# A Report on Waste Management Infrastructure for South Australian Regional Organisation of Councils


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## Executive Summary

This report has been prepared by the Legatus Group's CEO Simon Millcock with input from a Reference Group, LGA Secretariat and the Regional LGA Executive Officers for the South Australian Regional Organisation of Councils (SAROC). This report has been provided to the LGA Secretariat who will be submitting a report to SAROC based on their 2020-21 Business Plan which includes the development of a regional waste management strategy to enable the coordination of waste and recycling infrastructure across regions.

The South Australian Government released the South Australia's Waste Strategy 2020-25, showing that Regional Waste Management Plans ("Plans") are to be in place for all SA regional local government areas and/or regional city clusters by 2023. The Plans are required to set regionally appropriate and progressive waste diversion targets. The 20-Year State Infrastructure Strategy identifies opportunities for development in regional areas, including in investment in:

- equipment and facilities for waste compaction and bulk hauling to reduce costs of transporting waste to end markets;
- expanding or developing commercial composting organics from MSW and industries such as vineyards, orchards and other agriculture; and
- developing high-value organics products.

This report provides the basis for harmonising the current, first round of investments in waste management infrastructure as they become articulated in the up-coming Plans and it can progressively identify future cost-effective opportunities for revision of those Plans.

**Aim:** Identify opportunities for cost-effective participation in the Circular Economy (CE) by enabling the coordination of waste and recycling infrastructure across regions

**Purpose**: For this report to act as a coordinating statement for SA Regional Councils which included the need for more detailed regional planning

**Vision**: Provide a cost-effective regional network of waste management assets that maximises resource recovery and engagement in the circular economy.

**Analysis:** Based on economic modelling of the five biggest, individual regional waste streams: organics, metal, concrete, cardboard and comingled recycling.

**Scope**: Waste for which Councils are responsible; waste that has generated or been collected at Council Waste Transfer; other waste has not been taken into account.

### Findings

This report identifies a need to be flexible to the changing conditions. It is supported by on-going links to research and to policy development which will remain active. The economic model that informs this report can also provide advice on the cost implications of policy alternatives which arise and it can inform the regional planning ahead. All of this will contribute to the aim of the National Waste Policy, which is to "identify and improve regional, remote and indigenous communities' ability to access, influence and participate in a circular economy". The report finds:

1. Nothing can be achieved without collaboration
   a) Coalitions of Councils can deepen participation in the CE; the low waste volumes for regional councils do not support go-it-alone actions

b) These coalitions would need to be coordinated; they are likely to cross regional, metropolitan and even state boundaries and regional waste management authorities might be needed for this purpose
c) Coalitions with private waste managers can also provide scale, funding and skills to support Councils' action.

2. There are existing, cost-effective investment opportunities which would allow Councils to participate more in the CE, namely:
   a) Composting facilities for organic waste including:
      i opportunities to build more regional composting facilities which could include Councils collaborate with private sector sources and users.
   b) Some fixed plant to process concrete waste although these are less significant and apply only to some regions.
3. The current treatment of the following waste streams is cost-effective and contribute already to the CE, namely
   a) Ferrous metal
      i Scrap metal is currently accumulated at Council sites and sent periodically to Adelaide-based processors.
   b) Some concrete waste
      i Some Councils make cost-effective use of a mobile, privately-owned plant.
      ii The processed material is re-used in the regions and is a prime example of the CE in operation.
4. That investment in regional Materials Recovery Facilities is not currently cost-effective, despite the very large costs Councils currently bear in managing comingled recycling waste
   a) This option requires more modelling than has been possible in the course of this project.
   b) In particular, a regional MRF allows waste to be separated, compacted and sold but these effects have not yet been modelled.

**Future opportunities**

The following points are included for consideration and arise from the report's analysis.

1. Further develop the waste management cost model
   a) Expand on the Legatus Group's Memorandum of Understanding with UniSA for this and related research and development and the use of technology and machine learning including for waste management.
   b) Identify resources to develop the model.
   c) Endorse the role of the model in the process of coordinating Regional Waste Management Plans.
2. Apply the cost model to provide advice to Plans
   a) Complete the assessment of MRFs as it is critical that the cost implications of regional MRFs be better understood, especially those related to separation of comingled recycling.
   b) Optimise infrastructure location decisions as this document has simplified the analysis to a few, selected aggregation sites which are cost reducing. The cost model needs to be run repeatedly to identify the sites which are cost minimising and these should be used in waste management planning.
   c) Assess the viability of regional processing for waste streams not yet studied.
3. Support current research into composting and collaborate with Regional Development Australia and Industry, particularly to assess the cost implications of
   a) Removing contamination from collected compostable.
   b) Assessment of management of contaminations within Kerbside FOGO re organic processing facilities.
   c) Building additional composting facilities, especially the impact on other existing or potential facilities
   d) Including organic waste that is not managed by Councils.

# 1. Introduction

## 1.1 Background to the report

The Legatus Group was commissioned by the South Australian Regional Organisation of Councils (SAROC) to "develop a regional waste management strategy to enable the coordination of waste and recycling infrastructure across regions". The action was identified under Theme 4: Financial Sustainability and Governance in the SAROC Annual Business Plan 2019-20. Funding was made available by the Local Government Association (LGA) of SA and Green Industries SA (GISA) with in-kind support from the Legatus Group and the project Reference Group.

The Legatus Group:

- Employed Dr Paul Chapman as the Project Manager.
- Formed a reference group (refer attachment 1).
- Contracted Rawtec to provide a Background Report to Support Development of the SA Regional Waste Management Strategy (refer attachment 4).
- In partnership with the University of South Australia (UniSA) developed an economic model to support the strategy (refer attachments 2)
- Contract AEC Group to review the cost model (refer attachment 3)

The specific opportunities to process waste in the regions are identified using an economic model of Councils' waste management costs which has been developed specifically for this project. Investment options are found by balancing the transport costs of aggregating waste in the regions against the benefits that greater scale provides in reducing processing costs. It estimates if it is cheaper to process for re-use in the regions or send the waste to landfill or to Adelaide for processing.

The model was developed in partnership with UniSA and has used data provided by a private consulting firm, Rawtec. The model takes into account the average cost of regional waste processing and how these change with different levels of aggregation; estimates of regional waste streams themselves; and a viability analysis which balances the costs and benefits of aggregation. AEC Group Pty Ltd (AEC) has completed a review of the cost model which included separating the relevant input and assumption cells from calculation cells and then undertaking an audit of the model logic pertaining to the calculations underpinning the model outcomes. They did not attempt to verify any of the model's inputs and assumptions, which we understand were primarily sourced from Rawtec.

The model indicates cost-effective options for participation in the CE. Of course, more could be done than is cost-effective and the cost model can further estimate the additional costs if Councils choose to be greener than is cost-effective. For example, if Councils choose to develop a local MRF, despite that it is not cost-effective, the model can be used to estimate the impact on their budgets and hence on ratepayers.

The South Australian Government has released its Waste Management Strategy for 2020-25, showing that Regional Waste Management Plans are to be in place for all South Australian regional local government areas and/or regional city clusters by 2023. The Plans will set regionally appropriate and progressive waste diversion targets. Regional Waste Management Plans may be progressed at the regional local government area or to leverage and optimise synergies across major regional centres. The 20-Year State Infrastructure Strategy identifies opportunities for development in regional areas, including in investment in: • equipment and facilities for waste compaction and bulk hauling to reduce costs of transporting waste to end markets • expanding or developing commercial composting organics from MSW and industries such as vineyards, orchards and other agriculture • developing high-value organics products.

This report can provide the basis for harmonising the current, first round of investments in waste management infrastructure as they become articulated in the up-coming Plans and it can progressively identify future cost-effective opportunities for revision of those Plans. The investments required can be

supported by a range of Australian and South Australian Government funding programs, including the Council Modernisation Grants (from GISA) and the Recycling Modernisation Fund of the Federal Government. The investment programs can also support collaboration in managing private waste streams and potential users of recycled materials.

### 1.2 Aim of this report

The aim of this report is to identify investments in cost effective waste management opportunities which will allow Councils to deepen their participation in the Circular Economy (CE). The focus on costs is not a simple view of waste management. The costs considered include the Solid Waste Depot Levy which in turn is taken to represent the indirect, external costs of harm done to the environment and community health if waste is sent to landfill.

Nor does the focus on costs mean that Councils should do no more recycling than is cost effective, even including the levy. Individual Councils might choose to do more. Doing more will almost certainly mean higher costs but that option is available to Councils under direction of their elected members. Investing in cost-effective participation in the CE does not preclude doing more than is cost effective and it provides the tools to allow the cost implications of such choices to be estimated.

### 1.3 Scope of this Report

This report is about all waste that is the responsibility of regional Councils. This includes kerbside pick-ups, Councils' construction and demolition material and material delivered to Council-run Waste Transfer Stations (WTS) and landfills.

That scope means this report is not based on an exhaustive application of the CE in the regions. For practical reasons it focusses only on the five largest material streams by weight for which Councils are responsible. As such it might miss some specific resource management issues which are based on special, local circumstances that are significant e.g. managing fishing net waste around Port Lincoln.

The report does not consider recyclable material managed by others. And the focus on regional waste precludes the role of the regions as sites for reprocessing or disposing of material generated elsewhere e.g. in Adelaide.

This report also does not focus on the role that Councils might have as users of recycled waste. That is not within the scope of their materials management *per se* although it is a significant element of the CE.

Finally, the scope of this document includes some assessment of the policy options facing the South Australian Government (SAG), based on the analytical tools from which this has been developed.

### 1.4 Outline

Section 2 discusses the concept of the CE and the methods used to identify opportunities to participate. It also describes the work of consulting firm, Rawtec, in providing information about material streams and management and the operation of the cost model developed with UniSA.

The analysis is built from the cost analysis of the largest regional material streams, as measured by weight: organics, metals, cardboard, concrete and bricks and comingled recycling. Section 3 deals with each in turn and includes a description of current practices, a cost analysis of the three options (i.e. process for reuse in the regions, send to landfill or send to Adelaide) and a discussion of strategic issues. It also analyses the cost implications of building regional Materials Recovery Facilities.

Section 4 consolidates the analysis. It describes the cost-reducing spatial allocation of regional recycling infrastructure, how the investments can be made and the plant operated and, finally, the implications for employment and training and for future waste management plans.

Section 5 discusses the policy options facing the SAG to assist regional local governments to extend their participation in the CE beyond what is cost reducing.


## 2. Concepts and approach

### 2.1 The circular economy

This report into waste and recycling infrastructure is based on the current policy direction of the South Australian Government (SAG), as indicated by the recently released publication, *Supporting the Circular Economy. South Australia's Waste Strategy 2020 – 2025* (SAG, 2020ii) and its consultation draft (SAG, 2020i). There are two core concepts: firstly, that of the waste hierarchy. This strategy deals with the higher levels of the hierarchy which focus on managing waste already created.

Secondly, is the increasingly well-known concept of the circular economy which is "a generic term for an industrial economy that is producing no waste" by repairing, reusing and reprocessing what would otherwise be waste (SAG, 2020i, p 53). This report aligns with the strategic direction adopted by the South Australian Government to investigate "the opportunities the circular economy provides" (*ibid*, p 19).

The strategic questions for Councils arise from the costs of reordering its activities to participate in and contribute to the CE. The South Australian Government recognises that costs are greater for Councils, "whether or not this is offset by the sale of collected materials" (SAG, 2020i, p 19). But it adds that a focus on Council costs alone would "not assess the full financial, environmental and social costs and benefits of such (waste management) services" (*ibid*). There might be other costs and the community might place higher value on recycling than is indicated by costs to Councils.

This report is premised on the notion that Councils need a set of long-term actions which minimise the total costs while remaining compliant with regulations and paying the fees put in place by the South Australian government to deal with issues outside their purview. This means that the analysis here does not rely on Councils making estimations of the environmental and social costs of disposing of waste. Instead, it adopts the view that the South Australian Government sets a landfill levy which acts as a signal to Councils of those costs. Nor does this analysis include an assessment of the value the community places on recycling, leaving any adjustments for that to the elected members of Councils. The analytical tool used here can also be used to inform them of the cost implications of pursuing strategies that are not cost reducing.

