,244,243	98.71%
Waste Management Cost per Household		$131.57	$208.23	

As indicated in **Table 5.16** the annual cost for Option H is expected to increase to $208.23 per household.

5.8.2 Diversion Rates

A number of the assumptions regarding the quantity of recyclables generated and the bulk verge collection waste are derived from Option F. For Option H however, the RRF has the capacity to

accept all of the domestic waste from the City of Joondalup and the other member councils of the MRC. The estimated residue from the RRF process is assumed to be 75% which has also been used for Stage 1.

Table 5.17 estimates the quantity of waste generated and the diversion rate for Option H.

Table 5.17 - Waste Quantities Generated and Diverted for Option H

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	48,176	12,044		36,132	36,132	75%
Commingled Recyclables	11,204	2,801	8,403		8,403	75%
Bulk Verge Collection - General Waste	10,454	10,454			-	0%
Bulk Verge Collection - Green Waste	3,671		3,671		3,671	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**25,999**	**13,874**	**36,132**	**50,006**	**65.8%**
Total Waste	**64,801**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.19**					

The diversion rate is estimated to be 65.8% for Option H.

5.8.3 Summary

The introduction of Stage 2 of Resource recovery is estimated to increase the waste management cost for each household of the City of Joondalup to $208.23. The diversion rate will increase to 65.8%. The quantity of domestic waste and the recyclables that are diverted from landfill are assumed to be 75%, although the bulk waste and public litter bin wastes are still sent directly to Tamala Park and are not processed at the RRF.

5.9 OPTION I

The following section provides information on the cost and diversion rates of the Option I. For Option I it has been assumed that Stage 2 of the RRF is developed and all of the domestic waste generated by the City of Joondalup is disposed to the RRF.

For Option I it has been assumed that the recycling service is a compulsory 240L MGB and this cost is borne by the City of Joondalup and on charged to the residents. The bulk verge collection was changed to a 6 monthly cycle. The assumptions regarding the costs and waste diversion are explained in more detail in the following sections.

5.9.1 Costs

As indicated in **Section 5.8.1** above, the gate fee for the disposal of waste has been calculated using assumptions for the development of Lot 505, the disposal fee to be paid at the RRF, the quantity of residue from the RRF, the transport costs for residue and the development of landfill cells. The gate fee following the construction of Stage 2 of the RRF when all of the domestic waste from the City of Joondalup will be processed, is estimated to be $99.25 per tonne. This is based on a disposal fee at the RRF of $85 per tonne. It is assumed that the cost to dispose of non processable waste remains at $38.24 per tonne as calculated by the Deloitte model.

Option I has the same recycling and collection services as Option G and so the same assumptions are used in this regard.

Table 5.18 indicates the estimate cost to implement Option I with the introduction of the second stage of resource recovery.

Table 5.18 - Summary of Costs for Option I

Service	Cost component	Base Cost Option A1	Cost Option I	% of Total Waste Cost (Option I)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	22.43%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$4,746,723	40.82%
Recyclables	Collection Costs	$837,280	$1,491,051	12.82%
Recyclables	Disposal/Treatment Costs	$71,966	$280,100	2.41%
Bulk Waste	Collection Costs	$1,194,540	$1,433,448	12.33%
Bulk Waste	Disposal/Treatment Costs	$435,962	$554,324	4.77%
Trailer Passes	Collection Costs	$102,015	$102,015	0.88%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.52%
Litter Bins	Collection Costs	$77,946	$77,946	0.67%
Litter Bins	Disposal/Treatment Costs	$21,000	$69,473	0.60%
Other Costs		$205,000	$205,000	1.76%
Total Waste Management Cost		$7,203,785	$11,628,156	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$11,480,736	98.73%
Waste Management Cost per Household		$131.57	$212.61	

As indicated in **Table 5.18** the annual cost for Option I is expected to increase to $212.61 per household.

5.9.2 Diversion Rates

A number of the assumptions regarding the quantity of recyclables generated and the bulk verge collection waste were the same as Option G. For Option I however, the RRF has the capacity to accept all of the domestic waste from the City of Joondalup and the other member councils of the MRC. The estimated residue from the RRF process is assumed to be 75%, which has also been used for Stage 1.

The following **Table 5.19** estimates the quantities of wastes generated and the diversion rate for Option I.

Table 5.19 - Waste Quantities Generated and Diverted for Option I

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	47,287	11,822		35,465	35,465	75%
Commingled Recyclables	11,204	2,801	8,403		8,403	75%
Bulk Verge Collection - General Waste	10,976	10,976			-	0%
Bulk Verge Collection – Green Waste	4,038		4,038		4,038	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins - reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**26,299**	**14,241**	**35,465**	**49,706**	**65.4%**
Total Waste	**64,801**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.19**					

The diversion rate is estimated to be 65.4% for Option I.