Regions differ from metropolitan areas and South Australian Government policy makes a number of adjustments to recognise the differences e.g. lower landfill levies although the regions are now required to set their numerical targets. Management costs in the regions are also different. Regional communities "incur higher cost(s) … due to the large distances the collection vehicles need to travel". The impact of small scale, which increases per unit management costs compared to those in cities, is also recognised.

The implications of all this for regional participation in the CE is that not everything can be recycled everywhere and the aim is at "an optimum (*sic*) level of recycling" which "is likely to be more cost effective and achievable" than a complete application of the circular economy concept (SAG, 2017, p 18). In short, recycling some materials is not cost effective but which should be recycled depends on the scale being considered and these concepts are central to developing a draft regional waste management strategy.

### 2.2 Regional management costs

To obtain these insights into the costs of regional participation in the CE, the Reference Group has overseen development of a cost model by researchers at the University of South Australia. The model compares the costs and benefits of aggregating a regional material stream to determine if processing it for re-use in the regions is cost effective or, alternatively, if it is cheaper to send materials to Adelaide for reprocessing or to landfill.

The purpose of using the cost model is to provide a transparent, rigorous analysis and an accurate overview from which a broad, strategic understanding can be developed. It is not intended to be precise. The inputs to the model are nearly all estimates and do not capture all details of specific situations and the model is necessarily a simplification and so not a comprehensive view of all costs. Nonetheless, by giving an accurate, long-term, big picture the model can guide future waste management Plans and move the regions towards a more nearly optimal allocation of recycling infrastructure.

This section describes the cost model built at UniSA and the inputs for it provided by consulting firm, Rawtec.

The first step in the analysis is to look at the costs and benefits of aggregating resources that might be recycled in the regions. The benefits arise because the average cost of processing material declines as the volume increases. In other words, there are economies of scale in processing which operate as centripetal forces, concentrating the material and favouring regional processing. The analysis must also take account of the revenue which might be earned from sale of the processed material.

The costs of aggregation are fundamentally those of transporting material from a Councils' Transfer Station to a processing facility, which could be at an adjacent or other regional Council's facility or in Adelaide. These transport costs are centrifugal and favour the decentralised solutions.

The model calculates and compares the net costs and the total benefits of aggregating a given amount of material and processing it in the regions. That value is then compared with the cost of sending those same resources to nearest landfill or to Adelaide for processing. The costs of sending material to landfill includes the cost of transporting from a Councils' facility to the nearest landfill, the charges levied by the landfill site operator and the landfill levy imposed by the South Australian government. An algebraic description of the model is provided at Appendix 3.

The consultants to this project, Rawtec, have provided the inputs to the model. They describe the process in the accompanying Background Report.

The first element is the processing cost. That has two parts: firstly, the cost of transporting the material in question to a processing plant, which is an amount per kilometre per tonne, declining for longer distances; and, secondly, the costs of processing it which has three parts: the fixed costs of creating the processing facility, the effective life of the assets and the variable costs of processing at various, relevant quantities. Note that this approach therefore includes depreciation on equipment but not the full cost of capital.

The second element is the revenue derived from recycling. For many resource streams considered there is no revenue but a fee to pay to the re-processor.

The third set of data are geographic. All management options include transporting material and the model requires a significant amount of Geographic Information System (GIS) data. The precise data required emerges from the working of the model.

The model looks at each of Council in turn. It considers the costs and benefits of aggregating materials with other Councils and then processing them. By knowing how economies of scale impact on costs, it is possible, firstly, to estimate the costs of processing the Council's own materials at the Council's own facilities (in this case there are no transport costs ie the model assumes that if the Council processed materials it would be at its transfer station site). The model proceeds by then adding the volumes in adjoining Councils and recalculating the costs of processing. Of course, adding materials from other Councils involves transport from their sites to the central Council and so the road distances between sites in adjacent Councils is needed.

In principle, the central Council could aggregate material from Councils adjacent to the adjacent Councils in a process that could continue to include all regional Councils. However, in practice, not all combinations are sensible. To make the calculations possible in the time available, the model has used only some possible aggregation sites, being Port Lincoln, Whyalla, Port Pirie, Monash and Mount Gambier with peri-urban Councils all sending material to Adelaide if it is to be reprocessed.

The final input element is the cost of sending material to landfill. That has three parts: the landfill charges of the operator, the landfill levy of the South Australian Government and the costs of transport. Hence, the model also needs data on the distance from each Council's sites to the nearest landfill site.

The outputs of the cost model are, unsurprisingly, mostly costs of different options. The model is making distinctions among three possible activities: sending the Council's material to

- the nearest aggregation site for processing
- a processing plant in Adelaide
- the nearest landfill site.

The model makes estimates of the total and average costs of each option.

## 3. The Costs of Managing Regional Recycling and Resource Recovery

### 3.1 Introduction

The previous section described the cost model and the input data provided by Rawtec. This section describes the outputs of the model and deals with the five biggest identified waste streams in turn.

### 3.2 Organics

**Summary**

- There are already facilities in regional SA that compost organic matter
- The model confirms that these are cost reducing
- But they are incomplete and building more facilities is likely to reduce costs further
- The model finds that it is likely two new plant could be built on Eyre Peninsular and in the Riverland but has not yet determined the optimal location in either region
- The new plant would be more cost-effective if combined with a program to provide kerbside organic recycling bins in all regional Councils
- Any future investment could also consider combining organic matter from selected agricultural sources and research into this matter is underway
- There is an opportunity to complete the circular economy in regional compost by including final supply chain users in the planning.

**Current arrangements**

Organics are defined as kerbside pick-up, timber and other organics (mostly garden organics) delivered to Council Transfer Stations. Volumes range from trivial amounts, mostly in the more remote Councils, to 12,000 tonnes per annum in the large regional city of Whyalla. Usually, organics dropped off at WTS constitute the largest volumes. Councils collect a large quantity of organic material as part of the MSW, mixed with general waste in kerbside residual waste bins. These quantities (typically comprising 45-50% of the residual waste stream) have not been modelled but would add to the viability of regional processing plant if they could be separately collected.

There is significant variation in the way individual Councils deal with organics. Many now have access to one of the multiple private composting facilities, making this recycling stream unlike others. These composting facilities are mostly close to Adelaide (Buckland Park, Dublin, Langhorne Creek and Willunga) with one in Mount Gambier. The private composters charge Councils to receive material at an average cost of $52/tonne.

Councils without economic access to private facilities use collected organics in various ways. Timber and garden clippings are often shredded at a cost of $50 - $60/tonne. Some is used as mulch, some is used as a topping on old landfill to promote remediation.

One significant issue is the potential for shredded material to contain treated timber, making it unsuitable for both composting and mulching. Any organics with mixed timbers must go to landfill or sometimes finds low-grade uses such as landfill.

All of these methods of dealing with organic matter are relatively expensive. It is understood that some organics are not managed at all but decomposes, heaped on Council lands.

**Findings of the cost model**

The table below summarises the outputs of the cost model, comparing the cost of readying material in regional composting facilities for reuse and the cost of sending the material to landfill, for each of the selected aggregation sites.

| **Aggregation site** | **Average net cost of readying for reuse $/t** | **Average cost of sending to landfill $/t** |
|---|---|---|
| Port Lincoln | 165 | 176 |
| Whyalla | 103 | 190 |
| Port Pirie | 121 | 194 |
| Monash | 145 | 195 |
| Mount Gambier | 116 | 169 |
| Peri-urban to Adelaide | -13 | 173 |
| | | |

Table 1: Processing and landfill costs for organics in regional South Australia

The obvious conclusion is that it would be significantly cheaper to establish and use regional composting facilities rather than send organic material to landfill. This holds true even for organics which are not shredded before sending to landfill. The substantial cost saving would be a substantial contribution to the capital costs involved to establish the facilities.

The option of sending material to Adelaide has not been modelled for organics because it is less relevant, partly because of existing private composting facilities and also because it is relatively cheap to process it locally. The cost of sending all organics to existing private facilities has also not been modelled but it seems likely this is the least cost option for many Councils at present.

**Strategic implications**

There is an opportunity to improve the spatial distribution of composting infrastructure by building more plant in regions far from current facilities. This would provide more Councils with the opportunity to participate in the circular economy and reduce organic matter being used in low value ways or being sent to landfill.

The current distribution of facilities has been determined in a piece-meal fashion by the privately profitable considerations of major soil and composting companies and the impact of Council and State government decisions. As such the distribution is incomplete. These are valuable facilities which have contributed to waste management and plans for extra, new plant should not unduly compete with them.

It is implied that more cost-reducing, composting facilities could be built in locations further from Adelaide and evidently somewhere on southern Eyre Peninsular and in the Riverland. We have modelled Port Lincoln on Eyre Peninsular, which offers significant savings compared to sending to landfill. However, other locations, perhaps more central, might be better and it is strongly recommended that modelling be done as part of the waste management planning of those nearby Councils. The Riverland could also make efficient use of a composting facility and, again, the site of Monash which we have modelled should be checked for its cost implications for nearby Councils.

The modelling has shown that these processing facilities are likely to be viable when managing only organics collected by Councils. Their viability would be enhanced further by expanding throughput and one way to do that is to have all Councils provide kerbside organic collections. Currently, many regional Councils do not. It would require Councils without kerbside collections to purchase the bins and provide a collection service. Those costs are relatively well known and future work should be undertaken to estimate the cost savings that could be expected from a kerbside organics service.

A second element is that regional South Australia has readily available, additional sources of organics. Firstly, Councils deal directly or indirectly with sludge from Community Wastewater Management Schemes and septage from septic tanks. Both could be used in composting. In addition to organics for which Councils are currently responsible, regional agriculture is a huge potential source including of manures from intensive livestock, viticulture, sea-wrack and broadscale grain production. Legatus has commissioned work to consider optimal combinations of these material streams and hence identify the stakeholders to this proposal. That work will be complete in April 2021.

### 3.3 **Concrete**

**Summary**

- Current arrangements involve mobile plant attending Council WTS and are cost efficient
- Councils are users of the processed material and this is a prime example of participation in the circular economy
- It is likely that there are opportunities to build larger, stationary plant at some regional centres.

**Current arrangements**

Concrete is one of the major parts of construction and demolition materials. It is estimated that Councils are responsible for more than 45,000 tonnes in regional SA but many Councils did not provide information and estimates needed to be made on population basis for them. Volumes vary considerably from trivial amounts through to more than 5000 tonnes per annum in the larger Councils. Concrete volumes are relatively low in regional compared to metropolitan South Australia.

Concrete can be readily reused as an aggregate for road and civil construction and. To do so it must be separated and then crushed. The crushing plant is expensive. Even small plant, for up to 1000 tonnes per annum have a capital cost of $500,000 and large plant, for up to 20,000 tpa are at $840,000. Operating expenses are also high but decline quickly as volumes rise.

The common current practice of reporting Councils is to receive concrete at WTS where it is stored separately. When enough is accumulated to make it worthwhile, a mobile plant attends the WTS where the concrete is crushed and then restored for use on Council projects or taken away by the contractors at the cost of $19/tonne. Councils are therefore the managers of the material and the users of the reprocessed end-product, making this material stream a current example of Council participation around the full circular economy.

**Findings of the cost model**

The table below summarises the outputs of the cost model, comparing the cost of readying the concrete for reuse using fixed plant at each of the selected aggregation sites with the cost of using the mobile plant and the cost of sending the material to landfill. It is based on the idea that each aggregation site would install plant with capacity at least as great as local volumes.

| Aggregation site | Average cost processing at aggregation sites ($/t) | Average cost of processing using mobile plant ($/t) | Average cost of sending to landfill ($/t) |
|---|---|---|---|
| Port Lincoln | 145 | 77 | 162 |
| Whyalla | 52 | 77 | 171 |
| Port Pirie | 56 | 77 | 172 |
| Monash | 138 | 77 | 172 |
| Mount Gambier | 59 | 77 | 165 |
| Peri-urban to Adelaide | n/a | 77 | 169 |
| | | | |

Table 2: Concrete waste management costs in regional South Australia

The results of the model suggest there is no single best management for managing end of life concrete. All management options contributing to the circular economy are lower than sending it to landfill but, in some cases, where volumes are largest, it would be cheaper to build a dedicate, stationary plant.

**Strategic implications**

The analysis shows that Councils are currently taking the best option available to them. The current arrangements are also superior to the landfill option. The total cost of using the mobile plant is estimated to be $4.65 million p.a. The cost if it were sent to landfill is estimated to be $5 million p.a. The model also suggests changes to the recycling infrastructure. There appears to be an opportunity to centralise concrete crushing at larger plants in the larger regional centres. Mobile plant would continue to be the low-cost option for much of the state but the use of fixed plant would reduce total costs to $2.76 million p.a.

### 3.4 Ferrous Metal

**Summary**

- Ferrous metal is accumulated at WTS and periodically sent to Adelaide where it is shredded and sent to a steel mill
- The cost model results confirm that current arrangements are cost effective
- It is infeasible to reprocess or compact ferrous metals in the regions.

**Current arrangements**

The survey by Rawtec showed that nearly all metal collected by regional Councils is ferrous metal. This stream is estimated to be more than 14,000 tonnes per annum in regional South Australia.

Ferrous metal is collected mainly by drop-off at WTS but also by occasional hard rubbish kerb side pick-ups taken on to the WTS.

Ferrous metal can only be reused by being re-smelted at an existing blast furnace. Therefore, the options for regional South Australia are few and involve sending the material to a very large aggregation site in Adelaide where it is shredded and sent on to a smelter.

Current practices involve Councils storing ferrous materials at WTS, with the attendant holding costs which are not modelled here. Once enough is collected it is sent to Adelaide at a relatively low cost of $0.08 – $0.013 per tonne.

**Findings of the cost model**

The table below summarises the outputs of the cost model, comparing the cost of sending the material to landfill compared to sending it to Adelaide. The table reports the total costs for each of the selected aggregation sites to provide a summary. However, as the practice is for each Council to send waste directly from their WTS to Adelaide and not via an aggregation site, the costs for the two alternatives for each Council is provided at Appendix 4.

| **Aggregation site** | **Average net cost of sending to Adelaide $/t** | **Average cost of sending to landfill $/t** |
|---|---|---|
| Port Lincoln | 15 | 164 |
| Whyalla | 46 | 250 |
| Port Pirie | -10 | 174 |
| Monash | -13 | 176 |
| Mount Gambier | 0 | 166 |
| Peri-urban to Adelaide | -31 | 162 |
| | | |

Table 3: Sending ferrous metal to Adelaide and landfill in regional South Australia

The model shows that the current arrangement is the most cost effective. Sending ferrous metal to landfill is more costly and largely because scrap ferrous is valuable, returning an estimated average of $36/tonne.

**Strategic implications**

There is little that can be done to improve the current arrangements. It is not feasible to build a steel blast furnace in South Australia and certainly not in the regions. There is a question about whether a regional aggregation site is feasible where scrap metal could be compacted as is currently done in Adelaide, but the option is expected to be uneconomic and has not been modelled.

### 3.5 Cardboard

**Summary**

- Currently not feasible to process cardboard in the regions
- The modelling confirms that the current practice of accumulating this waste in the regions and sending periodically to Adelaide is cost efficient
- Greater quantities of cardboard can be found in comingled recycling.

**Current arrangements**

Volumes of cardboard in regional South Australia are the smallest of those analysed here at less than 8000 tonnes per annum and 1-2% of the total. However, it is a significant form of separated waste, a major form of commercial and industrial waste in the regions and it is readily recycled. In most cases, volumes are scaled in proportion to population. However, there are exceptions, with some Councils reporting virtually no collection.

Cardboard is reprocessed in large paper mills of which there are none in South Australia. All recycled cardboard is baled here and sent interstate by road or overseas in container ships. This fact illustrates the general strategic point that not everything can be recycled at every level of aggregation and in this case even all of South Australia appears to be insufficient to make a plant viable although the possibility of a fibre polishing plant is to be investigated further. In addition, cardboard is recycled into new paper products often in association with new paper production, which does not exist in South Australia.

Only some preliminary baling is done in only some regions. No matter how it is treated in the regions, the cardboard is sent to specialist firms in Adelaide. It is there that baling for shipment occurs and includes separating contaminating waste, compressing the cardboard and forming into prescribed bale sizes.

As with ferrous metal, regional Councils store cardboard at WTS until there is enough to justify sending it to Adelaide. The cost of doing so exceed $250,000 per annum.

Most of the cardboard received at WTS come from commercial concerns, either as drop-off or from kerb-side collection. Regional Councils do not separate cardboard from comingled recycling. The process involves simply baling cardboard and loading onto trucks.

Councils must pay $25/tonne to have cardboard accepted in Adelaide. The Adelaide aggregator uses little capital equipment and simple procedures.

**Findings of the cost model**

The table below summarises the outputs of the cost model, comparing the cost of readying the waste by sending it to Adelaide and the cost of sending the material to landfill, for each of the selected aggregation sites. Again, as with metal, the practice is to send the waste directly to Adelaide and not via an aggregation site and the data below only indicate the overall situation. The cost estimates for each individual Council are found at Appendix 3.

| Aggregation site | Average cost to send to Adelaide aggregator $/t | Average cost of sending to landfill $/t |
|---|---|---|
| Port Lincoln | 166 | 164 |
| Whyalla | 96 | 199 |
| Port Pirie | 80 | 190 |
| Monash | 77 | 198 |

| | | |
|---|---|---|
| Mount Gambier | 80 | 177 |
| Peri-urban to Adelaide | 33 | 165 |
| | | |

Table 4: Processing and landfill costs for cardboard recycling in regional South Australia

The cost model finds that it is cheaper to send the separated cardboard directly to Adelaide for recycling than it is to send it to landfill. This can be seen in the aggregated data in the table above and, when the estimates are made for each individual Council, the result is the same, as can be seen in Appendix 3.

**Strategic implications**

The situation with cardboard is like that with ferrous metal: the scale of plant required for reprocessing is so large that it does not exist even in Adelaide and there is no prospect of developing recycling infrastructure in regional South Australia.

The estimates of waste volumes suggest that some Councils are not collecting at least some available cardboard and it is not known what happens to uncollected cardboard. The costs in managing this waste are relatively small.

In addition, there is the possibility of increasing volumes of cardboard waste by separating it from other recyclable waste in kerbside recycling bins. But separating that waste in the regions can be expensive, as the final part of this section shows.

## 3.6 **Comingled recycling**

**Summary**

- *Comingled recycling may not be sent to landfill*
- *Nearly all is sent to Adelaide where it is separated and then sent on to processing plant*
- *Establishing regional MRFs incurs high capital costs and is modelled as more expensive than current arrangements*
- *However, the cost model does not take account of the advantages in compacting separated recyclables before transport, increasing waste volumes by separation or any potential revenue from separated*
- *Investing in regional MRFs can also have an educative role in indicating governments' intentions.*

**Current arrangements**

Currently, most regional Councils send comingled waste to Adelaide where it is separated for recycling at a Materials Recovery Facility (MRF). Regulations disallow sending waste from recycling bins to landfill unless they are heavily contaminated. A very common form of contamination is the presence of broken glass, but it is not known how much broken glass makes the comingled waste unusable or how much comingled waste is made unusable.

Councils do not receive any payment for the comingled waste they deliver to the Adelaide MRF. Instead, they are charged an average of $150/tonne to have the MRF manage the waste, although it should be noted that there are significant variations and frequent changes to the charge. In addition, the transport costs of sending waste to Adelaide are high, totalling more than $1m per year. It is possible to send the kerbside collection vehicle directly to Adelaide and it is understood this is a common practice for peri-urban Councils, but it is expensive at $0.47/tonne/km. For this reason, most regional Councils off-load at their WTS and reload onto larger trucks, suffering an estimated cost of $2/tonne to do so but saving significantly on subsequent costs of sending to Adelaide ($0.14 - $0.25/tonne/km).

There is one regional MRF, in the rural city of Mount Gambier. The report of the consultants offers only in complete information as to which Councils send waste there but it is understood this is a high-cost facility and used only by Councils close enough to transport to it without first reloading onto larger trucks, which is assumed to occur when distances exceed about 100 km.

**Findings of the cost model**

The table below summarises the outputs of the cost model, comparing the cost of readying the waste in the regions for reuse, of sending it to an Adelaide MRF and of sending the material to landfill, for each of the selected aggregation sites.

| Aggregation site | Average net cost of readying for reuse | Average cost of sending to Adelaide | Average cost of sending to landfill |
|---|---|---|---|
| Port Lincoln | 694 | 224 | 167 |
| Whyalla | 695 | 234 | 196 |
| Port Pirie | 709 | 209 | 192 |
| Monash | 690 | 202 | 195 |
| Mount Gambier | 701 | 227 | 176 |
| Peri-urban to Adelaide | 560 | 163 | 171 |
| | | | |

Table 5: Comingled waste management costs in regional South Australia

The first point is that it is cheaper to send comingled waste to landfill for all regions except the peri-urban regional Councils but, as discussed, this is banned by regulation, imposing higher costs on Councils, despite the waste levy.

The second and major point is that separating comingled waste at regional MRFs is expensive. This is largely the result of high capital costs. Even a small plant, able to deal with a single, typical Council's waste has an establishment cost of more than $750,000. The large plant needed for aggregation sites are estimated to cost more than $3,750,000 and so the scale economies from spreading fixed costs are small (average capital costs fall from $588 to $420 over this range). In addition, variable processing costs are high and fall relatively slowly with scale, decreasing by only half while scale increases by an order of magnitude.

**Strategic implications**

These high capital costs count against establishing MRFs in regional South Australia. Only larger potential aggregation sites show costs comparable to current arrangements but even then, costs are higher. In short, based on data used in the cost model, establishing regional MRFs cannot be recommended.

However, there are some further considerations. Firstly, to repeat the general point, the cost model is broadly accurate and fits the reality here where we find one, marginally viable regional facility but it is imprecise and it might be that a particular configuration of Councils and waste could make for a viable MRF.

Secondly, the analysis of the cost model is incomplete. One significant advantage of a regional MRF is that, once separated, waste can be compacted before sending to Adelaide. Especially once glass is removed, waste can be compacted and this will make it much cheaper to send it to an Adelaide recycler. This compaction effect requires further modelling.

The model also does not capture the impact of separation on volumes of other waste streams. For example, we have seen that the practice of sending currently separated waste cardboard to Adelaide for re-baling is cost effective. However, if a potential regional MRF were established with its own compacting and baling equipment the waste could be transported at lower cost. It could be sent to a processor, so avoiding the cost currently being paid to an Adelaide MRF. These effects also require further modelling.

Thirdly, the model does not consider the revenue that might be earned by sending separated waste to re-processors.

Finally, the development of regional MRFs can send a signal that waste management is about more than what is cost effective. Regional MRFs can have a positive effect on regional attitudes to recycling, providing an indication of state and local government's commitment to the circular economy as well as employment and income.

## 4. Strategic development

### 4.1 The strategic vision

This section consolidates the discussion of individual waste streams from Section 3 into a broader and general strategy for regional recycling. It summarises the implications for new regional infrastructure and discusses the options for building and operating those facilities. There are also implications for workers' skills and training.

This report began with the proposition that the CE as it relates to waste currently managed by councils can only be partially implemented at a regional level. The subsequent analysis bears this out. Some of the materials recovery supply chains are very short in the regions with neither processing nor reused in SA: metal and cardboard are examples. In these instances, regional management is about separating steams when that is cost effective to do so and sending it to aggregation sites in the State capital.

However, not all streams are of this sort. Some, such as organics and concrete, can not only be processed at aggregation sites in the regions but re-used there as well. These constitute prime opportunities for strategic management and examples of regional participation in the CE. They also constitute examples of future investment that can extend the participation.