5.9.3 Summary

The introduction of Stage 2 of Resource recovery and the introduction of a bulk verge collection every 6 months has been estimated to increase the waste management cost for each household of the City of

Joondalup to $212.61. The diversion rate would increase to 65.4%. The quantity of domestic waste and the recyclables that are diverted from landfill have been assumed to be 75%, however the bulk waste and public litter bin wastes are still sent directly to Tamala Park and are not processed at the RRF.

5.10 OPTION J

The following section provides information on the cost and diversion rates of Option J. For Option J the costs assume that Stage 1 of the RRF is developed and approximately 70% of the domestic waste is disposed to the RRF.

For Option J it has been assumed that the RRF treats all of the waste from a one bin collection system. The one bin collection and treatment system has been implemented by the City of Stirling. The domestic waste from the City of Stirling is sorted and recyclables extracted using mechanical separation at the Atlas treatment facility. Therefore there is not a separate recycling service provided to residents.

The bulk verge collection has been assumed to be on a 6 monthly cycle. The assumptions regarding the costs and waste diversion are explained in more detail in the following section.

5.10.1 Costs

The one bin collection system has a financial advantage in that it dos not require a separate recycling collection cost. In comparison to the current collection system, for example, this would translate into an annual saving of approximately $837,000. However there are likely to be additional costs incurred through the treatment of the waste through the RRF.

To treat waste using a one-bin collection system with the additional glass, metals and plastics that would need to be separated, there would be an increase in the processing costs. The costs would be greater due to the additional sorting equipment that would be required; and the maintenance and operation costs would be increased. There are also likely to be additional costs to transport and dispose of the increased residue and potentially less income from the sale of products. It has been assumed that the cost of processing municipal waste through the one-bin collection system would be $90 per tonne. This is in comparison to other Options (B through to I) where the processing cost was assumed to be $85 per tonne. If the gate fee at the RRF was $90 per tonne this would corresponds to a processable waste fee for all domestic waste of $77.74 per tonne

Table 5.20 indicates the estimated costs for Option J.

Table 5.20 - Summary of Costs for Option J

Service	Cost component	Base Cost Option A1	Cost Option J	% of Total Waste Cost (Option J)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	27.05%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$4,546,798	47.16%
Recyclables	Collection Costs	$837,280	$0	0.00%
Recyclables	Disposal/Treatment Costs	$71,966	$0	0.00%
Bulk Waste	Collection Costs	$1,194,540	$1,433,448	14.87%
Bulk Waste	Disposal/Treatment Costs	$435,962	$554,324	5.75%
Trailer Passes	Collection Costs	$102,015	$102,015	1.06%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.62%
Litter Bins	Collection Costs	$77,946	$77,946	0.81%
Litter Bins	Disposal/Treatment Costs	$21,000	$54,415	0.56%
Other Costs		$205,000	$205,000	2.13%
Total Waste Management Cost		$7,203,785	$9,642,021	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$9,509,661	98.63%
Waste Management Cost per Household		$131.57	$176.10	

As indicated in **Table 5.20** the annual cost for Option J is expected to increase to $176.10 per household.

5.10.2 Diversion rates

The one bin system operated by the City of Stirling currently diverts 67% of the waste stream from landfill. The remaining 33% of residue from the Atlas processing facility is disposed to Tamala Park. The assumed residue from the RRF facility for other options with a separate recyclable collection is 25%. For Option J it has been assumed that the RRF can divert 67% of the waste collected from the one bin system. The quantity of waste that is not collected through the recyclable collection system has assumed to be disposed in the one bin with the remainder of the domestic waste.

Table 5.21 estimates the quantity of waste generated and the diversion rate for Option J.

Table 5.21 - Waste Quantities Generated and Diverted for Option J

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	58,491	31,059		27,432	27,432	47%
Commingled Recyclables		-	-		-	
Bulk Verge Collection - General Waste	10,976	10,976			-	0%
Bulk Verge Collection - Green Waste	4,038		4,038		4,038	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins – reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**42,735**	**5,838**	**27,432**	**33,270**	**43.8%**
Total Waste	**76,005**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.39**					

The diversion rate is estimated to be 43.8% for Option J. This is a reduced diversion rate in comparison to Option E which has similar services in regards to the bulk verge collection and the capacity of the RRF. The diversion rate for Option E is estimated to be 50.6%.

5.10.3 Summary

There was a reduction in costs for Option J in comparison to Option E, because the recyclable collections and treatment costs are no longer incurred. This cost saving is offset to some degree by the expected increase in costs to process the waste collected in one bin through the RRF. The estimated waste management cost for Option J is $181.40 per household per year, and the estimated diversion rate is 43.8%.

If a one bin collection system was introduced the City of Joondalup would not need to dispose of recyclables to the Badgerup MRF. The City of Joondalup have made an agreement to share the costs and benefits of the Badgerup MRF with the City of Wanneroo. Therefore there may be ongoing costs to the City of Joondalup, even if the Badgerup MRF was not required, however these have not been factored into the assessment.