As shown above, the cost model can guide the analysis further by estimating the cost impacts of different number of plants and spatial configurations of infrastructure. The findings of the model so far indicate cost-*reducing* options. Repeatedly running the model could identify cost-*minimising* arrangements but that has not been attempted within the scope of this project.

This analysis covers only the largest waste streams. As such it is likely to include most of the major costs and to be indicating accurately the cost implications of different management options. However, it is incomplete – there are other waste streams – and lacks precise inputs concerning each Council. Hence, the

discussion of strategic development can be taken as accurate but preliminary. More detailed analysis is needed to guide Council spending, as is discussed in the final part of this section.

### 4.2 Future regional Infrastructure

A key finding from the he cost model indicates that some investments in new regional infrastructure will reduce Councils' costs. All cost-reducing investments will require the aggregation of waste from several Councils and use of joint processing facilities. The following section discusses the major elements of the investment required.

The major element of new infrastructure is the prospect of developing regional MRFs. These would be major, prominent investments. However, the model has shown that regional MRFs are not cost effective, despite the high costs of managing comingled recycling waste. But the analysis to date is incomplete and fails to capture all the benefits. Further work is required to determine if the plant would be viable undertaking particular tasks in specific locations.

Establishing regional MRFs might also have other benefits in providing incentives for and pressures on regional Councils to separate comingled recycling. That is the first and major step in diverting these mixed materials from landfill and into the CE, so investing in MRFs is likely to increase the amount of material managed by Councils and not simply thrown away.

The cost modelling indicates that organics can be economically processed for reuse in the regions, confirming the reality which is that there are private composting facilities in the regions. The model shows that more of these will cut Councils' costs but this option is complicated and more work is required.

Firstly, there are major sources of regional organics that are not managed by Councils but could be incorporated. Secondly, there are potential local users of this material which could be parties to the development of waste infrastructure. Thirdly, there are existing privately-owned plant in this waste stream which already provide cost-reducing services for regional Councils. Finally, there is currently uncollected residential organics and the cost-effectiveness of incorporating these sources needs further analysis. The multiple Councils, sources, users and stakeholders mean investment in organics infrastructure will need coordination, as discussed below.

Finally, the model suggests that concrete processing is viable at the larger aggregation sites. Investing in these plants will mean that local Councils reprocess local material for local reuse. They are exemplars of the CE and should be a priority for future investment.

### 4.3 Governing investment and operation

The model suggests investment in infrastructure but how can the new infrastructure be built and operated and how can the investments be financed?

The analysis shows these are cost-reducing investments and that suggests they will earn a return to Councils in the form of reduced management expenditures. Those reductions can be used to service the debt required for the Councils to build and own the infrastructure. Two issues are outstanding.

Firstly, more precise and detailed work is needed, by each Council, to determine how much capital investment their cost reductions would justify. The analysis so far is only an accurate view of the aggregated position and it is likely that some Councils will benefit more than others. Secondly, the investments themselves must be subject to a cost-benefit analysis. We have seen there is considerable cost reducing potential, but the cost model has not looked at all the business costs, especially the cost of capital. An analysis is needed to determine if the capital spending that can be supported by those cost reductions is sufficient to finance the infrastructure investment. If not, additional sources of funds would be needed from other funding bodies such as the South Australian and Australian governments. There are various funding

arrangements that could be pursued once the cost-benefit analysis confirms the strategy at an individual project level.

If the subsequent, detailed work shows that the investments are justified then attention must be paid to the means of organising the investments. Councils can choose to collaborate, to invest and jointly own the facilities. Alternatively, they could use the cost savings to pay a private firm to invest. And there is also the question of whether collaborating Councils should operate the plant or contract out for that service.

The future infrastructure waste management services must be specified, the performance must be monitored and the agreement enforced. And, no matter what arrangement is chosen, there will be a chance it will fail and the expected cost of failure must also be considered.

These governance costs are known in the academic literature as transaction costs. The best organisational option provides the service with the lowest transaction costs although, in principle, any arrangement for which the transaction costs are not prohibitive (i.e. do not exceed the net benefit in prospect) could be used.

It is likely that the transaction costs associated with materials management will be significantly high. Partly this is because there will be multiple parties involved and detailed agreements will be needed. But it is also because there are inherent difficulties in transacting over management services and these difficulties must be addressed in the contractual arrangements chose.

Organising a CE supply chain requires that parties connect sources of waste with users of recycled waste. The suppliers of waste need to be able to dispose of it whenever it arises, meaning their supply might not be constant or consistent. The users of recycled waste want to be able to purchase it whenever it is desired, and their demand also might not be constant or consistent. The processor wants a constant and consistent supply of waste for processing and a constant and consistent sales. Every time there is a mismatch between any of these three sets of parties, there is a need for inventories which can be expensive and environmentally damaging. These considerations make agreements difficult and expensive which can make investing in processing infrastructure unviable.

In addition, the parties want different time scales for agreements: the processor will invest in the plant and its on-going maintenance and upgrades if the time scale of the agreements with suppliers and users is sufficiently long but suppliers and users cannot be sure of the processor's long-term performance and would prefer shorter term agreements that give them the opportunity to switch processors.

What is needed is a set of arrangements that deals with both sets of issues: it must be long-lived and it must have rules that constrain suppliers, users and processors and reduce uncertainty over supply chain flows. There are a range of non-mutually exclusive options and a combination of them is likely to be optimal.

Firstly, Councils could collaborate and build jointly owned facilities at aggregation sites. The model for doing so is the well-established Waste Management Authority arrangement which operates as a subsidiary of the various Councils. The Authority could operate the plant or enter contracts with private, specialist firms.

Secondly, users could collaborate. In principle, regional users of processed materials can have access to cheap and reliable sources of inputs if someone builds the reprocessing plant. This provides an incentive for the users to be the investors.

Thirdly, specialist recycling firms could invest in and operate the new infrastructure. The other options are simpler for having fewer parties involved: if Councils own and operate, they can deal with uncertainties in supply; if it is users, they can deal with uncertainties in demand. Specialist firms will want agreements with both parties, up and down the supply chain, and this makes the arrangement inherently more costly.

These governance options are all costly. In principle, they can be reduced by adding governance resources, especially from existing institutions. The first and most obvious is for the LGA to play a coordinating role. It can bring the parties together and act as an honest broker in negotiations. It can provide secretarial support and an integrating role in the subsequent waste management planning.

Additional resources can also come from the SAG. GISA can play the roles described for the LGA or support the LGA in doing so. GISA can also assist in coordinating state government policies. For example, it can promote and assist the roll out of green bins in regional councils as part of the initiative to build composting facilities. GISA also has some influence over future adjustments Revenue SA might make to the waste levy.

Finally, it is evident that there is potential for restructuring future regional economies around the CE concept. To reiterate, the proposals made here are, in principle, partially self-funding because they cut costs but to put them into practice requires coordination and it is here that Regional Development Australia might find a role. For example, the research currently underway to extend organics processing to include private sector waste can be used as a foundation for future RDA work.

### 4.4 Skills, employment and training

There are a range of skills and training issues associated with Councils' current management activities. These include OHS&W policies and regulations. They extend also to regulations concerning hazardous wastes and others concerning specific recycling streams such as agricultural chemical drums and electronic equipment.

There is an opportunity to enhance training for these current activities.

The changes to skills and employment required are significant but the implications for Council staff are uncertain as it depends on who does the investing and operates the plant. However, when looked at from a regional perspective it is evident that implementation will mean

- An increase in regional employment in collecting, processing and reusing recycling will mean:
    - There might be some small reduction in employment at Adelaide MRFs currently receiving regional materials.
    - But any increase the amount of waste collected and processed, would mean a likely increase in state employment.
- A need for skills in operating composting plant
    - These skills will include biochemical and engineering training.
- A need for skills in operating regional MRFs
    - These will be simpler tasks with fewer skills and less training needed.

### 4.5 Regional waste management plans

One of the purposes of this report is that it can act as a coordinating statement for more detailed planning. The model upon which the Strategy is based has provided apparently accurate results, but they lack precision which will require the more detailed analysis. For example, the vision is for more and bigger composting facilities but where they are best placed, what they would best use as inputs and what the output be best used for are all questions for more detailed work in future.

Many regional Councils are parties to existing regional waste management plans. Some of these plans are current and some are or will be reviewed. In addition, the vision in the recently released waste strategy of the SAG includes that all Regional Local Government Areas will have Waste Management Plans in place by 2023.

**Regional LGA Management Plans current status:**

Legatus Group

2014-2020 Waste Management Strategy
Strategic Plan
Goal Three: Support development and infrastructure that contributes to sustainable communities: includes establish regional waste management regimes that reduces the volumes of hard waste going to landfill and minimises costs to Councils and their communities.
Goal Five: Manage a robust and financially sustainable model that underpins our operations: includes identify opportunities for resource sharing and support to Constituent Councils through regional and sub regional activities that add value and build capacity.
20/21 Business Plan
Progress the SA Regional Waste Management Strategy and develop a Legatus Group Waste Management Action Plan re local opportunities for waste reduction.

Murraylands Riverlands LGA

Developing a 2020-2025 Regional Waste Strategy and Implementation Plan including a procurement plan with recommendations regarding governance.
Strategic Plan
Create sustainable region waste management.
20/21 Work Plan
Negotiate agreement with RDA Murraylands and Riverland to co-fund project management of Regional Waste Strategy and Implementation Plan. Procure specialist resource to develop Regional Waste Strategy.

Southern & Hills LGA

2 well developed Regional Waste Authorities and the region is now into "phase 2" type energy to waste development. Phase 1 was the Landfill methane reclamation, phase 2 is the transformation of brown field landfill areas into solar farms.
2017-2021 Business Plan:
Objective 3 – To support sustainable economic, environmental and social development in the region.
2020-2021 Key Annual Action Plan:
Waste – Liaise with Regional Waste Management Authorities to develop regional plan.

Spencer Gulf Cities

In 2019 developed a Waste and Resource Recovery Strategy 2020-2025.

The strategy complements work undertaken by each of three USG Councils and sets out a strategic framework for managing waste and resources over the 5-year period, with a particular focus on reducing waste to landfill, efficiency and cost-effectiveness and; investigating opportunities to attract new recycling and re-manufacturing enterprises to the region. The report identifies that across the Upper Spencer Gulf, the Port Augusta, Port Pirie and Whyalla Councils collect a combined 20,000 tonnes of waste per year from the community and on average, only recycles 41%. The strong industrial growth and existing transport infrastructure across the region, including road, rail, sea and airport facilities also reinforces the Upper Spencer Gulf as an ideal location for additional resource recovery, re-processing and manufacturing operations and growth in a 'Circular Economy'.

Limestone Coast & Eyre Peninsula TBC

## 5. Future policy options for the South Australian Government

### 5.1 Introduction

The cost model shows how participation in the CE can currently be cost-effective for regional local governments. In other words, there are rational, self-interested reasons for Councils to be involved in the ways set out. The last section has emphasised that it is the cost of governing the ownership and operation of the infrastructure that are the major impediments. The primary policy options for the South Australian Government are to assist in developing the institutional and contractual arrangements in the ways described above.

This section sets out the main features of the current funding programs and discusses some of the policy options.

### 5.2 Infrastructure development assistance

Both the South Australian and Australian Governments have recently released updated waste management strategies.

The South Australian document, *Supporting the Circular Economy*, identifies several priority areas. This document aligns with and can be expected to fit funding criteria in the following areas:

1. Improve resource recovery

This report encourages investment "in infrastructure that supports circular economy material flows". The initiatives in composting have particular regard to "organic material, designed to re-enter and regenerate the environment safely (such as compost)" and to "materials (such as metals, paper and plastic) that are designed to circulate for as long as possible".

2. Infrastructure capability and capacity

The data collected and the model developed for this project "improve knowledge and awareness of resource recovery infrastructure (which will) improve knowledge and opportunities in relation to the potential return on investment … (and) … support soft infrastructure investment in workforce planning, training and talent retention ...".

3. Improve information to guide investment

This report includes recommendations for "research and development, commercialisation and innovation". It provides "knowledge management and metrics for waste and resource recovery in a circular economy".