5.11 OPTION K

The following section provides information on the cost and diversion rates for Option K. For Option K it has been assumed that Stage 2 of the RRF is developed and all of the domestic waste generated by the City of Joondalup is disposed to the RRF. In Option K it has been assumed that the RRF treats all of the waste from a one bin collection system. Therefore there would not be a separate recycling service provided to residents.

The bulk verge collection has been assumed to occur on a 6 monthly cycle. The assumptions regarding the costs and waste diversion are explained in more detail in the following section.

5.11.1 Costs

The one bin collection system has a financial benefit in that would not require a separate recycling collection cost. However, as discussed in **Section 5.10.1,** there are likely to be additional costs incurred through the treatment of the waste through the RRF.

Table 5.22 indicates the estimated cost for Option K.

Table 5.22 - Summary of Costs for Option K

Service	Cost component	Base Cost Option A1	Cost Option K	% of Total Waste Cost (Option K)
Domestic waste	Collection Costs	$2,608,082	$2,608,082	22.93%
Domestic waste	Disposal/Treatment Costs	$1,590,000	$6,257,391	55.02%
Recyclables	Collection Costs	$837,280	$0	0.00%
Recyclables	Disposal/Treatment Costs	$71,966	$0	0.00%
Bulk Waste	Collection Costs	$1,194,540	$1,433,448	12.60%
Bulk Waste	Disposal/Treatment Costs	$435,962	$554,324	4.87%
Trailer Passes	Collection Costs	$102,015	$102,015	0.90%
Trailer Passes	Disposal/Treatment Costs	$59,994	$59,994	0.53%
Litter Bins	Collection Costs	$77,946	$77,946	0.69%
Litter Bins	Disposal/Treatment Costs	$21,000	$74,886	0.66%
Other Costs		$205,000	$205,000	1.80%
Total Waste Management Cost		$7,203,785	$11,373,086	100.00%
Total Domestic Waste Cost (excludes litter bins)		$7,104,839	$11,220,254	98.66%
Waste Management Cost per Household		$131.57	$207.78	

As indicated in **Table 5.22,** the annual cost for Option K is expected to increase to $207.78 per household.

5.11.2 Diversion Rates

It has been assumed that the RRF processing waste from a one bin collection system can divert 67% of the waste stream from landfill. The quantity of waste that is not collected through the recyclable

collection system has been assumed to be disposed in the one bin with the remainder of the domestic waste.

Table 5.23 estimates the quantity of waste generated and the diversion rate for Option K.

Table 5.23 - Waste Quantities Generated and Diverted for Option K

Waste Source	Quantity of waste generated	To Tamala Park	To Badgerup facility	To Neerabup RRF	Total Diverted from Landfill	% Diverted from landfill
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
Domestic	58,491	19,302		39,189	39,189	67%
Commingled Recyclables		-	-		-	
Bulk Verge Collection - General Waste	10,976	10,976			-	0%
Bulk Verge Collection - Green Waste	4,038		4,038		4,038	100%
Green Waste from Trailer Brigade	1,800		1,800		1,800	100%
Public litter bins – reserves	700	700			-	0%
Total Waste and recyclables	**76,005**	**30,978**	**5,838**	**39,189**	**45,027**	**59.2%**
Total Waste	**76,005**					
Total Waste per household (excludes public litter bin and recyclables) (tonnes per household)	**1.39**					

The diversion rate was estimated to be 59.2% for Option K. This is a reduced diversion rate in comparison to Option I, which has similar services in regards to the bulk verge collection and all of the domestic waste being treated through Stage 2 of the RRF. The introduction of the one bin system would reduce the diversion rate from 65.4% to 59.2%.

5.11.3 Summary

There would be a reduction in costs for Option K in comparison to Option I, because the recyclable collections and treatment costs are no longer incurred. This cost saving would be offset to some degree by the expected increase in costs to process the waste collected in one bin through the RRF. The estimated waste management cost for Option K is $207.78 per household per year and the estimated diversion rate is 59.2%.

If a one bin collection system was introduced the City of Joondalup would not need to dispose of recyclables to the Badgerup MRF. The contract to use the Badgerup MRF may specify there are

ongoing costs to the City of Joondalup, even if the recyclables did not need to be processed at the Badgerup MRF, however this has not been factored into the assessment.

5.12 SUMMARY

Table 5.24 summarises the waste management costs, the costs per household and the waste diversion rates for each of the options assessed

Table 5.24- Summary of Costs and Diversion Rates

Option	Total Waste Management Cost	Cost per household	Diversion Rate
A	$6,591,116	$120.35	13.9%
A1	$7,203,785	$131.57	13.9%
B	$9,608,153	$175.54	50.5%
C	$9,720,050	$177.61	49.9%
D	$9,906,273	$181.06	50.7%
E	$10,112,355	$184.87	50.6%
F	$10,117,086	$184.96	51.5%
G	$10,323,168	$188.78	51.4%
H	$11,391,663	$208.23	65.8%
I	$11,628,156	$212.61	65.4%
J	$9,642,021	$176.10	43.8%
K	$11,373,086	$207.78	59.2%

5.12.1 Costs

Table 5.24 indicates that the introduction of resource recovery has the most significant impact on the waste management costs and diversion rates for the City of Joondalup. The introduction of Stage 1 of resource recovery will increase the costs to the City of Joondalup by approximately $2,400,000 per year or approximately $44 per household per year. The introduction of a second stage of resource recovery to treat all of the City of Joondalup's domestic waste increases the costs again (Option I). In comparison to Option A1, the annual costs would increase to over $4,400,000 per year or approximately $81 per household per year.