The South Australian Government provides funding under a range of programs for waste management. Of relevance to this report are:

1. Recycling Infrastructure grants

These on-going grants are intended to assist with installing "infrastructure … to increase the recovery of resources …". Grants of up to $500,000 are available for 50% of eligible project costs. The program has been extended in conjunction with the Australian Governments Recycling Modernisation Fund to now be a $30 million program Projects are to be of state significance, valued at $500,000 to $10 million and recipients must match the SAG contribution.

2. Council modernisation grant

These are also ongoing grants, offered annually, and are intended to promote waste management practices related to infrastructure, including via innovation, pilot projects for food waste, regional waste management plans and source separation.

The Commonwealth program, the National Waste Policy Action Plan contains a list of goals and actions but offers no funding assistance. Nonetheless, the Australian Government does provide modernisation and other grants for waste infrastructure.

### 5.3 The Regional Transport Subsidies Program

Currently, GISA offer assistance to regional Councils through the temporary Regional Transport Subsidies Program which reduces the costs of transporting kerbside recycling. The modelling we have done have not taken this program into account.

Policies which reduce all transport costs necessarily also reduce the costs of sending to landfill, but this policy is targeted only at the costs of transporting waste for recycling and this enhances its effectiveness. However, in principle, this policy fails to deal with the issue at its root. The problem is not transport costs, but a lack of recycling and the current approach makes transport cheaper and leads to more of it than is optimal: there are more journeys, more exhaust pollution, etc than is optimal.

It is better to promote recycling directly rather than by subsidising some part of the process. This policy is due to end in June 2021. When it does, the funding would be better directed at assisting Councils directly.

### 5.4 The waste levy

Revenue SA apply a number of levies on waste. The Waste Levy – hypothecation of waste levy is where the money raised from the waste levy is reinvested back into the waste, recycling, resource recovery sector for worthwhile initiatives. This report has discussed only the Solid Waste Depot Levy which is paid by the landfill licence holder who passes the fee onto Councils. The SAG can discourage waste to landfill and encourage recycling by increasing the levy. There are a number of considerations:

Firstly, the levy can be justified on the basis that there are external costs in using landfill and the levy acts as a so-called shadow price. As such it creates incentives to take account of the environmental and other costs that flow on from using landfill and this concept has informed this report throughout. However, if the levy were increased in order to increase recycling, rather than in response to rising external costs, it would diverge from the principle.

Secondly, the cost model shows that the solid waste depot levy is only one part of the costs of sending to landfill. The largest part is the disposal charge levied by the landfill licence holder. Transport costs are also significant. The levy cost is typically somewhere between the other two. This suggests that the impact of increasing the levy will be lessened by the weak linkage to total landfill costs.

**Attachment 1: The Reference Group**

| Name | Title / Organisation |
|---|---|
| Simon Millcock | CEO Legatus Group |
| Paul Chapman | Project Manager Legatus Group |
| Emily Heywood-Smith & then Brianna McGee | Policy Officers LGA |
| Grant McKenzie | Director Development & Regulation<br>Port Pirie Regional Council |
| Professor Guy M Robinson | Department of Geography, Environment and Population University of Adelaide |
| Associate Professor Nicholas Chileshe | University of South Australia |
| Tony Wright | CEO Limestone Coast LGA |
| Justin Lang | Manager Local Government and Infrastructure<br>Green Industries SA |
| Simon Grenfell | Executive Officer<br>Fleurieu Regional Waste Authority |
| Stephen Goldsworthy | Operations Manager<br>Yorke Peninsula Council |
| Ken Dolan | Director Works & Infrastructure Clare & Gilbert Valleys Council |

**Attachment 2: The cost model**

**Outline of decisions**

**Costs**

1) Total annual costs of aggregating
2) Net total annual costs of processing

   = total annual costs of processing – revenue
3) Total annual costs of sending to landfill
4) Net total annual costs of sending to MRF in Adelaide

   = total annual costs of sending to MRF - revenue

**Rules**

If (1) + (2) < (3) and (4) then process in the region

If (1) + (2) < (3) > (4) then send to MRF Adelaide

If (1) + (2) > (3) < (4) then send to landfill

Let

j = Council, j

$Q_{Wi}$ = the annual quantity of waste stream, i (tonnes)

$R_{Wi}$ = the annual quantity of waste stream, I ($)

$Q^{J}_{Wi}$ = the annual quantity of aggregated waste stream, I (tonnes)

$T_{Wi}$ = the cost of transporting waste stream, i ($/tonne/km)

$TAg_{Wi}$ = total annual costs of aggregating waste stream, i ($)

= $Q^{j}_{Wi}$ x $\sum_{j=1}^{n} T_{Wi}\, x\, kg_{Wi}$

Where $kg_{Wi}$ = distance to the aggregation site from WTS in Council, i ($/tonne/km)

$AC_{AWi}$ = average annual costs of aggregating waste stream, i ($)

= $TAg_{Wi}/Q^{J}_{Wi}$

$TP_{Wi}$ = total costs of processing waste stream, i ($)

= $(KQ^{j}_{Wi}\,/Kt/Q^{J}_{Wi}) + APCQ^{J}_{Wi}$

Where $KQ^{j}_{Wi}$ = capital cost of processing plant to process quantity, $Q^{J}_{Wi}$

$Kt$ = length of life

$APCQ^{J}_{Wi}$ = average processing cost of processing quantity, $Q^{J}_{Wi}$

$AP_{AWi}$ = average annual costs of processing waste stream, i ($)

= $AP_{Wi}/Q^{J}_{Wi}$

$TLF_{Wi}$ = total annual costs of sending waste stream, I to landfill ($)

= $Q^{J}_{Wi}\ x\ (T_{Wi}$ + levy + charge)

$TAd_{Wi}$ = total annual costs of sending waste stream to MRF in Adelaide, i ($)

= $Q^{J}_{Wi}\ x\ \sum_{j=1}^{n} T_{Wi}\ x\ ka_{Wi}$

Where $ka_{Wi}$ = distance to the MRF from WTS in Council, i ($/tonne/km)

$AAd_{Wi}$ = average annual costs of sending waste stream to MRF in Adelaide, i ($)

AEC Group Pty Ltd (Brisbane)
Level 5, 131 Leichhardt St
Spring Hill QLD 4000
ABN: 84 087 828 902

OUTCOME DRIVEN

4th February 2021

Simon Millcock
CEO
Legatus Group

Dear Simon,

## RE: REVIEW OF WASTE COST MODEL

AEC Group Pty Ltd (AEC) has completed its review of the cost model for the regional SA Council waste project.

Our process included separating the relevant input and assumption cells from calculation cells and then undertaking an audit of the model logic pertaining to the calculations underpinning the model outcomes. We did not attempt to verify any of the model's inputs and assumptions, which we understand were primarily sourced from Rawtec.

We have separately provided detailed findings in a number of emails. In summary:

- There was 1 significant error located in 2 sheets (compost and concrete), being the inclusion of product sales revenues in the cost base rather than offsetting against the cost base. While this occurred in another sheet (comingled), the sales value was $0/tonne and thus had no impact on the calculations.
- There were a few individual cell errors, some pertaining to transport distance and associated costs and others from input error, although the flow-on impact of these errors was relatively minor and did not have a significant impact on the findings.
- A number of cosmetic and functionality suggestions were made to enhance the useability of the model should inputs and assumptions be amended at any point.

Thank you for the opportunity to assist you with this project. Should you have any queries in relation to the above, please do not hesitate to contact me on 0438 550 018.

Yours sincerely

**Gavin O'Donovan**

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# Regional SA Waste and Resource Recovery Background Report SAROC



rawtec

## Document verification

| Date | Version | Title | Prepared by | Approved by |
|---|---|---|---|---|
| 30/11/20 | V1 | Regional SA Waste and Resource Recovery Background Report - Draft | K. Le Gallou, J. Webb & M. Rawson | M. Rawson |
| 16/12/20 | V1.1 | Regional SA Waste and Resource Recovery Background Report - Updated Draft | K. Le Gallou, J. Webb & M. Rawson | M. Rawson |
| 23/12/20 | V1.3 | Regional SA Waste and Resource Recovery Background Report | K. Le Gallou, J. Webb & M. Rawson | M. Rawson |

## Important notes

# Executive summary

The Legatus Group have been commissioned by the South Australian Regional Organisation of Councils (SAROC) to "develop a regional waste management strategy to enable the coordination of waste and recycling infrastructure across regions" in accordance with the action identified under Theme 4: Financial Sustainability and Governance in the SAROC Annual Business Plan 2019-20.

Funding for this was made available by the Local Government Association (LGA) of SA and Greening Industries SA (GISA) with in kind support from the Legatus Group and the project Reference Group.

The Legatus Group in partnership with the University of South Australia (UniSA) are developing an economic model to support the strategy.

This report provides background data collected from a survey of regional councils. It summarises the survey responses and provides insights and key considerations for the strategy based on national and state targets and Rawtec's contemporary knowledge of the waste and resource recovery sector.

## Summary of Regional SA

Regional councils collect an estimated 162,000 tonnes of waste and recycling from kerbside bins and 4,000 tonnes of hard waste.

An additional 185,000+ tonnes are managed at council transfer stations and resource recovery facilities each year. The main streams managed include, general waste, organics recycling, concrete and bricks, cardboard, ferrous metals and timber. Smaller volumes of materials include electronic waste, batteries, tyres, chemical drums and plastics.

Estimates from the 34 councils who responded indicates material collection, resource recovery and recycling is responsible for about 72 jobs (full time equivalent council employees) in Regional SA and is likely significantly higher.

Councils provided information on transport and processing/disposal costs. This was used to input into the UniSA modelling and determine average costs for five main recycling streams. The average costs have been provided as a guide for councils and are based on survey responses, assumptions and Rawtec experience.

## Common challenges

Across the state, there are consistent themes in the challenges regional councils have managing waste and recycling:

- Distance to markets and large geographical council areas.

- Costs and resourcing:
  - Transport costs are closely linked to distance and volumes of materials.
  - Disposal and processing costs are often higher because of lower volumes.
  - Staff resources to provide education or monitor issues like dumping.
- Managing waste and recycling
  - Issues of dumping of waste or informal management on property.
  - Contamination in the comingled and organics recycling bin.
  - Managing secondary waste streams at transfer stations and the cost of processing/disposal.
  - Data collection and information availability on the volumes of material councils manage.

### Common opportunities

Councils have many common opportunities to improve the way waste and recycling is managed to reduce costs, increase diversion from landfill and meet community expectations. While there can be differences between councils and regions, overall, common actions can be adjusted to suit most areas.

- Joint procurement of kerbside waste and recycling services to reduce costs and increase performance.
- Alternative kerbside collection models (alternative collection frequencies).
- Joint procurement of additional services for secondary waste streams.
- Organics recycling, including food waste to increase diversion from landfill and contribute to the circular economy.
- Community education to reduce contamination and increase source separation.
- Council ownership of key resource recovery infrastructure to influence services and costs.
- Purchasing materials with recycled content to support the SA circular economy.

### Considerations for the strategy

The development of the regional waste and resource recovery strategy should consider a range of themes, policies and opportunities:

- The waste hierarchy - the internationally accepted order of manage waste and recycling. Avoid/reduce, reuse, recycle/compost, recover, treat and as a last resort dispose to landfill.
- Circular economy - redesigning systems and products so they can be repaired, disassembled and recycled to keep materials circulating in the system at their highest value
- Government strategies and policies
  - South Australia's Waste Strategy 2020-2025
  - Environment Protection Act 1993
  - Environment Protection (Waste to Resources) Policy 2010 – SA landfill bans
  - National Waste Policy: Less Waste, More Resources 2018
  - National food waste strategy
  - Waste export ban
- Governance - collaboration and partnerships between councils does require a higher level of oversight, management and commitment. One successful model is establishing a regional waste authority under section 43 of the Local Government Act 1999 with multiple participating councils.
- Aligning council and regional strategies with the state strategy - some key directions for SA include:
  - no avoidable landfill by 2030.
  - implementing better contracting and monitoring of collection services to maximise council efforts, education and cost effectiveness
  - standardisation of collection contracts and mandatory reporting of collection data (using technology to collect and manage this information)
  - encouraging food and organics recycling services in all councils and supporting the national target of 50% reduction in food waste
  - maximising the performance of kerbside systems, reducing contamination and increasing source separation
  - encouraging councils to build support from their communities to explore different collection frequencies and variable pricing models.

**Equipment and infrastructure**

Councils identified various equipment and infrastructure to help manage waste and recycling in their region:

- Regional resource recovery centre or transfer stations to help regions cost effectively manage materials and store until suitable amounts for bulk transport and processing.
- A regional composting facility.
- Equipment to support transport efficiency - grinders, shredders, crushers, balers.
- Upgrades to facilities to increase efficiency and environmental compliance - weighbridge, containment bays, weatherproof skip bins, sorting tables; storage/sorting bins.

### Skills and training

Councils identified skills and training opportunities in the surveys:

- Environmental protection compliance auditing and monitoring.
- Fire training specific to resource recovery facilities.
- Standard Operating Procedures for waste handling.
- Trade certificate in waste management for field staff (Cert 3 & 4).

Community education is another aspect that is very important and highlighted by many councils. This includes:

- Source separation of materials.
- Disposal pathways for materials, where and how they are recycled.
- The waste hierarchy.
- Food waste, home composting.

## CONTENTS

# Project summary

SAROC has commissioned a Regional Waste and Resource Recovery Strategy for Regional SA councils. The strategy aims to identify options for councils to contribute to the circular economy.

There are multiple stages to this project:

1. Background report (this report): Developed by Rawtec, this provides the background data collected from councils to support the economic model. It also provides the responses and insights from the councils and key considerations for the strategy based on survey responses, national and state targets and contemporary knowledge of the waste and resource recovery sector.
2. Economic model: Developed by UniSA to assist high-level decision making on regional opportunities and the viability of processing options of materials for councils.
3. Strategy document: The draft strategy will be developed by Legatus Group through consultation with the Reference Group, incorporating the background report and the findings from the economic modelling for consideration by SAROC

LGASA and GISA has provided funding for the project. Project management and development of the draft strategy is being led by the Legatus Group and supported through their partnership with UniSA. .

### 1.1. Data sources

Volumes of waste and recycling in Regional SA was gathered from two sources:

- Survey of regional councils distributed by the Regional LGA Executive Officers. A copy of the survey is included in Appendix 1: Council survey
- SA LGA General Information Return database.

Remote councils and unincorporated areas were not included in the project. Of the
47 regional councils included, 34 surveys were returned (66 per cent). Additionally, Limestone Coast LGA provided permission to use data from their member councils provided in a previous project with Rawtec. This meant 82 per cent of the regional SA population was captured.

Where information was not available, we developed a waste generation per person metric based on the survey return data and applied this to councils with missing data.

Based on the varying sources, not all volume data is from the same year, but volumes are indicative of what is produced in each council and region.

## Summary of Regional SA

### 2.1. Kerbside waste and recycling volumes

Regional councils collect an estimated 162,000 tonnes of waste and recycling from kerbside bins and 4,000 tonnes of hard waste (Table 1).[1]

Table 1: Estimated kerbside waste and recycling by LGA Region

| Region | General waste | Hard waste | Comingled recycling | Organics recycling |
|---|---|---|---|---|
| | tpa | tpa | tpa | tpa |
| Eyre Peninsula | 10,800 | 500 | 1,300 | - |
| Legatus Group | 23,700 | 2,000 | 7,900 | 4,500 |
| Limestone Coast | 15,900 | 800 | 5,100 | 8,900 |
| Murraylands Riverland | 15,900 | 600 | 4,500 | 4,000 |
| Southern Hills | 17,700 | - | 8,700 | 12,000 |
| Spencer Gulf Cities | 12,500 | 200 | 3,700 | 4,500 |

[1] Waste volumes for each council were provided to the Legatus project team to support the modelling.

| | | | | |
|---|---|---|---|---|
| **Total** | **96,500** | **4,100** | **31,200** | **33,900** |

## 2.2. Transfer station waste and recycling volumes

Councils also receive and manage a range of waste and recycling streams at their transfer stations and resource recovery centres. Estimates of the volume of the most common materials is displayed in Table 2.

Table 2: Estimated waste and recycling collected at Council Transfer Stations by LGA Region

| Region | General waste | Organics recycling | C&D* | Cardboard | Ferrous metals | Timber^ |
|---|---|---|---|---|---|---|
| | tpa | tpa | tpa | tpa | tpa | tpa |
| Eyre Peninsula | 8,600 | 1,700 | 3,600 | 1,100 | 1,000 | 800 |
| Legatus Group | 9,700 | 8,000 | 8,300 | 2,300 | 3,800 | 3,300 |
| Limestone Coast | 9,600 | 5,000 | 4,800 | 1,400 | 2,300 | 2,000 |
| Murraylands Riverland | 7,300 | 2,900 | 5,600 | 1,400 | 2,100 | 2,200 |
| Southern Hills | 12,000 | 8,400 | 11,800 | 1,200 | 3,400 | 1,900 |
| Spencer Gulf Cities | 22,200 | 11,500 | 11,000 | 500 | 1,400 | 1,300 |
| **Total** | **69,400** | **37,500** | **45,100** | **7,900** | **14,000** | **11,500** |

* concrete and bricks collected separately at the transfer station.

^ untreated timber, suitable for mulching or composting.

## 2.3. Employment

Estimates from the 34 councils that provided a response indicates material collection, resource recovery and recycling is responsible for about 72 jobs (full time equivalent council employees).

This does not include private contractors or the councils that did not provide a survey response. Additionally, some councils indicated no FTE staff but managing waste and recycling at some level is likely part time in these areas. Therefore the level of employment in reginal SA will be significantly higher.

## 2.4. Bulk transport and processing costs

Councils provided information on transport and processing/disposal costs. This was used to input into the UniSA modelling and determine average costs for five main recycling streams.

Multiple variables determine the price of bulk transport and processing costs, including:

- type and size of the vehicle/payload used to transport
- type and density of material
- volume of material

- distance travelled to facilities or for processors to travel to council facilities
- type of processing.

The average costs provided are a guide only and are based on survey responses, assumptions and Rawtec experience. The range of costs is significant and there can be large differences in costs between councils.

**General waste**

Table 5 provides guidance for general waste when it is bulk transported to a landfill.

Where councils have access to a metropolitan landfill their average disposal cost is around $40 per tonne (not including levy).

Table 3: Estimated average costs for bulk transport and disposal of general waste (excluding landfill levy).

| Stream | Distance range[1] | Est. average transport cost[2] | Est. average disposal price for councils[3] |
|---|---|---|---|
| | kilometres | $/tonne/km | $/tonne |
| General waste | 100 - 210 km | $0.25 | $60 - $90 excluding levy |
| | 210- 430km | $0.14 | |

1 Distance ranges are based on analysis of main council facilities and known disposal facilities.

2 Figure is based on two survey responses for Comingled Recycling Bulk Transport pricing response, reality checked against general waste responses and Rawtec experience

3 Disposal in landfill. Disposal cost range is based on +/- 20% of the average disposal cost from 16 responses (excluding the top and bottom 10% outliers)

**Comingled recycling**

Table 4 provides guidance for comingled recycling when it is bulk transported to and processed at an established materials recovery facility.

The price for councils to have this material processed has been highly variable and increasing in the past 18 months and can vary between councils. This range only represents a point in time and is not a reliable long-term figure.

Table 4: Estimated average costs for bulk transport and processing for comingled recycling

| Stream | Distance range[1] | Est. average transport cost[2] | Est. average processing price for councils[3] |
|---|---|---|---|
| | kilometres | $/tonne/km | $/tonne |
| Comingled recycling | 100 - 470 km | $0.25 | $120- $180 |
| | 470- 760km | $0.14 | |

1 Distance ranges are based on analysis of main council facilities and known processing facilities.

2 Average transport costs are based on one survey response and Rawtec experience

3 Processing cost range is based on +/- 20% of the average disposal cost from 20 responses (excluding the top and bottom 10% outliers).

### Organics recycling

Table 5 provides guidance for organics recycling when it is bulk transported to and processed at an established commercial composting facility.

Table 5: Estimated average costs for bulk transport and processing for organics recycling

| Stream | Distance range[1] | Est. average transport cost[2] | Est. average processing price for councils[3] |
|---|---|---|---|
| | kilometres | $/tonne/km | $/tonne |
| Organics recycling | 220- 440km | $0.14 | $40 - $60 |
| | 100 - 220 km | $0.25 | |

1 Distance ranges are based on analysis of main council facilities and known processing facilities.

2 No pricing provided in the survey, so figure is based on one survey response for Comingled Recycling Bulk Transport pricing response and Rawtec experience 3 Processing at an established composting facility. Processing cost range is based on +/- 20% of the average disposal cost from 13 responses (excluding the top and bottom 10% outliers)

### Concrete and bricks

Table 6 provides guidance for bulk transporting concrete and bricks and the cost to council to have this material processed onsite by a construction and demolition (C&D) processor using mobile equipment.

Table 6: Estimated average costs for bulk transport and processing for concrete and bricks recycling

| Stream | Distance range[1] | Est. average transport cost[2] | Est. average processing price for councils[3] |
|---|---|---|---|
| | kilometres | $/tonne/km | $/tonne |
| Concrete & Bricks recycling | 0 - 80 km | $0.23 | $60- $90 |
| | 80 - 150km | $0.10 | |
| | 150- 220km | $0.09 | |

1 Distance ranges are based on analysis of main council facilities and known processing facilities.

2 Average transport costs are based on one survey response and assumed vehicle costs of $150 hour and a 20-tonne payload.

3 Processing cost range is based on +/- 20% of the average disposal cost from five responses (excluding the top and bottom 10% outliers)

### Cardboard recycling

Table 7 provides guidance for cardboard recycling when it is bulk transported to and processed at a cardboard processing facility. The estimated net price for councils is after the commodity value of the

cardboard is applied to the processing costs. The final cost to councils will depend significantly on the transport costs.

Note this market has been highly variable in the past two years and there may be significant variation in what councils receive.

Table 7: Estimated average costs for bulk transport and processing for cardboard recycling

| Stream | Distance range[2] | Est. average transport cost[3] | Est. average processing cost[4] | Est. revenue | Est. net price for councils |
|---|---|---|---|---|---|
| | kilometres | $/tonne/km | $/tonne | $/tonne | $/tonne |
| Cardboard recycling | 0 - 220 km | $0.26 | $40 - $60 | $60 - $90 | -$20 to -$30 (rebate) |
| | 220 - 470 km | $0.22 | | | |
| | 470 - 760 km | $0.08 | | | |

## 2.5. Waste and resource recovery facilities

Figure 1 show the locations of council waste and resource recovery infrastructure. It also includes the main commercial processing and disposal facilities (i.e. composting facilities, materials recovery facilities and commercial landfills).

[2] Distance ranges are based on analysis of main council facilities and known processing facilities.

[3] Average transport costs are based on five survey responses and Rawtec experience

[4] Rawtec assumption for delivery to large commercial baler/exporter in metro Adelaide in current market conditions (cost includes unbaling and re-baling).