The introduction of a compulsory MGB for recycling as well as Stage 1 of resource recovery (Option F) would increase the costs to the City of Joondalup by approximately $2,900,000 per year (in comparison to the current cost – Option A1). This would be an increase to households of approximately $53 per year.

Increasing the frequency of the bulk verge collection (to 6 months) as well as the introduction of a compulsory recycling bin and resource recovery (Option G) would increase the costs to the City of Joondalup by approximately $3,100,000 per year (in comparison to the current cost – Option A1). This would be an increase to households of approximately $57 per year.

It should be noted that the costs to buy back the recycling bins from residents that have previously purchased them is not included in the costs indicated in **Table 5.24** (for Options C, D and E). The cost to buy back the bins has been estimated at $203,280.

5.12.2 Diversion Rates

The introduction of resource recovery does increase the waste diversion rates (from landfill) from approximately 14% to over 50%. The waste diversion rates would be around 65% with the introduction of a second stage of resource recovery that could treat all of the household waste from the City of Joondalup.

The waste diversion rates are not expected to increase significantly with the introduction of a compulsory recycling system, because recyclables only make up a small proportion (approximately 15%) of the overall waste stream generated. A change in the frequency of the bulk verge collection will not significantly impact on the diversion rates because the general bulk waste, only makes up a small proportion (approximately 14%) of the overall waste stream generated.

5.12.3 Services

5.12.3.1 Domestic Waste Service

The current disposal point for the domestic waste is the Tamala Park landfill. The introduction of resource recovery is an initiative being introduced by the MRC in order to sustainably manage waste and meet the requirements of the State government strategy. The residents of the City of Joondalup will incur a significant waste management cost increase, however there will be a significant amount of waste diverted from landfill. The introduction of resource recovery also has significant environmental benefits, which are outlined in **Section 4.1.2**.

5.12.3.2 Recycling Service

A number of recyclable collection services have been analysed in **Section 5**. The recyclable collection service is the service that has the most number of options. The costs and benefits of the recyclable collection options are discussed below. For each of these options it is assumed that part of the domestic waste is disposed (treated) at the RRF and the disposal point for the recyclables will continue to the Badgerup MRF. **Table 5.25** provides a summary of the options and the costs associated with the recyclable collection and disposal.

Table 5.25 – Summary of Recycling Collection Options and Costs

Option	Description of Recycling Service	Recyclable Collection Costs	Recyclable Disposal Costs	Total Recyclable Cost	Recyclables diverted (tonnes)
B	Current collection system. Bag with voluntary MGB at cost to resident	$837,280	$71,966	$909,246	5,104
C	Bag collection system continues, MGB collection system ceases	$837,280	$51,572	$888,852	3,658
D	Voluntary MGB provided to resident. C of J pays for MGB's	$1,151,528	$213,300	$1,364,828	6,399
F	Compulsory MGB provided to resident. C of J pays for MGB's	$1,491,051	$280,100	$1,771,151	8,403
J	One Bin collection system, ie no separate recycling service	$0	$0	$0	0

Notes: The costs for Options C and D are associated with the ongoing costs and do not include the one off cost to purchase the bins.
The recyclables diverted refers to the recyclables in the recycling receptacle and does not include recyclables that can be diverted from the RRF (Hence Option J indicates that no recyclables are diverted)

a. Current collection service (Option B)

The current collection service comprises a bag collection service and MGB collection service. This scenario has been modelled in Option B and the cost is used as the base cost for comparison with the other options.

As is typical the bag for recycling has a lower yield of recyclables and a lower participation rate. In comparison the MGB for recyclables has a higher yield and participation rate. The bag is not always perceived well by residents as a recycling receptacle. It is perceived to be a sub standard service and not easy to use in comparison to an MGB. The bag system is a low cost option in terms of capital required for the receptacle, however the contract cost to collect the bag is the same as the MGB's. The contractor providing the collection service charges per drive by and there is more uncertainty regarding the number of residents that will participate in recycling if the two receptacles are used. The uncertainty to the contractor is likely to lead to increased costs in the collection rate.

b. Bag collection system (Option C)

Option C has assumed that the bag collection system continues and the MGB collection system does not. As indicated in **Table 5.25**, there is a reduction in cost if the MGB collection system was ceased. This is because it is expected that the generation of recyclables would decrease. While the participation rate would remain the same, the bag system produces a lower generation and therefore the quantity of recyclables generated decreases.

Although the recyclable service costs decrease, as indicated in **Table 5.24** the overall waste management cost increases. This is because the recyclable material that is not disposed with the

recyclables is instead disposed in the domestic waste MGB. The disposal cost for the domestic waste will increase significantly with the development of the RRF.

The following **Table 5.26** provides an analysis of the disposal (or treatment) costs for domestic waste and recyclables, with the different recycling operations. The disposal cost for recyclables is assumed to be $25 per tonne at the Badgerup MRF and $73.17 per tonne at the Neerabup RRF. Waste audits indicate that 10 to 15 % of the domestic waste is recyclable packaging material, while a further 15 to 25% is paper or cardboard. Theoretically up to 40% of the domestic waste could be diverted to the recyclables bin. In practice not every household participates in recycling and a lot of the recyclable material ends up in the domestic bin. The last three rows in **Table 5.26** indicate the effect of increasing the tonnes of recyclables, which leads to a decrease in the tonnes of waste disposed in the domestic waste bin.

Table 5.26 – Summary of Disposal Costs of Domestic Waste and Recyclables

Option	Total Domestic waste and Recyclables Disposed (tonnes)	Recyclables disposed (tonnes)	Domestic Waste disposed (tonnes)	Disposal cost of domestic waste and recyclables
B	59,380	6,380	53,000	$ 4,037,510
C	59,380	4,572	54,808	$ 4,124,601
D	59,380	8,532	50,848	$ 3,933,848
F	59,380	11,204	48,176	$ 3,805,138
J	58,491	0	58,491	$ 4,546,798
20% of recyclables diverted	59,380	11,876	47,504	$ 3,772,768
25% of recyclables diverted	59,380	14,845	44,535	$ 3,629,751
30% of recyclables diverted	59,380	17,814	41,566	$ 3,486,734

Notes: *Option J includes a 6 monthly bulk verge collection and not a 9 monthly bulk verge collection and therefore the total amount of waste is reduced because additional waste is assumed to be disposed through the bulk verge collection.*
The disposal cost for recyclables is not the same as for Options B and C in Sections 5.2 and 5.3 respectively because the current disposal cost of $11.28 / tonne at the Badgerup MRF was used for these options

Although the removal of the MGB recycling service and the standardisation of the recycling collection service using bags system would appear to be a cheaper option, it is actually more expensive than the current system. The collection costs are not expected to change while the disposal costs are likely to increase as indicated in **Table 5.26**. The saving of not having to raise the additional capital to purchase the MGB's does not outweigh the additional costs of disposal. The provision of a bag recycling service is likely to divert the least amount of recyclables and therefore the system is not likely to achieve the stated Vision. There is also likely to be a backlash from the community if the MGB service was ceased.

c. Voluntary MGB system (City of Joondalup pays for the MGB) (Option D)

In this option it is assumed that the MGB recycling service would continue, however the bag collection service would cease. The cost of the bin and operational cost would be paid for by the City of Joondalup and on charged in the rubbish rate. The resident that volunteers to participate in the MGB recycling service would not be required to pay an additional cost for the MGB. The current system requires the resident that volunteers to participate in the MGB recycling service to pay for the MGB and an additional operational cost.

Option D has an increased cost of approximately $5.50 per household in comparison to Option B. The increase in costs is due to the cost of the recyclable collection, which includes the cost of providing the MGB to an assumed 50% of residents. The number of collections to be undertaken would also increase. There are some cost offsets for the additional quantities of recyclables being treated at the Badgerup MRF rather than the Neerbaup RRF as indicated in **Table 5.26.**

In Option D there has been some assumptions made regarding the number of participants that would request an MGB and the exact number is difficult to know. If the MGB was provided at no cost, it is likely that there would be a large number of residents that would request an MGB. By providing the MGB to residents at no cost, it would not financially penalise the residents that want to do the right thing by participating in recycling. There may also be residents that request the MGB to secure additional bin capacity.

There may be some operational difficulties in implementing the recycling system modelled in Option D. The contract for the recyclable collection service would be difficult to specify because the exact number of participants would not be known and would be likely to change over time. There would also be ongoing management by the City of Joondalup to provide additional bins.

The system could be modified by specifying a time period, say once month a year, when residents could request an MGB for recycling. The provision of MGB's would be done in bulk once a year rather than a smaller number scattered throughout the year. Following this period there could also be negotiations with the collection contractor who would have a better appreciation of the increased scope of work because the number of additional bins would be known.

Alternatively a nominal cost of $40 could be charged for the MGB and this would be a one off cost. At present the resident is charged $84.70 for the MGB and an annual service cost of $35.20. The proposed system is likely to only attract the dedicated recyclers, and although it still penalises them

financially the cost is not as great as the present situation. If a nominal one off cost of $40 for each MGB was charged to the resident and the participation assumptions are the same as for Option D (ie 50% of the residents would participate) the cost per household would be $178.97 in comparison to the Option D cost of $181.06. The saving of $2.09 per household roughly correlates to the saving in the capital cost of providing the MGB to nearly 50% of residents.