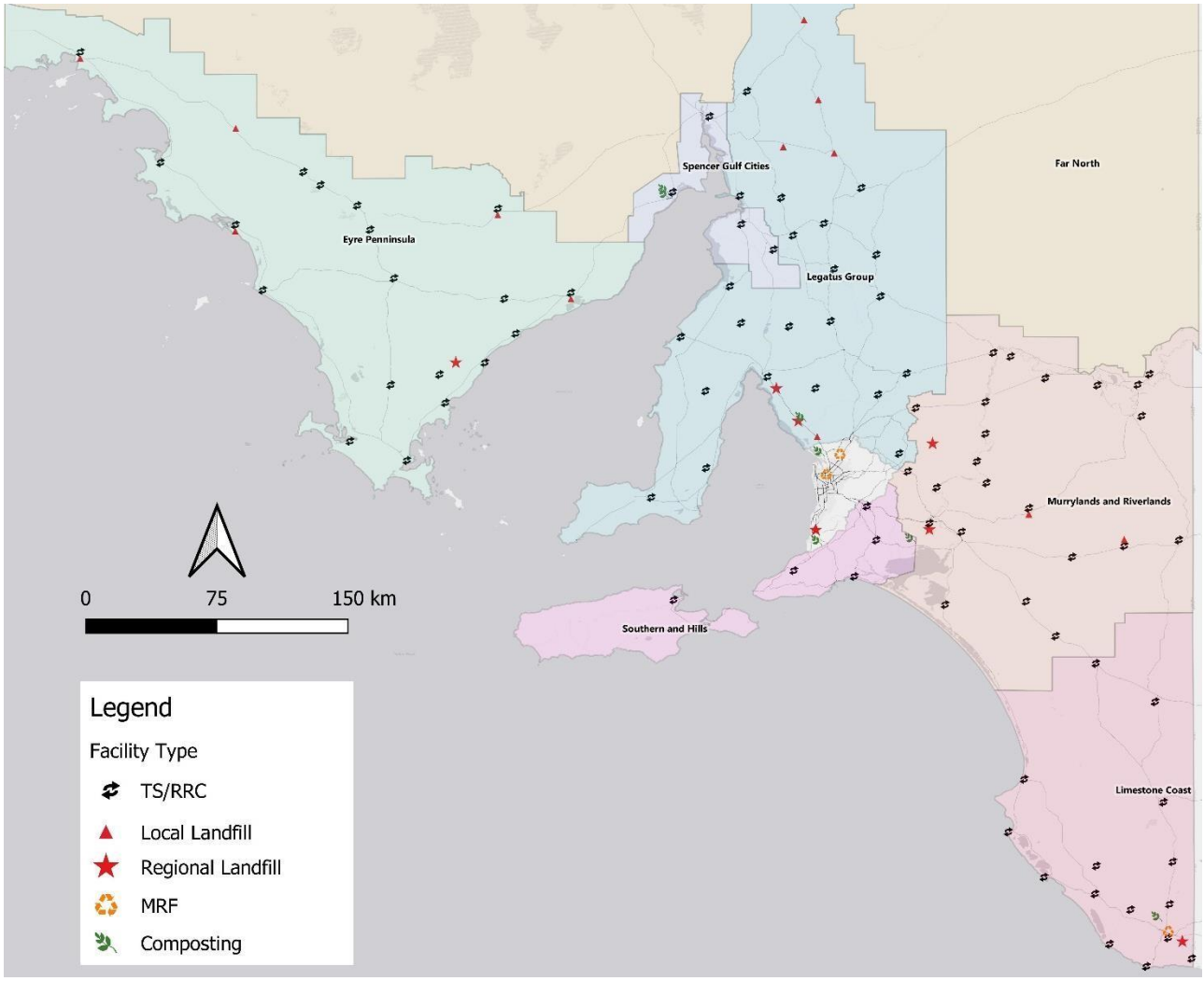


Figure 1: Location of council waste and resource recovery infrastructure and key processing/disposal sites

# Common challenges

Across the state, there are consistent themes of the significant challenges regional councils face in managing waste and recycling.

## 3.1. Distance

Distance to processing/disposal/markets is one of the major challenges for regional councils and directly links to many other challenges.

Some regions have disposal options within their region, but very few have processing options for recyclables. Large distances from disposal and processing sites and markets for materials makes it difficult to collect and costly to manage.
Most materials need to be transported out of the region.

Distance within council areas also creates challenges. Low population density and large geographical areas can make it difficult to provide broader services to communities, despite increasing community expectations.

## 3.2. Costs and resourcing

Costs are the second major challenge for regional councils.

#### Transport costs

Costs for transporting material is closely linked to distance and volumes. Smaller volumes mean less transport efficiencies and distances to processing locations can be significant.

#### Disposal and processing costs

Lower population and density mean lower volumes of materials are collected. Regional councils typically cannot benefit from economies of scale. This is especially true when they act individually and do not increase the aggregated tonnes with neighbouring councils.

Councils may also be limited in their ability to recover costs for managing waste and recycling. Community willingness to pay for appropriate services can be challenging and higher prices could lead to increase dumping or informal management.

#### Staff resources

Having adequate staff resources for waste and recycling along with skills and training and compliance requirements is another significant

challenge. Lack of resources to deliver education to residents or to manage issues such as dumping, create flow on challenges.[5]

## 3.3. Managing waste and recycling

There are a range of challenges around managing waste and recycling in Regional SA.

#### Dumping of waste or informal management

Many councils face challenges of waste dumping or on property management of waste. This can especially be the case where councils try cover their own costs to manage materials which can lead to increasing costs for the community.

#### Contamination

Contamination of the comingled and organics recycling stream was identified by many councils as an issue. Resources to educate residents is often limited.

Some councils also identified the different messages applicable for metropolitan Adelaide compared to their own area (e.g. food in the organics bin, which is only a garden waste bin).

#### Secondary waste streams

Many regional councils have challenges with secondary waste streams, often coming from agricultural sources. This can be specific to a region and include:

- copper chrome arsenate (CCA) treated timber posts
- irrigation pipe
- plastics
- fish rope and nets
- tyres

Volumes that make processing of this material feasible can take time to stockpile and it is still a significant cost for councils. Other materials do not have a processing option (i.e. CCA posts) and become a problem waste stream.

#### Data collection and information availability

Many councils currently lack good information on the volume of materials they manage or is managed on their behalf. This can make it difficult to understand the true costs of the services and maintain transparency in service costs being charged by contractors.

[5] Note the issues identified have been taken up through Legatus Group in discussions with TAFE SA, Industry and LGA Training

# Common opportunities

Councils have a lot of common opportunities to improve the way waste and recycling is managed to reduce costs, increase diversion from landfill and meet community expectations. While there can be differences between councils and regions, overall, there is a common set of options that can be adjusted to suit most areas.

## 4.1. Joint procurement of kerbside waste and recycling services

Joint procurement of waste and recycling services one of the biggest opportunities for regional councils. To reduce service costs neighbouring councils must cooperate. In our experience councils can typically look to save at least five per cent of their collection, transport and disposal costs through collaborating in a joint procurement process.

Multiple councils are already working together to achieve positive outcomes. Councils that work on their own will not achieve the best financial and environmental outcomes for their residents.

A competitive joint procurement tender process can lead to:

- more responses from the market
- lower collection and disposal and processing costs
- competitive and consistent bulk transport costs
- increased availability of services
- greater local investment and innovation
- increased transparency of costs and reporting.

Joint procurement still provides flexibility. It can be structured to allow:

- different services between councils
- different contract start dates (i.e. timing does not need to match perfectly)
- separate providers for services (e.g. different provider/contract for collection, transport and disposal/processing)
- a separate contract for each council
- councils to choose different contractors (if desired).

## 4.2. Alternative kerbside collection models

Regional councils can explore alternative kerbside collection models to reduce costs and improve landfill diversion.

Most councils currently collect general waste bins every week and comingled and organics recycling is mostly collected fortnightly (where these services are offered).

The collection of bins is a significant component of waste and recycling costs and exploring alternative frequencies could help to reduce costs and increase diversion from landfill. Regional councils have no legislative requirements on how often they collect kerbside bins, unlike metropolitan Adelaide. Reducing the frequency of general waste collections can:

- reduce collection costs (where fortnightly comingled and organics recycling is already provided)
- help cover the cost to increase comingled and organics recycling services
- increase source separation
- reduce landfill costs.
- any changes to kerbside services/frequency needs to be carefully planned and include engagement/communication with the community. They must also be suitably resourced to create a good outcome.

**Fleurieu Regional Waste Authority (FRWA) councils**

Since 2016 the four FRWA councils have progressively switched to fortnightly collection of general waste, comingled and organics recycling. Overall, this is an increase in services for the community. They also implemented additional bin collections over summer to manage the peak tourist season. This system achieved 58 per cent diversion from landfill in 2019/20 while keeping costs down.

**Standard bin service with alternative sizes or additional bins**

If councils implement fortnightly services, they can provide options to households with special requirements (i.e. medical, nappies, large families) so they can match their needs. Most residents are provided a standard bin service and those that demonstrate a genuine need can access additional bins (Table 8).

Table 8: Standard service options and possible alternative options for residents to choose

| Stream | Standard service | Options |
|---|---|---|
| General waste | 140 litre bin collected fortnightly | 2x 140 litre bins or a 240 litre bin collected fortnightly |
| Comingled recycling | 240 litre bin collected fortnightly | 2x 240 litre bin collected fortnightly |

| | | |
|---|---|---|
| Organics recycling | 240 litre bin collected fortnightly | 2x 240 litre bin collected fortnightly |

To manage costs, councils could place a price signal on additional bins. All households receive the standard service option and increased services cost more (i.e. cost recovery of providing the service). This does require waste and recycling costs to be separate charge in the rates notice and residents must renew annually.

This allows residents to respond to any changing needs.

### 4.3. Joint procurement of additional services

Councils manage a range of secondary waste streams that can be expensive to process or dispose. This can include:

- metals
- concrete and bricks
- tyres
- treated timber
- plastics
- garden organics.

On their own, councils may not have enough volume of these materials to get competitive pricing for processing. Partnering with neighbouring councils and coordinating processing could increase the cost efficiency of these services (e.g. reducing travel and mobilisation/demobilisation costs for the contractor).

### 4.4. Organics recycling

Twenty-six regional councils currently offer residents an organics recycling service.[3] Organics recycling is a significant opportunity for councils with an established composting facility in their region or access to cost effective transport.

Sending material to a commercial composting facility has multiple benefits:

- Food waste can be placed into the kerbside organics bin. Food can be 30 per cent or more of the general waste bin and diverting it from landfill reduces disposal costs and provides environmental benefits.
- Reduced costs for managing green waste at transfer stations as there is no need for a mulching contractor to shred garden organics.
- More types of organic materials can be accepted, such as weeds, as the composting process will destroy seeds and pathogens from food waste.
- A valuable compost product certified to the Australian standard is produced that has many benefits for local agriculture/horticulture.

Councils that do not collect organics may be able to consider this service, especially if exploring alternative collection frequencies. Reducing general waste collection costs and bulk transporting green waste from transfer stations may increase the viability of an organics service.

When considering composting options, we recommended regions explore a partnership with the private sector to establish a facility. Composting is a biological process that needs to be closely monitored and controlled to meet product standards. A commercial composter will reduce council's risk, create a certified product and have established markets to distribute to.

3 Organics recycling services vary between councils and the service is often only offered to townships. Some only accept garden waste and only 14 councils accept food waste. 21 councils collect fortnightly and five only collect monthly.

## 4.5. Community education

Continuous community education is an important part of an effective waste and recycling system. Providing ongoing education can help to reduce contamination and increase landfill diversion, reducing costs for councils.

Where resourcing is a challenge, explore opportunities for a regional approach to education. Partnering with neighbouring councils or a waste authority (more detail below) can make education more efficient and cost effective.

Education can also be linked to the collection contractor's reporting system. Collection vehicles can be equipped with cameras and the driver to photographs contamination. A letter addressed to the household can be sent explaining what items can be placed into the bins and explain the correct disposal method.

## 4.6. Council owned infrastructure

It is beneficial for regional councils to own a key resource recovery infrastructure site in their council area that services the community (e.g. transfer station, resource recovery centre or bulk transport facility).

By owning a facility, councils have greater control over the services and costs for the community. Where the private sector controls key infrastructure, they may only provide services that provide a commercial return and they can set the price for managing materials. If there are no other alternative options in the region or nearby, then councils and the community can be locked into the arrangement.

Council does not necessarily need to operate the facility. They may choose to contract this to the private sector. However, maintaining ownership of the facility gives councils flexibility and control of the services for the region. If the private operator is not performing to the required standard, the contract can re-tendered.

### 4.7. Purchasing materials with recycled content

Materials are not truly recycled until they become new products. Councils can contribute to the local circular economy by purchasing products containing recycled materials (including bins, construction materials, fixtures, office and stationery, organic materials). This creates demand for recycled materials and encourages local processing and manufacturing, meaning materials recycled by councils have viable markets.

The Local Government Association of SA has prepared a list of suppliers of products containing recycled materials. Nine councils are participating in the Buying Back LGA Circular Procurement Pilot Project[4] to increase the demand for recycled materials in SA.

4 https://www.lga.sa.gov.au/sa-councils/part-of-your-everyday/waste-management

## Considerations for the strategy

The development of the regional waste and resource recovery strategy should consider the following themes, policies and opportunities.

### 5.1. The waste hierarchy

The hierarchy is the internationally accepted order of waste and recycling management practices (Figure 2). Councils should base their waste and resource recovery systems on the waste hierarchy.

- Avoiding and reducing creating waste is the best option. It avoids initial purchase costs and the cost to dispose or process items.
- Reusing materials for as long as possible reduces purchasing and disposing of new/single-use items.
- Recycling or composting creates new products from valuable resources and reduces use of virgin materials.
- Recover captures and uses the energy value from materials that are difficult to recycle or cannot be recycled.
- Treat/dispose wastes resources and energy used to produce items are wasted when sent to landfill and have no more value.

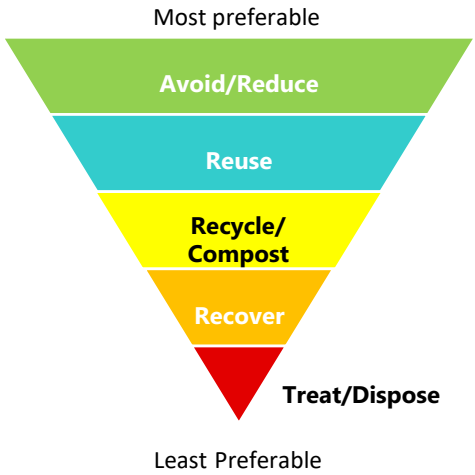


Figure 2: The waste management hierarchy

## 5.2. Circular economy

The circular economy involves redesigning systems and products so they can be repaired, disassembled and recycled to keep materials circulating in the system at their highest value (Figure 3). It is different from a "take, make, dispose" economy, which is unsustainable due to limited resources.


Figure 3: Features of the circular economy (Image Source: European Parliament)

## 5.3. Government strategies and policies

### South Australia's Waste Strategy 2020-2025

The new state strategy was released in December 2020. It will includes targets of:

- no avoidable landfill by 2030

- five per cent reduction per capita waste generation (from 2020 baseline)[5]

Regional councils will also be asked to set targets in regional waste management plans.

**Environment Protection Act 1993 and Environment Protection (Waste to Resources) Policy 2010**

The 1993 Act specifies the management of waste and promotes resource recovery and ecologically sustainable development.[6] The objective of the policy is sustainable waste management by applying the waste management hierarchy consistently with the principles of ecologically sustainable development.[7]

5 South Australia's Waste Strategy 2020-2025 (Consultation Draft), 2020, 2020, Green Industries SA, https://www.greenindustries.sa.gov.au/south-australias-wastestrategy-consultation-draft-2020-2025

6 Environment Protection Act 1993, Government of South Australia, 2020, https://www.legislation.sa.gov.au/LZ/C/A/ENVIRONMENT%20PROTECTION%20ACT%201993/CURRENT/1993.76.AUTH.PDF

7 Environment Protection (Waste to Resources) Policy 2010, Government of South Australia, 2019, https://www.legislation.sa.gov.au/LZ/C/POL/ENVIRONMENT%20PROTECTION%20(WASTE%20TO%20RESOURCES)%20POLICY%202010/CURRENT/2010.-.AUTH.PDF

**Landfill bans**

Under the Environment Protection Policy multiple materials are banned from landfill. This includes aggregated paper and cardboard, glass packaging, metals, PET, HDPE, PP, LDPE, PVC and PS packaging and vegetative matter collected by councils. Other materials are also banned that councils should be aware of.[8]

**National Waste Policy: Less Waste, More Resources 2018 and National food waste strategy**

The national policy makes the circular economy the foundation of managing the nation's waste and recycling.

The Australian Government's national strategy is targeting a 50 per cent reduction in Australia's 7.3 million annual tonnes of food waste by 2030.[9]

**Waste export ban**

In January 2021, the first waste export ban comes into place. Progressively other materials will be banned until a total export ban of waste plastic, paper, glass and tyres is complete by July 2024. The ban will require materials to be processed in Australia and will create resources, jobs, innovative solutions and improve environmental outcomes.[10]

## 5.4. Collaboration

Collaboration between councils is one of the biggest opportunities, as discussed previously. With increasing costs and regulations, councils can no longer afford to work independently.

## 5.5. Governance

Partnerships between councils will require a higher level of oversight, management and commitment. It is also important to make sure that the costs and benefits are shared in an equal way. There are multiple ways that this can be achieved and each region may require a different approach.

One successful model is establishing a regional waste authority. An authority is a regional subsidiary established under section 43 of the Local Government Act 1999 with multiple participating councils.

There are different ways the group can operate and what the focus of the group will be. However, at minimum the employees are dedicated to managing waste and recycling services and contracts on behalf of the council and providing education to the community.

8 Environment Protection (Waste to Resources) Policy 2010: Guidelines on handling wastes banned from landfills, SA EPA, 2012, https://www.epa.sa.gov.au/files/4771783_guide_banned_waste.pdf

9 National Food Waste Strategy: Halving Australia's food waste by 2030, Commonwealth of Australia 2017, https://www.environment.gov.au/system/files/resources/4683826b-5d9f-4e65-9344-a900060915b1/files/national-food-waste-strategy.pdf

10 Waste Export Ban, Commonwealth of Australia, 2020, https://www.environment.gov.au/protection/waste-resource-recovery/waste-export-ban

**Regional waste authorities in SA**

There are two regional waste authorities operating in South Australia:

- The Adelaide Hills Region Waste Management Authority includes the District Council of Mount Barker, Adelaide Hills Council, Rural City of Murray Bridge and Alexandrina Council.
- FRWA includes Alexandrina Council, City of Victor Harbor, Kangaroo Island Council and District Council of Yankalilla.

There are also multiple authorities in metropolitan Adelaide, include the Central
Adelaide Waste and Recycling Authority, Eastern Waste Management Authority (East Waste) and the Northern Adelaide Waste Management Authority.

### 5.6. Aligning council and regional strategies with the state strategy

GISA released South Australia's Waste Strategy 2020-2025 in December 2020. This will move the state to higher resource recovery, waste avoidance and towards a circular economy.

For the first time, councils will be asked to set diversion targets for their regional waste management plans. These plans will need to be provided to GISA by 2023. Understanding current performance and determining actions will be needed to set achievable targets.

Some of the key directions for the state include:

- no avoidable landfill by 2030.
- implementing better contracting and monitoring of collection services to maximise council efforts, education and cost effectiveness
- standardisation of collection contracts and mandatory reporting of collection data (using technology to collect and manage this information)
- encouraging food and organics recycling services in all councils and supporting the national target of 50% reduction in food waste
- maximising the performance of kerbside systems, reducing contamination and increasing source separation
- encouraging councils to build support from their communities to explore different collection frequencies and variable pricing models.

The challenges for regional councils are acknowledged, but there are still significant opportunities to achieve positive financial and environmental outcomes.

## Equipment and infrastructure

Councils identified various equipment and infrastructure that would help manage waste and recycling in their region:

- Regional resource recovery centres or transfer stations to help regions cost effectively manage and store materials until suitable amounts for bulk transport and processing.
- A regional composting facility.
- Equipment to increase transport efficiency - grinders, shredders, crushers and balers.
- Upgrades to facilities to maximise efficiency and environmental compliance - weighbridge, containment bays, weatherproof skip bins, sorting tables; storage/sorting bins.

## Skills and training

Councils identified skills and training opportunities in the surveys:

- Environmental protection compliance auditing and monitoring.
- Fire training specific to resource recovery facilities.
- Standard Operating Procedures for waste handling.
- Trade certificate in waste management for field staff (Cert 3 & 4).

Community education is another aspect that is very important and highlighted by many councils. This includes:

- Source separation of materials.
- Disposal pathways for materials, where and how they are recycled.
- The waste hierarchy.
- Food waste, home composting.

A problem with current education highlighted the difference in messaging for metropolitan Adelaide and regional councils and how this can cause problems where services are not available (i.e. food waste in the garden organics bin).

Delivery of community education can be challenging for councils due to lack of resources. A cooperative approach via LGA regional groups could be a way to achieve effective and consistent education.

# Appendix 1 - Council Survey

Regional SA Waste and Resource Recovery Strategy - Council survey

Information from this survey will help the South Australian Regional Organisation of Councils to develop a waste and resource recovery strategy for Regional South Australia. It aims to target the five largest waste streams managed by councils and identify if there are options to process materials in Regional SA.

Commercially sensitive data will be kept confidential to the project team. Any questions on this survey can be directed to Kristian Le Gallou, Consultant at Rawtec: 8294 5571 | kristian.legallou@rawtec.com.au **1)** Council contact details

| | | | |
|---|---|---|---|
| Council: | | Phone: | |
| Name: | | Email: | |
| Position: | | | |

**2)** What waste and resource recovery systems or initiatives are working well in your council area?

| |
|---|
| |

**3)** How many people (FTEs) that Council directly employs are associated with material collection, resource recovery and/or recycling (permanent or casual staff)?

| |
|---|
| |

**4)** What are your specific challenges and barriers to implementing or managing waste and resource recovery in your council area? Please list and rate its importance (add more rows where needed).

| | | |
|---|---|---|
| Challenges: | 1) | /10 |
| | 2) | /10 |
| | 3) | /10 |
| Barriers: | 1) | /10 |
| | 2) | /10 |
| | 3) | /10 |

**5)** What equipment/infrastructure or skills/training (including compliance) would help Council manage waste and resource recovery in the region?

| | |
|---|---|
| Equipment/ infrastructure: | |
| Skills/training: | |

**6)** Do you have waste and resource recovery strategies or plans specific to your council, or partnerships, strategies or plans with other councils? Please outline.

| |
|---|
| |

**7)** What key topics or considerations you would like considered for a regional waste and resource recovery strategy?

| |
|---|
| |

8) Contract details

| | Stream | Service provider | Expiry Date (without extensions) | Extensions |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Collection** | Kerbside collection services | | | |
| **Disposal/ Processing** | General waste | | | |
| | Comingled recycling | | | |
| | Organics recycling | | | |
| **Bulk Transport** | General waste | | | |
| | Comingled recycling | | | |
| | Organics recycling | | | |
| | Other, please specify | | | |
| | Other, please specify | | | |

### 9) Waste and recycling facilities

Please include current and any planned facilities. Feel free to include the gate rate information as an attachment.

| Facility Name | Address | Capacity | Gate rate ($/tonne) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## 10) Waste and recycling streams and pricing

Please provide information into the table below, where you have it available. If you have any other significant volumes of separated materials, add these in the blank rows.

| Material stream | Annual volumes | Processing/Disposal destination (% of annual volumes) | | | | Bulk transport costs | Disposal/ processing costs | Commodity value received |
|---|---|---|---|---|---|---|---|---|
| | Tonnes or estimated volume | Locally in Council area | Elsewhere in Regional SA | Adelaide | Interstate | $/tonne/km | $/tonne | $/tonne |
| General waste - kerbside | | | | | | | | |
| General waste - drop off | | | | | | | | |
| Comingled recycling | | | | | | | | |
| Organics recycling - kerbside | | | | | | | | |
| Organics recycling - drop off | | | | | | | | |
| C&D - bricks and concrete | | | | | | | | |
| Cardboard - separately collected | | | | | | | | |
| Metal - separately collected | | | | | | | | |
| Timber - separately collected | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Thank you for taking the time to complete this survey. Please return to kristian.legallou@rawtec.com.au If we have any follow-up questions about your response, we will contact you.