If the City of Joondalup decides to increase recycling by introducing additional MGB's it may be simpler to introduce a compulsory MGB to all residents. This would eliminate a number of the unknowns in terms of participation. This scenario is analysed in Option F, which is discussed below.

d. Compulsory MGB system (City of Joondalup pays for the MGB) (Option F)

In this option it is assumed that the MGB recycling service would be offered to all of the residents by providing them all with a MGB. The cost of the bin and operational cost would be paid for by the City of Joondalup and on charged in the rubbish rate.

Option F has an increased cost of approximately $9.42 per household in comparison to Option B as indicated in **Table 5.24**. The increase in costs is due to the cost of the recyclable collection, which includes the cost of providing the MGB to all residents. The number of collections to be undertaken would also increase. There are some cost offsets for the additional quantities of recyclables being treated at the Badgerup MRF rather than the Neerbaup RRF as indicated in **Table 5.26.**

This system would lead to the greatest diversion rate. The biggest query over this system would be the residents desire to pay an additional $9.50 per household per year, when their rubbish rate is expected to increase by $44 per household per year with the introduction or resource recovery. In order to have some information regarding the resident's inclination to pay the additional costs a public consultation program is outlined in **Section 6.4**.

e. One Bin system (Option J)

In this option it is assumed that the recycling service would not be continued and all of the domestic waste would be sent to the RRF. The RRF will have the capability to extract some recyclables from the domestic waste stream although due to contamination of the recyclable and the difficulties in segregating a heterogenous waste stream, not all recyclable swill be extracted. The Atlas waste treatment facility that treats waste from the City of Stirling which is delivered in a one bin system. The treatment facility separates out recyclables at a rate similar to a bag collection system.

As shown in **Table 5.24** and **5.25**, the cost of this system would be approximately $176.10 per household per annum. There are significant savings due to the recyclable collection service not being required. However as indicated in **Table 5.26** the disposal costs are much greater because all of the waste is sent to the RRF. It is also likely that there will be an increased disposal cost at the RRF if it was required to treat waste from a one bin system.

The one bin system does not recycle paper and cardboard products from the waste stream, however these materials would be recovered in to compost or methane for electricity generation. From a waste

management perspective it is considered preferable to recycle paper and cardboard back into paper products.

As indicated in **Table 5.24** the diversion rate for this option is low and therefore it would not be as successful as other options in meeting the waste management Vision outlined for the City of Joondalup.

6. COMMUNITY CONSULTATION

There has previously been public surveys undertaken the City of Joondalup and by the MRC regarding the recycling collection service and the development of the RRF. A summary of these surveys is provided in the sections below.

6.1 CITY OF JOONDALUP CONSULTATION

The City of Joondalup has previously undertaken a survey of community attitudes regarding their recycling service. Research Solutions undertook the research on behalf of the City in January 2003.

Some of the key findings of this study were:

- More than 80% of respondents believed that a recycling MGB would improve the Council's recycling service. Less than 3% believe the service would be worse.
- Over 90% of respondents consider a recycling MGB a valuable service which they would probably or definitely use if there was no extra cost.
- Among the 10% of residents who would not use the MGB recycling service or are undecided, the majority are concerned about the cost of the service.
- 65.6% indicated that they are prepared to pay extra in rates for the recycling service using a MGB, but for half of these it would depend on how much extra the annual; fee was. Most residents indicated that they would be prepared to pay an additional $20 to $30. Over 30% of residents indicted that they would be prepared to pay more than $30 per annum.

6.2 MRC

The MRC have also undertaken a survey of residents across the region in order to provide information on the preferred bin collection system. The survey covered 614 respondents across six of the seven council areas comprising the Mindarie Regional Council. 104 of the respondents were from the City of Joondalup. The survey was designed to determine;

- The level of awareness of the Resource Recovery Facility,
- Desirable environmental outcomes for waste management
- Importance of bin collection system features, and
- The preferred bin collection systems.

6.2.1 Awareness of the Resource Recovery Facility

For the City of Joondalup only 33% of respondents reported that they were aware that the Resource Recovery Facility (RRF) was to be built. The average awareness across the MRC was only 29%.

6.2.2 Desirable Environmental Outcomes

Table 6.1 below compares the relative importance placed on the "reduction of landfill", and the "increase in recycling" outcomes of waste management practices. Residents within the City of Joondalup have a slightly heightened level of concern (compared to the average respondent in the MRC) that the councils waste management procedures produce a reduction in landfill (92%) and an increase in recycling (95%).

Table 6.1 - Importance of Waste Management Outcomes

	City of Joondalup		**Average for the MRC**	
	Reduce Landfill (%)	**Increase Recycling (%)**	**Reduce Landfill (%)**	**Increase Recycling (%)**
Very important	**67**	**69**	64	65
Quite important	**25**	**26**	23	23
At least quite important	92	95	**87**	**88**
Tending to be important	**5**	**2**	4	4
Net important	97	97	**91**	**92**
Not important	**3**	**3**	9	8
Total	100	100	**100**	**100**

Therefore it can be seen that the great majority of respondents from the City of Joondalup regard it as being important that the waste management practices achieve a reduction in landfill and an increase in recycling.

6.2.3 Importance of System Features

Table 6.2 below shows the variation in the perceived importance of the various waste management features.

Table 6.2 - Importance Scores

	City of Joondalup %	**Average for the MRC %**

Reduce overall Greenhouse gases	92	90
Ensure adequate bin capacity	88	87
Maximise diversion from landfill	88	86
Allow high value recycling	86	85
Provide employment in recycling	86	84

The most important outcomes from a waste management system are the reduction in greenhouse gases, an adequate bin capacity for households, and maximum diversion from landfill. Although it is apparent that all of the features were considered to be al least quite important.

6.2.4 Rate of Diversion in Relation to Cost

The respondents were asked to indicate a preference for a system that either produced;

- High diversion rates at minimum cost, or
- A slightly more expensive system that achieve high diversion rates and also maximised recovery of recyclable materials.

The clear majority of the City of Joondalup residents (61%) opted for the more environmentally superior outcome at the higher cost. Against this, 34% opted for the low cost route, resulting in the overall preference for the dual environmental benefit at the rate of almost 2 to 1.

6.2.5 Bin System Preference

Respondents were asked to indicate their preference of bin diversion systems. The result was:

- 67% would prefer a "2 bin system" in which householders sort rubbish into recyclable and non-recyclable bins. They were told such an exercise would produce the same diversion from landfill as the other "2 bin system" but would produce better recycling, and a 10% higher cost that a single bin system.

- 22% reported that they would prefer a "2 bin" system in which householders sort their rubbish into wet and dry bins. They were told that this would produce more landfill diversion than the single bin system, better compost, and a 10% higher cost to rate payers than the single bin system.

- Just 10% of respondents indicated that they would prefer a single bins system that diverts about 70% of rubbish from landfill, but did not produce high levels of recycling material.

Observers can be confident that the majority of residents in the City of Joondalup have a strong preference for a 2 bin system for households which sorted waste into recyclable and non-recyclable bins.

6.3 CONSULTATION SUMMARY

The results indicate that the City of Joondalup residents have a preference for a second bin for recycling. The introduction of a second bin for recycling is perceived by the community to have environmental benefits. Residents are also prepared to pay additional costs for the service.

The results also indicate however that only a minority of residents are aware of the plans to introduce resource recovery. The survey results indicate that principles behind waste diversion and incurring higher costs to achieve this are accepted. However residents associate waste diversion and doing the right thing for the environment with recycling and not resource recovery.

6.4 FURTHER COMMUNITY CONSULTATION

The previous consultation has demonstrated that the City of Joondalup residents have strong environmental awareness and they are prepared to pay extra for a second recycling bin and for their waste to be treated by a RRF. Further consultation could be undertaken to determine the resident's preparedness to pay for the second MGB for recycling, given the increase in rates due to the introduction of resource recovery. This report has provided additional information regarding the costs that will apply to the City of Joondalup residents regarding the introduction of resource recovery and a second MGB for recycling. These costs could be provided to the residents so they can make an informed decision about their preferred waste services and the cost they are prepared to pay.

The introduction of resource recovery is an important step and the MRC and therefore the City of Joondalup are committed to its introduction. However as indicated in Section 6.2.1, only 33% of residents in the City of Joondalup surveyed were aware of the project. Further consultation is recommended that provides information on resource recovery, then asks the question regarding the provision of a second bin for recycling.

The recommended consultation process would be undertaken as follows:

- Residents in the City of Joondalup are contacted by telephone regarding their preparedness to answer some questions regarding waste management services. The participants should be randomly selected, and a statistically significant number of residents should be signed up to undertake the survey.

- If they agree to participate, they are sent some information regarding resource recovery. The information would indicate the environmental benefits of resource recovery and the requirement to introduce resource recovery to meet waste management strategies. The outcomes of resource recovery would be highlighted including the requirement to divert recyclable materials. The cost of resource recovery would also be indicated.

- The second part of the survey would provide information on introducing a second bin for recycling. The environmental benefits and likely cost of introducing a second bin would be provided.

Once the residents had information about resource recovery and its cost implications, they would then be asked whether they are prepared to pay extra for a second bin for recycling.

- The survey should also ask some preliminary questions regarding resident's awareness of the resource recovery project and also whether they agree with the proposed Vision Statement for waste management for the City of Joondalup.

Information on the costs and benefits of resource recovery and recycling would need to be provided to a market research company who would then undertake the survey. The market research company will also need to provide advice on the level of detail that should be sent to residents.

7. CONCLUSIONS AND WAY FORWARD

The Vision for the City of Joondalup in regards to waste management should be to reduce waste to landfill and provide a comprehensive but sustainable service to residents. This Vision is compatible with the Strategic Direction as specified by the State Government and the objectives of the MRC.

The Vision should be considered as a long term goal. The initial State Government Strategy indicated that zero waste by 2020 was achievable. Therefore from the City of Joondalup perspective there is time to introduce at least one generation of infrastructure. The life span of an MGB is estimated to be 10 to 15 years and therefore there is an opportunity to introduce a new bin system to all residents. There is also an opportunity to make changes when the existing contracts for collection services elapse and the services are re-tendered. The Vision can therefore be achieved through a series of steps over time with different waste streams and services targeted.

The introduction of resource recovery will be a significant step towards achieving this vision. The RRF can contribute to the sustainable management of waste by increasing recycling, diverting waste from landfill, reducing green house gases and turning the organic fraction of waste into a useful product. However in order to develop the RRF there will be a significant increase in costs to ratepayers. It is estimated that the introduction of Stage 1 of resource recovery, when 70% of the domestic waste from the City of Joondalup will be processed, will increase the waste management costs to ratepayers by approximately $44 per household per year. The diversion from landfill rate will increase from the current rate of approximately 14% to over 50% with the introduction of resource recovery.

The introduction of a second 240L MGB for recycling has also been assessed. Surveys undertaken by the City of Joondalup and the MRC indicate that there is a preference for this system within the City. The cost to introduce a compulsory MGB to all residents is expected to be in the order of $9.50 per household per year (Comparing Options B and F). The overall costs are expected to increase due to an increased contract collection rate and the cost of providing an additional bin to all ratepayers (assuming the bin is amortised over 12 years). The additional costs for the collection however are slightly offset by the reduced disposal / processing costs. It is assumed that the cost to process recyclables through the Badgerup MRF (approximately $25 per tonne) will be significantly less than the cost of processing the recyclables through the RRF at Neerabup (approximately $73 per tonne).

Therefore although there are additional costs for processing the recyclables through the Bagderup MRF, this waste (in the form of traditional kerbside recyclables) is diverted from the RRF that has a higher processing cost.

The other main variable analysed is increasing the frequency of the bulk verge collection from every 9 months to every 6 months. The increase in cost per household for this service to be increased in frequency is estimated to be approximately $4 per household per year. The change in frequency is not likely to vary the diversion from landfill rates significantly and the increase in frequency is considered because it may be more convenient to residents.

Options J and K investigate the impact of introducing a one bin collection system in the City of Joondalup. In these options the recyclable collection and treatment costs are not applicable because there is not a separate collection of recyclables. However there are assumed to be increased waste disposal / treatment costs. It is assumed that the gate fee for the RRF would increase (from $85 to $90 per tonne) due to the additional recyclable materials that would need to be extracted from the domestic waste stream. There is also a higher percentage of residue that is expected form a one bin collection system and this would need to be transported and disposed. Comparing Options G and Option J (which have the same bulk verge collection frequency but vary in the recyclable collection service) the one bin system is expected to reduce the overall waste management costs by $680,000 per year or $12.61 per household per year. The waste diversion rates are expected to decrease with a one bin system with 43.8% for Option J compared to 51.4% for Option G.

The introduction of a second stage of resource recovery will increase the waste management costs. The investigations into these options (H, I and K) does highlight that with a second resource recovery facility treating the organic fraction of the domestic waste the maximum diversion rates are likely to be in the order of 65%. In order to achieve zero waste, the residue from the initial stages of resource recovery (Stage 1 and possibly Stage 2) and the general bulk waste collected will need to be recovered. This will require a thermal type resource recovery process. The organic fraction of the residual waste is low and can not be converted into compost. However the waste will still have some calorific value that could be used in a waste to energy or thermal treatment process.

The community surveys undertaken previously by the MRC and the City of Joondalup highlight that while the community is supportive of recycling, their knowledge of the RRF is not high. The modelling of the costs for the various options indicates that the move to RRF will have a much more significant impact on the costs to ratepayers than any change to the collection services. Therefore it is important that the community is made aware of the benefits of the RRF.

While the ratepayers have indicated that they would support the introduction of a 240L MGB for recycling and be prepared to pay extra for it, they are providing feedback without knowledge of the RRF project or its benefits. The costs for waste management will rise significantly in the next few years. The unknown area is will the ratepayers be prepared to pay more again for the introduction of a 240L MGB for recycling or an increase to the frequency of the bulk verge collections.

It is therefore recommended that a survey be devised and undertaken by a market research company that analyses the ratepayers preparedness to pay for additional services following the introduction of resource recovery.

8. RECOMMENDATIONS

It is recommended that:

- The City of Joondalup adopt as their waste management Vision the following: ***Towards zero waste while providing a comprehensive and sustainable waste service***;

- The Vision is considered as a long term goal with zero waste achievable by 2020, through a series of steps;

- The City of Joondalup support the MRC's strategy to introduce resource recovery in a number of stages in order to achieve zero waste;

- The City consider consulting their residents regarding the waste management options to ascertain their preparedness to pay for additional services following the introduction of resource recovery.

APPENDICES

Tables included: