South Australian Waste and Resource Recovery Plan: waste projection and economic assessment

Final Report

Prepared for the Office of Green Industries SA
(supporting Zero Waste SA)
by Rawtec in collaboration with
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Executive Summary

Background

The Office of Green Industries SA supporting Zero Waste SA is developing a state-wide Waste and Resource Recovery Infrastructure Plan to provide South Australia with a roadmap to guide future investment in waste management and resource recovery infrastructure that supports a resource efficient economy in South Australia.

The plan aims to provide an evidence base and strategic direction to inform planning and investment decisions and to ensure adequate provision of suitably located sites for waste and resource recovery activities in the State for the next 30 years with an immediate focus on the next 10 years.

The objectives of this Waste Projection and Economic Assessment project are to:

- Develop a South Australian waste flow projection model to support the development of a state-wide Waste and Resource Recovery Infrastructure Plan which will track and project future solid waste flows over the next 30 years until 2045,
- Identify capacity gaps and the associated infrastructure needs, and
- Provide a high level analysis of potential economic impacts that may result from the state-wide waste and resource recovery infrastructure investment profiles.

The waste flow projections and corresponding infrastructure needs have been modelled for 3 scenarios:

- Business As Usual (BAU)
- Moderate Additional Diversion (MAD)
- High Additional Diversion (HAD)

It should be noted that the waste projections and associated infrastructure are predominantly focussed on the Municipal Solid Waste (MSW), Commercial and Industrial Waste (C&I) and Construction and Demolition Waste (C&D) streams. The modelling looks at the additional tonnes to be managed for the different scenarios only, and considers additional infrastructure needs, not the replacement of existing infrastructure. This leads to a conservative estimate of the waste, recycling and remanufacturing infrastructure needs and economic benefits for the 10 and 30 year periods modelled.

South Australia is currently leading the nation in resource recovery, achieving the highest recycling rates out of all jurisdictions in Australia. The infrastructure needs identified in this study will assist the State to maintain and further increase its levels of resource recovery, recycling and remanufacturing. Around Australia jurisdictions are investing in programs to improve their recycling performance. Of particular note is the NSW government ‘Waste Less, Recycle More’ program, which includes investment of $250 million over 5 years in waste and recycling infrastructure to enhance recycling and alternative waste treatment infrastructure across NSW. Without investment in upgrades and expansion of SA’s waste, resource recovery and remanufacturing infrastructure, it is possible that SA will not be able to maintain its position as Australia’s leading recycler.

Key Waste Projection and Infrastructure Findings

Table 0-1 provides a summary of South Australia's waste flow projections and the estimated total investment (capital expenditure) needed for new/upgraded infrastructure to manage projected waste volumes under each diversion scenario (for 10 and 30 year timespans). It also provides estimates of annual operating expenditure and revenue from new/upgraded infrastructure.

Table 0-1 : Projected waste generation, resource recovery and landfill volumes for South Australia for 10 and 30 year timespans under diversion scenarios and total investment (capital expenditure) in new/upgraded infrastructure needed to manage projected volumes, and resulting annual operating expenditure and revenues from investment in new/upgraded infrastructure.

Timespan	Diversion scenario	Waste generation	Resource recovery	Landfill	Total capital expenditure	Annual operating expenditure	Annual revenue
		Mt			$ million		
Baseline (2013-14)		4.50	3.59	0.91			
10 years	BAU diversion	5.45	4.36	1.08	110.90	64.89	84.36
	Moderate additional diversion	5.45	4.60	0.84	129.21	72.78	94.62
	High additional diversion	5.45	5.38	0.06	296.27	191.94	249.52
30 years	BAU diversion	8.13	6.61	1.53	514.48	263.26	342.24
	Moderate additional diversion	8.13	6.93	1.21	554.38	277.87	361.23
	High additional diversion	8.13	8.05	0.09	918.90	457.22	594.38

Key points for 10 year timespan are:

- Total state waste generation increases by nearly one million tonnes (0.95 million tonnes) which needs to be collected, recovered, recycled, remanufactured and/or disposed of.
- Business-as-usual scenario: Total investment of $110.90 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. It includes infrastructure such as kerbside bin systems, collection vehicles, composting facilities and E-waste facilities.
- Moderate additional diversion scenario: Total investment of $129.21 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. It includes

infrastructure from the BAU scenario above as well as covered composting facilities, Energy from Waste - anaerobic digestion and other reprocessing/remanufacturing facilities.

- High additional diversion scenario: Total investment of $296.27 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. It includes infrastructure from the MAD scenario above as well as Mechanical Biological Treatment and additional reprocessing/remanufacturing, including waste derived fuel manufacture.

Key points for 30 year timespan are:

- Total state waste generation increases by around three and half million tonnes (3.63 million tonnes) which needs to be collected, recovered, recycled, remanufactured and/or disposed.
- Business-as-usual scenario: Total investment of $514.48 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. . It includes infrastructure such as kerbside bin systems, collection vehicles, transfer stations, vacuum collection systems, composting facilities (open windrow and covered tunnel), E-waste facilities, waste soil storage/remediation facilities and energy from waste –anaerobic digestion.
- Moderate additional diversion scenario: Total investment of $554.38 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. It includes infrastructure from the BAU scenario above as well as covered composting facilities, Energy from Waste - anaerobic digestion and other reprocessing/remanufacturing facilities.
- High additional diversion scenario: Total investment of $918.90 million investment in new/upgraded infrastructure is needed to manage projected waste volumes across SA. It includes infrastructure from the MAD scenario above as well as Mechanical Biological Treatment, additional reprocessing/remanufacturing, and Energy from Waste – Combustion.

Economic Analysis

While the impact analysis illustrates the economic activity arising from the proposed investment, the Cost Benefit Analysis (CBA) shows whether or not the proposed investment represents an efficient use of public money. The results of the CBA are presented in Table 0-2 below for the 10 and 30 year periods.

Table 0-2: Results of the cost benefit analysis

	10 Years		30 Years	
	Option 1 (Moderate)	Option 2 (High)	Option 1 (Moderate)	Option 2 (High)
Net present value (NPV) ($m)	30	261	91	566
Benefit-cost ratio (BCR)	1.7	1.4	1.9	1.4

The results from the CBA indicate that according to the two evaluation criteria used, both options are worthwhile investments over a 10-year and 30-year period. In terms of ranking the options, the High Additional Diversion Scenario (Option 2) generates greater net benefits than the Moderate Additional Diversion Scenario (Option 1) over both time periods, although the Benefit Cost Ratio (BCR) is higher for Option 1.

Accordingly, the net benefit of investing in Options 1 and 2 outweigh the net benefits of proceeding with the business-as-usual investment (base case).

The total economic impact of the infrastructure investment options on the SA economy includes the capital impact and the operating impact. Table 0-3 below is the total economic impact (capital expenditure and operation) of the infrastructure investment options.

Table 0-3: Total economic impact of the infrastructure investment options

	At Year 10			At Year 30		
	Baseline	Moderate	High	Baseline	Moderate	High
Waste Stream Total						
GSP ($m)						
Direct	45.2	51.5	138.7	177.3	188.5	311.7
Flow-on	52.6	59.0	148.7	203.5	214.0	344.6
Total	**97.8**	**110.4**	**287.3**	**380.7**	**402.5**	**656.3**
Employment (fte)						
Direct	575	646	1,040	1,956	2,076	2,404
Flow-on	358	399	1,014	1,367	1,433	2,315
Total	**933**	**1,045**	**2,053**	**3,323**	**3,509**	**4,719**
fte/10,000 tonnes	**12**	**10**	**11**	**11**	**11**	**11**

The total economic impact of the infrastructure investment options **at year 10** was:

- $97.8m in gross state product (GSP) and 933 full-time equivalent (fte) jobs under the baseline option
- $110.4m in GSP and 1,045 fte jobs under the moderate investment option
- $287.3m in GSP and 2,053 fte jobs under the high investment option.

The total economic impact of the infrastructure investment options **at year 30** was:

- $380.7m in GSP and 3,323 fte jobs under the baseline option
- $402.5m in GSP and 3,509 fte jobs under the moderate investment option
- $656.3m in GSP and 4,719 fte jobs under the high investment option.

Both the moderate and high additional diversion scenarios present an opportunity to significantly increase the contribution of the waste sectors to GSP and employment, which are currently at $504 million and employment of 4,800 (Econsearch, 2014).

The waste service sector would have the highest contribution out of all industry sectors to estimated GSP economic impacts. Other significant industry sectors that would contribute to GSP include electricity, gas and water, other services, ownership of dwellings, manufacturing and construction.

The waste service sector would have the highest contribution out of all industry sectors to estimated employment economic impacts. Other significant industry sectors that would contribute to employment include other services, manufacturing, electricity, gas and water, construction and retail trade.

Land Use Planning Consideration

The SA land use planning system is built around the Strategic directions set within the SA Strategic Plan and is represented spatially through the South Australian Planning Strategy. The volumes of the Planning Strategy, guide the policy development for Development Plans across the different regions of South Australia, and therefore provide guidance for the future provision of developable land, including for such uses as industry and waste facilities.

Key considerations for siting large scale waste, recycling and remanufacturing infrastructure include suitable separation distances, logistical considerations relative to sources and destination of inputs/ outputs, technology used (e.g. fully enclosed facilities with air filtration), and access to services infrastructure (electricity, gas, water etc.).

It is likely that the larger scale, more intensive waste and resource recovery infrastructure would be positioned within the Greater Adelaide Area (rather than in regional SA). This is due to the large volumes of material available in metropolitan areas, access to transport networks and proximity to many of the final markets for recycled products (or ports for export to overseas markets). A number of large scale key strategic industrial and employment land areas are identified within the 30 Year Plan for the Greater Adelaide, at Gillman/Wingfield, Greater Edinburgh Parks, Lonsdale, Monarto and Roseworthy.

Within these locations, there is a range of zones which provide differing levels of support for waste and resource recovery activities and associated infrastructure. The benefits and challenges of the identified key locations within Greater Adelaide are summarised in the report, with a view to highlighting the potential locations for the full range of infrastructure considered.

Summary

The waste, recycling and remanufacturing sector will require significant investment in new/additional infrastructure to collect, recover, recycle, remanufactured and/or dispose of additional waste generated in South Australia in the next 10 and 30 years periods.

There are additional benefits to the State and the Waste Sector from the Moderate and High Additional Diversion Scenarios over the Business as Usual Scenario which should be considered in the State Waste Strategy and State Waste Infrastructure plan.

To enable the Moderate and High Additional Diversion Scenarios to be achieved, it is expected that a range of additional policy, regulatory and reinvestment program initiatives will be required.

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1. Introduction

1.1 Background

The Office of Green Industries SA supporting Zero Waste SA is developing a state-wide Waste and Resource Recovery Infrastructure Plan to provide South Australia with a roadmap to guide future investment in waste management and resource recovery infrastructure that supports a resource efficient economy in South Australia.

The plan aims to provide strategic direction and an evidence base to inform planning and investment decisions and to ensure adequate provision of suitably located sites for waste and resource recovery activities in the State for the next 30 years with an immediate focus on the next 10 years.

This plan will support the objectives of the new South Australia's Waste Strategy 2015-2020, in particular the objective of "a stable and efficient market for investors through a clear policy framework providing a solid platform for investment decisions".

1.2 Objectives

The objectives of this project are to:

- Develop a South Australian waste flow projection model to support the development of a state-wide Waste and Resource Recovery Infrastructure Plan which will track and project future solid waste flows over the next 30 years until 2045,
- Identify capacity gaps and the associated infrastructure needs, and
- Provide a high level analysis of potential economic impacts that may result from the state-wide waste and resource recovery infrastructure investment profiles.

It is intended that the findings from this project will help to further inform and complement the development of the state-wide Waste and Resource Recovery Infrastructure Plan.

1.3 Report structure

The remainder of this report is structured as follows:

- Section 2 – presents key findings from waste flow projection modelling.
- Section 3 – presents key findings from infrastructure assessment.
- Section 4 – presents key findings from economic analysis.
- Section 5 – presents key findings regarding land use planning considerations.
- Appendix 1 – provides information about data and assumptions underpinning waste flow projection model.
- Appendix 2 – provides information about data and assumptions underpinning infrastructure assessment.
- Attachment 1 – Waste Flow Projection Model
- Attachment 2 – Complete set of data tables from infrastructure assessment
- Attachment 3 – Full report containing economic analysis by EconSearch
- Attachment 4 – Complete set of output tables from the Waste Flow Projection Model

2. Waste flow projections

2.1 Introduction

A South Australian Waste Flow Projection Model (WFPM) was developed in Microsoft Excel that tracks and projects future solid waste flows over the next 30 years until 2045 by:

- Quantity (tonnes)
- Source sector (Municipal, Commercial and Industrial, and Construction and Demolition)
- Waste stream (masonry, metals, organics, cardboard & paper, plastics, glass, waste soil, other materials, e-waste, medical waste and other hazardous waste)
- Location (SA Government Region), and
- Under landfill diversion scenarios prescribed (see Table 2-1):
    - Business-as-usual
    - Moderate additional diversion
    - High additional diversion

A copy of the model is provided as Attachment 1. The following sections provide a summary of key waste flow projections by source sector for Metropolitan Adelaide and Regional SA, for 10 and 30 year projection periods, and for each landfill diversion scenario. These tables also show the change in waste volumes from base year (2013-14), which were estimated from SA Recycling Activity survey data (Zero Waste SA, 2015). Further information about the WFPM, including a summary of underpinning data and assumptions and waste flow projections by Government Region, source sector and waste stream, is provided in Appendix 1. The complete set of projection output tables is provided in Excel as Attachment 4, which provides a further breakdown of estimated volumes by waste stream.

Table 2-1: Diversion rates for landfill diversion scenario adopted in the WFPM

MSW diversion rate	SA	metro	regional
Business-as-usual	55%	60%	39%
Moderate additional	70%	70%	70%
High additional	98%	100%	90%
C&I diversion rate	**SA**	**metro**	**regional**
Business-as-usual	83%	77%	93%
Moderate additional	85%	80%	94%
High additional	98%	100%	95%
C&D diversion rate	**SA**	**metro**	**regional**
Business-as-usual	87%	88%	60%
Moderate additional	89%	90%	70%
High additional	100%	100%	95%

2.2 Metropolitan Adelaide

2.2.1 Projections for 2024/25 (10 years)

It is estimated that 4.41 million tonnes of waste will be generated across Metropolitan Adelaide in 2024/25 (up by 0.86 Mt per annum from 2013/14 volumes). This includes 0.70 Mt from MSW sources, 1.18 Mt from C&I sources, and 2.52 Mt from C&D sources.

Table 2-2, Table 2-3, and Table 2-4 below summarise waste volume estimates by diversion scenario.

- Under business-as-usual scenario an estimated 3.56 Mt of waste is resource recovered and 0.85 Mt is sent to landfill.
- Under moderate additional diversion scenario, an estimated 3.71 Mt of waste is resource recovered and 0.70 Mt is sent to landfill.
- Under the high additional diversion scenario, an estimated 4.41 Mt of waste is resource recovered with no tonnes sent to landfill.

Table 2-2: Metropolitan Adelaide – Projections 2024/25 (Business-as-usual diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.70	0.42	0.28
C&I	1.18	0.91	0.28
C&D	2.52	2.23	0.29
Total	4.41	3.56	0.85
Change in total volumes from base year (2013/14)	0.86	0.72	0.14

Table 2-3: Metropolitan Adelaide – Projections 2024/25 (Moderate additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.70	0.49	0.21
C&I	1.18	0.95	0.24
C&D	2.52	2.27	0.25
Total	4.41	3.71	0.70
Change in total volumes from base year (2013/14)	0.86	0.87	- 0.01

Table 2-4: Metropolitan Adelaide – Projections 2024/25 (High additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.70	0.70	-
C&I	1.18	1.18	-
C&D	2.52	2.52	-
Total	4.41	4.41	-
Change in total volumes from base year (2013/14)	0.86	1.57	- 0.71

2.2.2 Projections for 2044/45 (30 years)

It is estimated that 6.61 million tonnes of waste will be generated across Metropolitan Adelaide in 2044/45 (up by 3.06 Mt per annum from 2013/14 volumes). This includes 0.82 Mt from MSW sources, 1.85 Mt from C&I sources, and 3.94 Mt from C&D sources.

Table 2-5, Table 2-6 and Table 2-7 below summarise waste volume estimates by diversion scenario.

- Under business-as-usual scenario an estimated 5.39 Mt of waste is resource recovered and 1.22 Mt is sent to landfill.
- Under moderate additional diversion scenario, an estimated 5.60 Mt of waste is resource recovered and 1.01 Mt is sent to landfill.
- Under the high additional diversion scenario, an estimated 6.61 Mt of waste is resource recovered with no tonnes is sent to landfill.

Table 2-5: Metropolitan Adelaide – Projections 2044/45 (Business-as-usual diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.82	0.49	0.33
C&I	1.85	1.42	0.43
C&D	3.94	3.48	0.46
Total	6.61	5.39	1.22
Change in total volumes from base year (2013/14)	3.06	2.55	0.51

Table 2-6: Metropolitan Adelaide – Projections 2044/45 (Moderate additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.82	0.57	0.25
C&I	1.85	1.48	0.37
C&D	3.94	3.55	0.39
Total	6.61	5.60	1.01
Change in total volumes from base year (2013/14)	3.06	2.76	0.30

Table 2-7: Metropolitan Adelaide – Projections 2044/45 (High additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.82	0.82	-
C&I	1.85	1.85	-
C&D	3.94	3.94	-
Total	6.61	6.61	-
Change in total volumes from base year (2013/14)	3.06	3.77	- 0.71

2.3 Regional South Australia

2.3.1 Projections for 2024/25 (10 years)

It is estimated that 1.03 million tonnes of waste will be generated across Regional SA in 2024/25 (up by 0.08 Mt per annum from 2013/14 volumes). This includes 0.22 Mt from MSW sources, 0.69 Mt from C&I sources, and 0.12 Mt from C&D sources.

Table 2-8, Table 2-9 and Table 2-10 below summarise waste volume estimates by diversion scenario.

- Under business-as-usual scenario an estimated 0.80 Mt of waste is resource recovered and 0.23 Mt is sent to landfill.
- Under moderate additional diversion scenario, an estimated 0.89 Mt of waste is resource recovered and 0.14 Mt is sent to landfill.
- Under the high additional diversion scenario, an estimated 0.97 Mt of waste is resource recovered and 0.06 Mt is sent to landfill.

Table 2-8: Regional SA – Projections 2024/25 (Business-as-usual diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.22	0.09	0.13
C&I	0.69	0.64	0.05
C&D	0.12	0.07	0.05
Total	1.03	0.80	0.23
Change in total volumes from base year (2013/14)	0.08	0.06	0.02

Table 2-9: Regional SA – Projections 2024/25 (Moderate additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.22	0.15	0.06
C&I	0.69	0.65	0.04
C&D	0.12	0.09	0.04
Total	1.03	0.89	0.14
Change in total volumes from base year (2013/14)	0.08	0.15	- 0.07

Table 2-10: Regional SA – Projections 2024/25 (High additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.22	0.19	0.02
C&I	0.69	0.66	0.03
C&D	0.12	0.12	0.01
Total	1.03	0.97	0.06
Change in total volumes from base year (2013/14)	0.08	0.23	- 0.15

2.3.2 Projections for 2044/45 (30 years)

It is estimated that 1.53 million tonnes of waste will be generated across Regional SA in 2044/45 (up by 0.58 Mt per annum from 2013/14 volumes). This includes 0.25 Mt from MSW sources, 1.08 Mt from C&I sources, and 0.19 Mt from C&D sources.

Table 2-11, Table 2-12 and Table 2-13 summarise waste volume estimates by diversion scenario.

- Under business-as-usual scenario an estimated 1.22 Mt of waste is resource recovered and 0.31 Mt is sent to landfill.
- Under moderate additional diversion scenario, an estimated 1.33 Mt of waste is resource recovered and 0.20 Mt is sent to landfill.
- Under the high additional diversion scenario, an estimated 1.44 Mt of waste is resource recovered and 0.09 Mt is sent to landfill.

Table 2-11: Regional SA – Projections 2044/45 (Business-as-usual diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.25	0.09	0.15
C&I	1.08	1.01	0.08
C&D	0.19	0.12	0.08
Total	1.53	1.22	0.31
Change in total volumes from base year (2013/14)	0.58	0.48	0.10

Table 2-12: Regional SA – Projections 2044/45 (Moderate additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.25	0.18	0.08
C&I	1.08	1.02	0.06
C&D	0.19	0.13	0.06
Total	1.53	1.33	0.20
Change in total volumes from base year (2013/14)	0.58	0.59	- 0.01

Table 2-13 Regional SA – Projections 2044/45 (High additional diversion)

Million tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
MSW	0.25	0.23	0.03
C&I	1.08	1.03	0.05
C&D	0.19	0.18	0.01
Total	1.53	1.44	0.09
Change in total volumes from base year (2013/14)	0.58	0.70	- 0.12

3 Infrastructure needs assessment

3.1 Introduction

State-wide scenarios were developed for how identified infrastructure needs can be met (including building new and/or upgrading existing infrastructure) to optimise a resource efficient economy under the Baseline Diversion, Moderate Additional Diversion and High Additional Diversion projections for the next 10 years and 30 years timespan.

These scenarios for improving resource recovery across both metropolitan and regional SA areas considered investment that:

- Targets key waste streams, or sectors, where the largest gains in resource recovery may be achieved, as identified by the Waste Flow Projection Model (refer Section 2)
- Fosters the circular economy and remanufacturing
- Creates local employment, and contributes to Gross State Product
- Considers logistics and markets for recovered resources, waste technology advancement and economies of scale required for different infrastructure investments
- Considers the infrastructure supply chain (from source separation through to remanufacturing)

3.2 Important considerations

The following sections present key findings from the high-level assessment of infrastructure needs for State-wide scenarios. Information about key assumptions underpinning the scenarios and infrastructure assessment is provided in Appendix 2. A full set of tables from the infrastructure assessment (including assessments for each Government Region) is provided as Attachment 2.

This assessment identifies infrastructure needs for key sets of infrastructure, as defined in Table 3-1. It is recognised that this list is not exhaustive and there are other types of infrastructure that may be needed for specialised waste streams. These other infrastructure types are discussed in Section 3.10.

The number of infrastructure units identified in the assessment is based on an average processing capacity (tonnes per annum). In the case of waste and recycling facilities, this could involve either building a new facility or upgrading an existing facility to increase its capacity. Refer to Section 7.1.3 in Appendix 2 for information about average processing capacities.

The assessment also identifies infrastructure needs by Government Region. It is important to note that infrastructure needed to manage waste from a given region may not necessarily be built in that region. For example, waste from regional SA may be transported in bulk via transfer vehicles to a facility in or near metropolitan Adelaide for processing. Refer to Section 5 for land use planning considerations.

Table 3-1: Infrastructure types

Infrastructure class	Infrastructure type	Description
Collection infrastructure	Kerbside Source Separation (SS) Bin Systems	Kerbside bins for collection of MSW waste.
	Skip Bin	Bins for collection of C&I and C&D waste (which range from 120 litres up to 20 cubic meters).
	Collection Vehicles	Vehicles for collection of waste, including side-lift, rear-lift, front-lift, Pantech, flatbed trucks, hook lift and other waste collection vehicles.
	Vacuum System	An automated collection system that transports waste underground from a series of waste inlets to a collection station through a closed pipe network.
Resource recovery infrastructure	Transfer Station	Also referred to as resource recovery facilities, transfer stations are permanent sites set up to receive, sort, and temporarily store waste and recyclables prior to be taken to a reprocessing or disposal facility.
	Transfer Vehicles	Large vehicles for bulk transport of waste (e.g. a walking floor truck).
	Material Recovery Facility	A facility where mixed recyclable materials are sorted to specifications, then baled, shredded, crushed, compacted or otherwise prepared for shipment to market.
	CDL Facilities	Depots where container deposit legislation (CDL) bottles/cans can be dropped off by businesses or the general public for refund, and are sorted to specifications for shipment to market.
	Drop Off Facilities	Depots where waste under product stewardship schemes (e.g. computers and TVs) may be dropped off, and are aggregated for transfer to suitable recyclers.
Reprocessing infrastructure	Composting Facilities (Open Windrow)	Facilities where of source separated organics are composted using open windrow technology. The material is set out in long triangular cross section windrows in the open air with no enclosures or covers.
	Composting Facilities (Covered / Tunnel)	Facilities where of source separated organics are composted using covered windrow or fully enclosed tunnel technologies. These technologies minimise the potential for fugitive odour emissions from the piles. Tunnel technologies provide a totally enclosed conditions where the composting environment can be significantly controlled and near-optimal composting conditions can be maintained.
	Energy from Waste Facilities – Combustion	Facilities where waste is combusted and energy is recovered.
	Energy from Waste Facilities – Anaerobic Digestion	Facilities where microorganisms breakdown biodegradable waste in the absence of oxygen to produce methane, which is recovered for energy.
	Mechanical Biological Treatment	Facilities that combine a sorting facility with a form of biological treatment such as composting or anaerobic digestion.
	Construction and	Facilities that sort, crush, screen and recycle

	Demolition Processing Facilities	building materials.
	Other Processing Facilities (medium tech)	Other medium technology waste processing technologies that are grouped based on having capital and operating expenditures in the same order of magnitude. This includes reprocessing facilities for glass, plastics, paper/cardboard, metals, grape marc and meat rendering.
	Other Processing Facilities (high tech)	Other high technology waste processing technologies that are grouped based on having capital and operating expenditures in the same order of magnitude. Potential examples include low volume, high capital processing facilities such as nickel cadmium, lithium ion battery processing, and CCA post processing and mercury distillation.
Hazardous Waste infrastructure	Hazardous Waste Facilities	Facilities that treat hazardous waste. Treatment types includes recycling, chemical/physical treatment, thermal, energy recovery, immobilisation, biological and other.
	Soil Storage and Remediation Facilities	Facilities that store and remediate contaminated soil so that it can be beneficially reused.
	Emerging Waste Streams Facilities	Facilities that process emerging waste stream (e.g. e-waste).
Disposal infrastructure	Landfills	Facilities where waste is disposed into suitably constructed engineered cells.
	Medical Waste Disposal	Facilities that treat medical waste, including autoclave and incineration technologies.

3.3 Headline results

Table 3-2 provides a summary of estimated total investment (capital expenditure) needed for new/upgraded infrastructure to manage projected waste volumes under each diversion scenario (for 10 and 30 year timespans). It also provides estimates of annual operating expenditure and revenue from new/upgraded infrastructure.

For 10 year timespan:

- Business-as-usual scenario: Total investment of $110.90 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $64.89 million/year and $84.36 million/year respectively.
- Moderate additional diversion scenario: Total investment of $129.21 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $72.78 million/year and $94.62 million/year respectively.
- High additional diversion scenario: Total investment of $296.27 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $191.94 million/year and $249.52 million/year respectively.

For 30 year timespan:

- Business-as-usual scenario: Total investment of $514.48 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $236.26 million/year and $342.24 million/year respectively.
- Moderate additional diversion scenario: Total investment of $554.38 million in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $277.87 million/year and $361.23 million/year respectively.
- High additional diversion scenario: Total investment of $918.90 million investment in new/upgraded infrastructure is needed to manage projected waste volumes across SA. Annual operating expenditure and revenue from new/upgraded infrastructure is estimated at $457.22 million/year and $594.38 million/year respectively.

The following sections provide a breakdown of these results by infrastructure type for each diversion scenario.

Table 3-2: Projected waste generation, resource recovery and landfill volumes for South Australia for 10 and 30 year timespans under diversion scenarios and total investment (capital expenditure) in new/upgraded infrastructure needed to manage projected volumes, and resulting annual operating expenditure and revenues from investment in new/upgraded infrastructure.

Timespan	Diversion scenario	Waste generation	Resource recovery	Landfill	Total capital expenditure	Annual operating expenditure	Annual revenue
		Mt			$ million		
10 years	BAU diversion	5.45	4.36	1.08	110.90	64.89	84.36
	Moderate additional diversion	5.45	4.60	0.84	129.21	72.78	94.62
	High additional diversion	5.45	5.38	0.06	296.27	191.94	249.52
30 years	BAU diversion	8.13	6.61	1.53	514.48	263.26	342.24
	Moderate additional diversion	8.13	6.93	1.21	554.38	277.87	361.23
	High additional diversion	8.13	8.05	0.09	918.90	457.22	594.38

3.4 10 year timeframe: business-as-usual diversion

Table 3-3 and Table 3-4 identify infrastructure needs for business-as-usual diversion (10 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Infrastructure needs for business-as-usual diversion (10 year timeframe) include:

- Collection infrastructure to pick up additional volumes of waste and recyclables including 51,499 sets of kerbside MSW bins, 11,179 skip bins, 63 waste collection vehicles, and 0.5 vacuum system.
- Resource recovery infrastructure to recover additional volumes of waste and recyclables, including 1.4 transfer stations, 18 transfer vehicles, 14.7 CDL facilities and 43.5 drop-off facilities (for waste recovered under product stewardship schemes).
- Reprocessing infrastructure to process additional volumes of recovered recyclables, including 2.1 open windrow composting facilities, 0.6 covered tunnel composting facilities, 1.2 anaerobic digestion facilities, 0.8 construction and demolition processing facilities, and 10.1 other processing facilities (medium tech).
- Other waste infrastructure, including 1.0 waste soil storage and remediation facility and 1.6 emerging waste stream facilities (for e-waste).

Total capital expenditure on new/upgraded infrastructure is estimated at $110.90 million, including $30.13 million across the MSW sector, $61.86 million across the C&I sector and $18.90 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $64.89 million, including $20.25 million across the MSW sector, $30.74 million across the C&I sector and $13.90 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $84.36 million, including $26.32 million across the MSW sector, $39.97 million across the C&I sector and $18.07 million across the C&D sector.

Table 3-3: Infrastructure assessment for SA by sector for business-as-usual diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[1].

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	51,499	-	-	51,499
Skip Bin	-	10,891	288	11,179
Collection Vehicles	6	39	18	63
Vacuum System	0.5	-	-	0.5
Transfer Stations	-	1.4	-	1.4
Transfer Vehicles	3	8	7	18
Material Recovery Facility	-	-	-	-
CDL Facilities	4.7	10.0	-	14.7
Drop Off Facilities	43.5	-	-	43.5
Composting Facilities (Open WR)	0.3	1.8	-	2.1
Composting Facilities (Covered Tunnel)	0.1	0.5	-	0.6
Energy from Waste Facilities - Combustion	-	-	-	-
Energy from Waste - Anerobic Digestion	0.1	1.1	-	1.2
Mechanical Biological Treatment	-	-	-	-
C&D Processing Facilities	-	-	0.8	0.8
Other Reprocessing Facilities (Medium Tech)	0.7	9.5	-	10.1
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilities	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	1.0	1.0
Emerging Waste Streams Facilities	1.3	0.3	-	1.6
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	30.13	61.86	18.90	110.90
Annual operating expenditure ($ million)	20.25	30.74	13.90	64.89
Annual revenue ($ million)	26.32	39.97	18.07	84.36

[1] Values in table may not sum to totals due to rounding.

Table 3-4: Infrastructure needs for management of waste from each Government Region for business-as-usual diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[2].

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	7,355	12,591	11,824	7,617	1,799	1,706	1,229	1,454	653	1,636	1,742	1,893	51,499
Skip Bin	1,334	2,284	2,145	1,382	156	1,141	107	126	57	955	1,096	396	11,179
Collection Vehicles	8.6	14.7	13.8	8.9	0.9	4.4	0.6	0.7	0.3	3.7	4.2	1.8	63
Vacuum System	0.1	0.2	0.2	0.1	-	-	-	-	-	-	-	-	0.5
Transfer Stations	-	-	-	-	-	0.5	-	-	-	0.4	0.5	-	1.4
Transfer Vehicles	3.0	5.1	4.8	3.1	0.2	0.6	0.1	0.2	0.1	0.5	0.6	0.3	18
Material Recovery Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
CDL Facilities	2.0	3.3	3.1	2.0	0.6	0.6	0.4	0.5	0.2	0.6	0.6	0.7	14.7
Drop Off Facilities	5.8	9.9	9.3	6.0	1.8	1.7	1.3	1.5	0.7	1.7	1.8	1.9	43.5
Composting Facilities (Open WR)	-	-	-	-	0.5	0.1	0.4	0.4	0.2	-	0.1	0.4	2.1
Composting Facilities (Covered Tunnel)	0.1	0.2	0.2	0.1	-	-	-	-	-	-	-	-	0.6
Energy from Waste Facilities - Combustion	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy from Waste - Anerobic Digestion	0.1	0.2	0.2	0.1	-	-	-	-	-	0.5	-	-	1.2
Mechanical Biological Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-
C&D Processing Facilities	0.01	0.34	0.29	0.03	0.02	0.02	0.01	0.01	-	0.02	0.02	0.02	0.8
Other Reprocessing Facilities (Medium Tech)	1.1	1.8	1.7	1.1	-	1.7	0.1	0.1	0.1	0.9	1.2	0.2	10.1
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	1.0	-	-	-	-	-	-	-	-	-	-	1.0
Emerging Waste Streams Facilities	-	1.6	-	-	-	-	-	-	-	-	-	-	1.6
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	11.9	35.0	21.2	12.4	1.6	7.0	1.2	1.5	0.6	10.0	6.2	2.3	110.9
Annual operating expenditure ($ million)	6.5	21.8	11.7	6.8	1.1	4.7	0.9	1.0	0.5	4.3	4.1	1.5	64.9
Annual revenue ($ million)	8.4	28.4	15.3	8.8	1.4	6.2	1.1	1.3	0.6	5.6	5.4	1.9	84.4

[2] Values in table may not sum to totals due to rounding.

3.5 10 year timeframe: moderate additional diversion

Table 3-5 and Table 3-6 identify infrastructure needs for moderate additional diversion (10 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Resource recovery and reprocessing infrastructure needs are greater under the moderate additional diversion scenario (compared to the business-as-usual scenario). This includes:

- Reprocessing infrastructure to process additional volumes of recovered recyclables, including 5.8 open windrow composting facilities, 1.1 covered tunnel composting facilities, 1.6 anaerobic digestion facilities, 1.2 construction and demolition processing facilities, and 12.2 other processing facilities (medium tech).
- Other waste infrastructure, including 1.2 waste soil storage and remediation facility.

Total capital expenditure on new/upgraded infrastructure is estimated at $129.21 million, including $41.33 million across the MSW sector, $66.37 million across the C&I sector and $21.50 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $72.78 million, including $24.67 million across the MSW sector, $32.27 million across the C&I sector and $15.84 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $94.62 million, including $32.07 million across the MSW sector, $41.95 million across the C&I sector and $20.60 million across the C&D sector.

Table 3-5: Infrastructure assessment by sector for moderate additional diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue.[3]

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	51,499	-	-	51,499
Skip Bin	-	10,891	288	11,179
Collection Vehicles	6	39	18	63
Vacuum System	0.5	-	-	0.5
Transfer Stations	-	1.4	-	1.4
Transfer Vehicles	3	8	7	18
Material Recovery Facility	-	-	-	-
CDL Facilities	4.7	10.0	-	14.7
Drop Off Facilities	43.5	-	-	43.5
Composting Facilities (Open WR)	3.9	1.9	-	5.8
Composting Facilities (Covered Tunnel)	0.5	0.6	-	1.1
Energy from Waste Facilities - Combustion	-	-	-	-
Energy from Waste - Anerobic Digestion	0.3	1.3	-	1.6
Mechanical Biological Treatment	-	-	-	-
C&D Processing Facilities	-	-	1.2	1.2
Other Reprocessing Facilities (Medium Tech)	2.1	10.0	-	12.2
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilities	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	1.2	1.2
Emerging Waste Streams Facilities	1.3	0.3	-	1.6
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	41.33	66.37	21.50	129.21
Annual operating expenditure ($ million)	24.67	32.27	15.84	72.78
Annual revenue ($ million)	32.07	41.95	20.60	94.62

[3] Values in table may not sum to totals due to rounding.

Table 3-6: Infrastructure needs for management of waste from each Government Region for moderate additional diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue.[4]

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	7,355	12,591	11,824	7,617	1,799	1,706	1,229	1,454	653	1,636	1,742	1,893	51,499
Skip Bin	1,334	2,284	2,145	1,382	156	1,141	107	126	57	955	1,096	396	11,179
Collection Vehicles	8.6	14.7	13.8	8.9	0.9	4.4	0.6	0.7	0.3	3.7	4.2	1.8	63
Vacuum System	0.1	0.2	0.2	0.1	-	-	-	-	-	-	-	-	0.5
Transfer Stations	-	-	-	-	-	0.5	-	-	-	0.4	0.5	-	1.4
Transfer Vehicles	3.0	5.1	4.8	3.1	0.2	0.6	0.1	0.2	0.1	0.5	0.6	0.3	18.4
Material Recovery Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
CDL Facilities	2.0	3.3	3.1	2.0	0.6	0.6	0.4	0.5	0.2	0.6	0.6	0.7	14.7
Drop Off Facilities	5.8	9.9	9.3	6.0	1.8	1.7	1.3	1.5	0.7	1.7	1.8	1.9	43.5
Composting Facilities (Open WR)	-	-	-	-	1.2	0.7	0.8	0.9	0.4	-	0.7	1.1	5.8
Composting Facilities (Covered Tunnel)	0.2	0.4	0.3	0.2	-	-	-	-	-	-	-	-	1.1
Energy from Waste Facilities - Combustion	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy from Waste - Anerobic Digestion	0.2	0.4	0.3	0.2	-	-	-	-	-	0.5	-	-	1.6
Mechanical Biological Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-
C&D Processing Facilities	0.05	0.40	0.35	0.07	0.06	0.05	0.03	0.04	0.00	0.05	0.05	0.06	1.23
Other Reprocessing Facilities (Medium Tech)	1.3	2.2	2.1	1.4	-	1.9	0.2	0.2	0.1	1.0	1.4	0.3	12.2
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	1.2	-	-	-	-	-	-	-	-	-	-	1.2
Emerging Waste Streams Facilities	-	1.6	-	-	-	-	-	-	-	-	-	-	1.6
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	14.2	39.6	25.0	14.9	2.3	7.9	1.8	2.1	0.9	10.2	7.1	3.2	129.2
Annual operating expenditure ($ million)	7.4	23.9	13.1	7.7	1.4	5.2	1.1	1.4	0.6	4.5	4.6	1.9	72.8
Annual revenue ($ million)	9.6	31.1	17.1	10.0	1.8	6.8	1.5	1.8	0.8	5.8	6.0	2.5	94.6

[4] Values in table may not sum to totals due to rounding.

3.6 10 year timeframe: high additional diversion

Table 3-7 and Table 3-8 identify infrastructure needs for high additional diversion (10 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Resource recovery and reprocessing infrastructure needs are different under the high additional diversion scenario (compared to the business-as-usual and moderate additional scenarios). This includes:

- For MSW and C&I:
    - The same additional reprocessing infrastructure needs as under business-as-usual volumes to process recovered MSW and C&I organics, with the exception of organics to open windrow composting facilities where a total of 2.4 facilities are needed (up from 2.1 facilities under BAU scenario to manage extra volumes from C&I regional sources).
    - To achieve high additional diversion, the difference in volumes (between business-as-usual and high additional diversion) for MSW and metropolitan C&I waste would be processed via mechanical biological treatment (MBT) processes. This requires investment in 5.3 MBT facilities.
    - Increase (from business-as-usual scenario) in investment in other processing facilities (medium tech) to process both recovered dry recyclables, and process a fraction of the outputs from MBT. This requires total investment in 17.5 other processing facilities (medium tech).
- Additional infrastructure is needed to process C&D waste. Total infrastructure needs for this include 3.1 construction and demolition processing facilities and 2.0 waste soil storage and remediation facilities.
- Additional transfer vehicle infrastructure (compared to business-as-usual and moderate additional scenarios) is needed to transfer MSW waste from regional areas to MBT facilities, with a total of 19 transfer vehicles needed.
- Additional CDL facilities (compared to business-as-usual and moderate additional scenarios) to recover CDL. Total infrastructure needs for this are 17.2 CDL facilities.

Total capital expenditure on new/upgraded infrastructure is estimated at $296.26 million, including $143.87 million across the MSW sector, $116.29 million across the C&I sector and $36.11 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $191.94 million, including $97.06 million across the MSW sector, $67.91 million across the C&I sector and $26.97 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $249.52 million, including $126.17 million across the MSW sector, $88.29 million across the C&I sector and $35.06 million across the C&D sector.

Table 3-7: Infrastructure assessment by sector for high additional diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[5].

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	51,499	-	-	51,499
Skip Bin	-	10,891	288	11,179
Collection Vehicles	6	39	18	63
Vacuum System	0.5	-	-	0.5
Transfer Stations	-	1.4	-	1.4
Transfer Vehicles	3	8	8	19
Material Recovery Facility	-	-	-	-
CDL Facilities	5.4	11.7	-	17.2
Drop Off Facilities	43.5	-	-	43.5
Composting Facilities (Open WR)	0.3	2.0	-	2.4
Composting Facilities (Covered Tunnel)	0.1	0.5	-	0.6
Energy from Waste Facilities - Combustion	-	-	-	-
Energy from Waste - Anerobic Digestion	0.1	1.1	-	1.2
Mechanical Biological Treatment	3.6	1.7	-	5.3
C&D Processing Facilities	-	-	3.1	3.1
Other Reprocessing Facilities (Medium Tech)	4.9	12.6	-	17.5
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilties	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	2.0	2.0
Emerging Waste Streams Facilities	1.3	0.3	-	1.6
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	143.87	116.29	36.11	296.26
Annual operating expenditure ($ million)	97.06	67.91	26.97	191.94
Annual revenue ($ million)	126.17	88.29	35.06	249.52

[5] Values in table may not sum to totals due to rounding.

Table 3-8: Infrastructure needs for management of waste from each Government Region for high additional diversion 10 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[6].

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	7,355	12,591	11,824	7,617	1,799	1,706	1,229	1,454	653	1,636	1,742	1,893	51,499
Skip Bin	1,334	2,284	2,145	1,382	156	1,141	107	126	57	955	1,096	396	11,179
Collection Vehicles	8.6	14.7	13.8	8.9	0.9	4.4	0.6	0.7	0.3	3.7	4.2	1.8	63
Vacuum System	0.1	0.2	0.2	0.1	-	-	-	-	-	-	-	-	0.5
Transfer Stations	-	-	-	-	-	0.5	-	-	-	0.4	0.5	-	1.4
Transfer Vehicles	3.0	5.1	4.8	3.1	0.3	0.6	0.2	0.2	0.1	0.5	0.6	0.4	19
Material Recovery Facility	-	-	-	-	-	-	-	-	-	-	-	-	-
CDL Facilities	2.3	4.0	3.7	2.4	0.7	0.7	0.5	0.6	0.3	0.6	0.7	0.7	17.2
Drop Off Facilities	5.8	9.9	9.3	6.0	1.8	1.7	1.3	1.5	0.7	1.7	1.8	1.9	43.5
Composting Facilities (Open WR)	-	-	-	-	0.6	0.1	0.4	0.5	0.2	-	0.2	0.5	2.4
Composting Facilities (Covered Tunnel)	0.1	0.2	0.2	0.1	-	-	-	-	-	-	-	-	0.6
Energy from Waste Facilities - Combustion	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy from Waste - Anerobic Digestion	0.1	0.2	0.2	0.1	-	-	-	-	-	0.5	-	-	1.2
Mechanical Biological Treatment	0.8	1.4	1.3	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	5.3
C&D Processing Facilities	0.29	0.80	0.73	0.31	0.15	0.14	0.09	0.12	0.04	0.13	0.14	0.16	3.1
Other Reprocessing Facilities (Medium Tech)	2.2	3.8	3.5	2.3	-	2.1	0.3	0.3	0.1	1.1	1.5	0.4	17.5
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilties	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0
Emerging Waste Streams Facilities	-	1.6	-	-	-	-	-	-	-	-	-	-	1.6
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	39.5	85.9	65.6	41.0	6.4	12.0	4.7	5.5	2.4	14.6	11.2	7.6	296.3
Annual operating expenditure ($ million)	25.1	58.3	41.6	26.0	4.3	8.1	3.2	3.8	1.7	7.4	7.5	5.0	191.9
Annual revenue ($ million)	32.6	75.7	54.1	33.8	5.6	10.5	4.1	4.9	2.2	9.6	9.8	6.5	249.5

[6] Values in table may not sum to totals due to rounding.

3.7 30 year timeframe: business-as-usual diversion

Table 3-9 and Table 3-10 identify infrastructure needs for business-as-usual diversion (30 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Infrastructure needs for business-as-usual diversion (30 year timeframe) include:

- Collection infrastructure to pick up additional volumes of waste and recyclables including 156,863 sets of kerbside MSW bins, 40,039 skip bins, 221 waste collection vehicles, and 5.0 vacuum system.
- Resource recovery infrastructure to recover additional volumes of waste and recyclables, including 13.3 transfer stations, 64 transfer vehicles, 0.5 MRFs, 50.1 CDL facilities and 67.5 drop-off facilities (for waste recovered under product stewardship schemes).
- Reprocessing infrastructure to process additional volumes of recovered recyclables, including 5.0 open windrow composting facilities, 5.2 covered tunnel composting facilities, 5.1 anaerobic digestion facilities, 7.9 construction and demolition processing facilities, and 36.4 other processing facilities (medium tech).
- Other waste infrastructure, including 3.7 waste soil storage and remediation facility and 2.5 emerging waste stream facilities (for e-waste).

Total capital expenditure on new/upgraded infrastructure is estimated at $514.48 million, including $124.48 million across the MSW sector, $285.09 million across the C&I sector and $104.91 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $263.26 million, including $56.90 million across the MSW sector, $133.32 million across the C&I sector and $73.04 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $342.24 million, including $73.97 million across the MSW sector, $173.31 million across the C&I sector and $94.96 million across the C&D sector.

Table 3-9: Infrastructure assessment by sector for business-as-usual diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[7].

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	156,863	-	-	156,863
Skip Bin	-	39,008	1,031	40,039
Collection Vehicles	17	140	63	221
Vacuum System	5.0	-	-	5.0
Transfer Stations	1.5	11.8	-	13.3
Transfer Vehicles	9	29	26	64
Material Recovery Facility	-	0.5	-	0.5
CDL Facilities	14.3	35.8	-	50.1
Drop Off Facilities	67.5	-	-	67.5
Composting Facilities (Open WR)	1.0	3.9	-	5.0
Composting Facilities (Covered Tunnel)	1.0	4.3	-	5.2
Energy from Waste Facilities - Combustion	-	-	-	-
Energy from Waste - Anerobic Digestion	0.5	4.6	-	5.1
Mechanical Biological Treatment	-	-	-	-
C&D Processing Facilities	-	-	7.9	7.9
Other Reprocessing Facilities (Medium Tech)	2.0	34.4	-	36.4
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilities	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	3.7	3.7
Emerging Waste Streams Facilities	2.0	0.5	-	2.5
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	124.48	285.09	104.91	514.48
Annual operating expenditure ($ million)	56.90	133.32	73.04	263.26
Annual revenue ($ million)	73.97	173.31	94.96	342.24

[7] Values in table may not sum to totals due to rounding.

Table 3-10: Infrastructure needs for management of waste from each Government Region for business-as-usual diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[8].

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	22,403	38,351	36,017	23,200	5,480	5,196	3,743	4,429	1,990	4,982	5,307	5,767	156,863
Skip Bin	4,779	8,182	7,684	4,949	559	4,085	382	452	203	3,419	3,927	1,418	40,039
Collection Vehicles	30	52	49	31	3	16	2	2	1	13	15	6	221
Vacuum System	0.9	1.6	1.5	1.0	-	-	-	-	-	-	-	-	5.0
Transfer Stations	0.5	1.5	1.3	0.5	0.3	2.9	0.0	0.1	-	2.4	2.8	1.0	13.3
Transfer Vehicles	10.4	17.8	16.8	10.8	0.7	2.0	0.5	0.5	0.2	1.7	2.0	1.0	64
Material Recovery Facility	-	0.3	0.2	-	-	-	-	-	-	-	-	-	0.5
CDL Facilities	6.7	11.4	10.7	6.9	2.1	2.0	1.5	1.7	0.8	1.9	2.1	2.2	50.1
Drop Off Facilities	8.8	15.1	14.1	9.1	3.0	2.9	2.1	2.5	1.1	2.8	2.9	3.2	67.5
Composting Facilities (Open WR)	-	-	-	-	1.1	0.3	0.8	0.9	0.4	0.1	0.4	1.0	5.0
Composting Facilities (Covered Tunnel)	1.0	1.7	1.6	1.0	-	-	-	-	-	-	-	-	5.2
Energy from Waste Facilities - Combustion	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy from Waste - Anerobic Digestion	0.5	0.8	0.8	0.5	-	-	-	-	-	2.5	-	-	5.1
Mechanical Biological Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-
C&D Processing Facilities	1.2	2.3	2.2	1.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	7.9
Other Reprocessing Facilities (Medium Tech)	3.8	6.5	6.1	3.9	-	6.8	0.3	0.4	0.2	3.2	4.7	0.5	36.4
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	3.7	-	-	-	-	-	-	-	-	-	-	3.7
Emerging Waste Streams Facilities	-	2.5	-	-	-	-	-	-	-	-	-	-	2.5
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	64.3	147.1	111.4	66.9	5.4	28.4	3.6	4.4	1.8	45.8	25.4	9.9	514.5
Annual operating expenditure ($ million)	30.1	79.6	51.2	31.3	3.5	19.3	2.3	2.9	1.1	18.8	17.0	6.4	263.3
Annual revenue ($ million)	39.1	103.4	66.5	40.6	4.5	25.1	3.0	3.7	1.5	24.4	22.1	8.3	342.2

[8] Values in table may not sum to totals due to rounding.

3.8 30 year timeframe: moderate additional diversion

Table 3-11 and Table 3-12 identify infrastructure needs for moderate additional diversion (30 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Resource recovery and reprocessing infrastructure needs are greater than under the moderate additional diversion scenario (compared to the business-as-usual scenario). This includes:

- MRF infrastructure to process additional volumes of recovered dry recyclables. Total needs is 1.6 MRF facilities.
- Reprocessing infrastructure to process additional volumes of recovered recyclables, including total of 9.5 open windrow composting facilities, 6.9 covered tunnel composting facilities, 6.0 anaerobic digestion facilities, 8.6 construction and demolition processing facilities, and 39.0 other processing facilities (medium tech).
- Other waste infrastructure, including 3.9 waste soil storage and remediation facility.

Total capital expenditure on new/upgraded infrastructure is estimated at $554.38 million, including $148.62 million across the MSW sector, $296.76 million across the C&I sector and $109.01 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $277.87 million, including $64.79 million across the MSW sector, $136.98 million across the C&I sector and $76.10 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $361.23 million, including $84.23 million across the MSW sector, $178.07 million across the C&I sector and $98.92 million across the C&D sector.

Table 3-11: Infrastructure assessment by sector for moderate additional diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[9].

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	156,863	-	-	156,863
Skip Bin	-	39,008	1,031	40,039
Collection Vehicles	17	140	63	221
Vacuum System	5.0	-	-	5.0
Transfer Stations	1.5	11.8	-	13.3
Transfer Vehicles	9	29	26	64
Material Recovery Facility	1.1	0.6	-	1.6
CDL Facilities	14.3	35.8	-	50.1
Drop Off Facilities	67.5	-	-	67.5
Composting Facilities (Open WR)	5.1	4.3	-	9.5
Composting Facilities (Covered Tunnel)	2.0	4.9	-	6.9
Energy from Waste Facilities - Combustion	-	-	-	-
Energy from Waste - Anerobic Digestion	1.0	4.9	-	6.0
Mechanical Biological Treatment	-	-	-	-
C&D Processing Facilities	-	-	8.6	8.6
Other Reprocessing Facilities (Medium Tech)	3.7	35.3	-	39.0
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilities	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	3.9	3.9
Emerging Waste Streams Facilities	2.0	0.5	-	2.5
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	148.62	296.76	109.01	554.38
Annual operating expenditure ($ million)	64.79	136.98	76.10	277.87
Annual revenue ($ million)	84.23	178.07	98.92	361.23

[9] Values in table may not sum to total due to rounding.

Table 3-12: Infrastructure needs for management of waste from each Government Region for moderate additional diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[10].

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	22,403	38,351	36,017	23,200	5,480	5,196	3,743	4,429	1,990	4,982	5,307	5,767	156,863
Skip Bin	4,779	8,182	7,684	4,949	559	4,085	382	452	203	3,419	3,927	1,418	40,039
Collection Vehicles	30.3	51.8	48.7	31.4	3.0	15.7	2.1	2.4	1.1	13.2	15.1	6.2	221
Vacuum System	0.9	1.6	1.5	1.0	-	-	-	-	-	-	-	-	5.0
Transfer Stations	0.5	1.5	1.3	0.5	0.3	2.9	0.0	0.1	-	2.4	2.8	1.0	13.3
Transfer Vehicles	10.4	17.8	16.8	10.8	0.7	2.0	0.5	0.5	0.2	1.7	2.0	1.0	64
Material Recovery Facility	-	0.3	0.2	-	0.2	0.2	-	0.1	-	0.1	0.2	0.3	1.6
CDL Facilities	6.7	11.4	10.7	6.9	2.1	2.0	1.5	1.7	0.8	1.9	2.1	2.2	50.1
Drop Off Facilities	8.8	15.1	14.1	9.1	3.0	2.9	2.1	2.5	1.1	2.8	2.9	3.2	67.5
Composting Facilities (Open WR)	-	-	-	-	1.9	1.1	1.3	1.5	0.7	0.2	1.1	1.8	9.5
Composting Facilities (Covered Tunnel)	1.3	2.2	2.1	1.3	-	-	-	-	-	-	-	-	6.9
Energy from Waste Facilities - Combustion	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy from Waste - Anerobic Digestion	0.6	1.1	1.0	0.7	-	-	-	-	-	2.5	-	-	6.0
Mechanical Biological Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-
C&D Processing Facilities	1.24	2.44	2.26	1.30	0.20	0.19	0.13	0.16	0.06	0.18	0.19	0.21	8.6
Other Reprocessing Facilities (Medium Tech)	4.1	7.0	6.6	4.2	-	7.0	0.4	0.5	0.2	3.4	4.9	0.6	39.0
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	3.9	-	-	-	-	-	-	-	-	-	-	3.9
Emerging Waste Streams Facilities	-	2.5	-	-	-	-	-	-	-	-	-	-	2.5
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	69.9	157.8	120.6	72.7	6.7	29.9	4.3	5.4	2.2	46.5	26.9	11.5	554.4
Annual operating expenditure ($ million)	31.9	83.8	54.2	33.2	3.9	20.0	2.6	3.3	1.3	19.1	17.6	7.0	277.9
Annual revenue ($ million)	41.5	108.9	70.5	43.2	5.1	26.0	3.4	4.3	1.7	24.8	22.9	9.1	361.2

[10] Values in table may not sum to total due to rounding.

3.9 30 year timeframe: high additional diversion

Table 3-13 and Table 3-14 identify infrastructure needs for high additional diversion (30 year timeframe) broken down by sector (MSW, C&I, C&D) and Government Region respectively. These tables identify the number of new/upgraded infrastructure units needed to manage additional waste volumes and the estimated total capital expenditure, annual operating expenditure and revenue.

Resource recovery and reprocessing infrastructure needs are different under the high additional diversion scenario (compared to the business-as-usual and moderate additional scenarios). This includes:

- For MSW and C&I:
    - The same additional reprocessing infrastructure needs as under business-as-usual volumes to process recovered MSW and C&I organics, with the exception of organics to open windrow composting facilities that increased (by an additional 0.8 facilities) to a total of 5.8 facilities to manage extra tonnes from C&I regional sources
    - To achieve high additional diversion the difference in volumes (between business-as-usual and high additional diversion) for MSW waste and metropolitan C&I waste would be processed via a combination of energy-from-waste combustion and mechanical biological treatment (MBT) technologies. This requires investment in 1.7 energy-from-waste combustion facilities and 6.8 MBT facilities.
    - Increase (from business-as-usual scenario) in investment in other processing facilities (medium tech) to process both recovered dry recyclables, and process outputs from MBT. This requires total investment in 36.8 other processing facilities (medium tech).
- Additional infrastructure is needed to process C&D waste. Total infrastructure needs for this include 11.5 construction and demolition processing facilities and 5.1 waste soil storage and remediation facilities.
- Additional transfer vehicle infrastructure (compared to business-as-usual and moderate additional scenarios) is also needed to transfer MSW waste from regional areas to MBT facilities, with a total of 66 transfer vehicles needed.
- Additional CDL facilities (compared to business-as-usual and moderate additional scenarios) is needed to recover CDL. Total infrastructure needs for this are 58.6 CDL facilities.

Total capital expenditure on new/upgraded infrastructure is estimated at $918.90 million, including $356.26 million across the MSW sector, $430.69 million across the C&I sector and $131.96 million across the C&D sector.

Annual operating expenditure from operation of new/upgraded infrastructure is estimated at $457.22 million, including $162.74 million across the MSW sector, $200.92 million across the C&I sector and $93.55 million across the C&D sector.

Annual revenue from operation of new/upgraded infrastructure is estimated at $594.38 million, including $211.57 million across the MSW sector, $261.2 million across the C&I sector and $121.62 million across the C&D sector.

Table 3-13: Infrastructure assessment by sector for high additional diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[11].

Number of new/upgraded infrastructure units	MSW	C&I	C&D	*total SA*
Kerbside Source Separation Bin Systems	156,863	-	-	156,863
Skip Bin	-	39,008	1,031	40,039
Collection Vehicles	17	140	63	221
Vacuum System	5.0	-	-	5.0
Transfer Stations	1.5	11.8	-	13.3
Transfer Vehicles	9	29	27	66
Material Recovery Facility	-	0.5	-	0.5
CDL Facilities	16.6	42.0	-	58.6
Drop Off Facilities	67.5	-	-	67.5
Composting Facilities (Open WR)	1.0	4.7	-	5.8
Composting Facilities (Covered Tunnel)	1.0	4.3	-	5.2
Energy from Waste Facilities - Combustion	1.1	0.7	-	1.7
Energy from Waste - Anerobic Digestion	0.5	4.6	-	5.1
Mechanical Biological Treatment	4.2	2.6	-	6.8
C&D Processing Facilities	-	-	11.5	11.5
Other Reprocessing Facilities (Medium Tech)	2.0	34.8	-	36.8
Other Reprocessing Facilities (High Tech)	-	-	-	-
Hazardous Waste Facilities	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	-	5.1	5.1
Emerging Waste Streams Facilities	2.0	0.5	-	2.5
Landfills	-	-	-	-
Medical Waste Disposal	-	-	-	-
Other	-	-	-	-
Total capital expenditure ($ million)	356.26	430.69	131.96	918.90
Annual operating expenditure ($ million)	162.74	200.92	93.55	457.22
Annual revenue ($ million)	211.57	261.20	121.62	594.38

[11] Values in table may not sum to total due to rounding.

Table 3-14: Infrastructure needs for management of waste from each Government Region for high additional diversion 30 year timespan, including estimated number of new/upgraded infrastructure units, total capital expenditure, annual operating expenditure and revenue[12].

Number of new/upgraded infrastructure units	Eastern Adelaide	Northern Adelaide	Southern Adelaide	Western Adelaide	Adelaide Hills	Barossa Light and Lower North	Fleurieu Kangaroo Island	Eyre Western	Far North	Limestone Coast	Murray Mallee	Yorke Mid North	*Total SA*
Kerbside Source Separation Bin Systems	22,403	38,351	36,017	23,200	5,480	5,196	3,743	4,429	1,990	4,982	5,307	5,767	156,863
Skip Bin	4,779	8,182	7,684	4,949	559	4,085	382	452	203	3,419	3,927	1,418	40,039
Collection Vehicles	30.3	51.8	48.7	31.4	3.0	15.7	2.1	2.4	1.1	13.2	15.1	6.2	221
Vacuum System	0.9	1.6	1.5	1.0	-	-	-	-	-	-	-	-	5.0
Transfer Stations	0.5	1.5	1.3	0.5	0.3	2.9	0.0	0.1	-	2.4	2.8	1.0	13.3
Transfer Vehicles	10.4	17.8	16.8	10.8	0.9	2.2	0.6	0.7	0.3	1.9	2.1	1.2	66
Material Recovery Facility	-	0.3	0.2	-	-	-	-	-	-	-	-	-	0.5
CDL Facilities	7.9	13.6	12.8	8.2	2.4	2.3	1.6	1.9	0.9	2.2	2.3	2.5	58.6
Drop Off Facilities	8.8	15.1	14.1	9.1	3.0	2.9	2.1	2.5	1.1	2.8	2.9	3.2	67.5
Composting Facilities (Open WR)	-	-	-	-	1.2	0.5	0.8	1.0	0.4	0.3	0.5	1.1	5.8
Composting Facilities (Covered Tunnel)	1.0	1.7	1.6	1.0	-	-	-	-	-	-	-	-	5.2
Energy from Waste Facilities - Combustion	0.3	0.5	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Energy from Waste - Anerobic Digestion	0.5	0.8	0.8	0.5	-	-	-	-	-	2.5	-	-	5.1
Mechanical Biological Treatment	1.1	1.8	1.7	1.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	6.8
C&D Processing Facilities	1.61	3.07	2.85	1.68	0.34	0.33	0.23	0.27	0.11	0.31	0.33	0.36	11.50
Other Reprocessing Facilities (Medium Tech)	3.8	6.5	6.1	3.9	-	6.9	0.3	0.4	0.2	3.3	4.9	0.5	36.8
Other Reprocessing Facilities (High Tech)	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous Waste Facilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Soil Storage and Remediation Facilities	-	5.1	-	-	-	-	-	-	-	-	-	-	5.1
Emerging Waste Streams Facilities	-	2.5	-	-	-	-	-	-	-	-	-	-	2.5
Landfills	-	-	-	-	-	-	-	-	-	-	-	-	-
Medical Waste Disposal	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-
Total capital expenditure ($ million)	125.9	258.3	210.3	130.7	15.5	38.3	10.5	12.6	5.5	55.3	35.5	20.6	918.9
Annual operating expenditure ($ million)	58.9	136.1	97.5	61.1	8.2	24.0	5.5	6.7	2.9	23.2	21.7	11.4	457.2
Annual revenue ($ million)	76.5	177.0	126.8	79.5	10.6	31.2	7.2	8.7	3.7	30.2	28.2	14.8	594.4

[12] Values in table may not sum to total due to rounding.

3.10 Other infrastructure

In addition to the infrastructure needs identified in the above assessment, there will be further infrastructure required for specialised or emerging waste streams. A number of these potential infrastructure needs are discussed in the following sections.

3.10.1 Tyre recycling infrastructure

Significant volumes of tyres, 21,300 tonnes in 2013/14, (Zero Waste SA, 2015) are currently shredded and sent for energy recovery overseas. This represents about 70% of end of life tyres generated in South Australia, which is estimated at 30,500 tonnes or about 2.2 Equivalent Passenger Units (EPUs) per person. (National Environment Protection Council, 2015)

There is potential for infrastructure for further processing of end of life tyres to produce fuel suitable for energy recover in South Australia or remanufacture into higher value products (such as asphalt additive, matting surfaces, etc.)

3.10.2 Photovoltaic (PV) panels recycling infrastructure

The rapid growth in installation of both residential and commercial photovoltaic panels (solar panels) for the production of electricity will lead to the generation of a new waste stream when they reach the end of their useful life. Based on current economic lifetime estimates of 20-25 year, this will mean that this waste stream will need a suitable recycling ore remanufacturing option within the 30 year time frame of this study.

There is the potential that PV panels may get processed through E Waste infrastructure in the future and/or more specialised processing infrastructure developed to capture component parts, such as the silicon material used in the solar cells.

3.10.3 CCA-treated timber disposal/recycling infrastructure

Copper Chrome Arsenate (CCA) is a preservative used to treat timber to prevent attack by fungi and insects and to protect wood products against decay from the elements. CCA treated timber is mainly used in agriculture, viticulture and also in building and aquaculture which can extend the life of a pine post from a few years to 30 years of more. CCA treated timber poses significant challenges for disposal and recycling when it reached end of life. Burning of CCA treated timber is restricted in SA due to environmental and health concerns of the chemicals and heavy metals present in the ash from burnt CCA treated timber. Currently only suitably licenced landfills can accept CCA posts for disposal.

This presents an opportunity for future infrastructure to be developed to treat CCA posts to enable recycling/recovery of the components or a more favourable disposal options.

3.10.4 Absorbent Hygiene Product recycling infrastructure

It is estimated that between 29,000 and 36,000 tonnes of Absorbent Hygiene Product (AHP) waste is currently disposed to landfill (Zero Waste SA, Absorbent Hygiene Products Waste Review of South Australia, 2013). There are currently technologies being used overseas for the recycling of the components of this waste stream which may be suitable for South Australia in the medium term.

3.10.5 Packaged food waste

It is estimated that 2,800 tonnes of packaged food waste is generated in SA every year and is disposed of to landfill (Rawtec, 2015). This material could instead be recovered for recycling using de-packaging equipment to separate the organic fraction from the packaging waste (e.g. plastics, cardboard, metal). The organic fraction could be sent to a composting or anaerobic digestion to produce fuel and fertiliser, and packaging waste could be sent to a recycler.

3.10.6 Batteries

It has been estimated that only 5% of the end of life batteries produced every year are recycled. The Australian Government Minister of Environment has approved the listing of used batteries (less than 5kg in weight) under the 2014-2015 Product Priority list for development of a national scheme under the Product Stewardship Act (Australian Government Department of Environment, 2015). While there was broad support for an industry-led voluntary scheme for used batteries, the major brand owners of primary (non-rechargeable) batteries opposed an all-inclusive voluntary scheme. At the meeting of Environment Ministers of 15 July 2015, it was agreed that work to explore an industry led used battery stewardship approach be refined to focus on secondary batteries, i.e. hazardous and rechargeable battery types, such as button cell, power tool, sealed lead acid and emergency lighting batteries. Should a National Product Stewardship Scheme for used secondary batteries be introduced, coupled with other measures for effective collection of primary batteries, then larger volumes of batteries may be recovered for recycling in SA and this may create the economies of scale required to consider investment in new battery recycling infrastructure.

3.10.7 Hazardous waste infrastructure

South Australia has sufficient capacity within existing infrastructure to process the standard suite hazardous streams (including medical waste) over the next 10-30 years. However, investment in new infrastructure will be needed to process emerging waste streams, such as Copper Chromate Arsenate and PV panels (see section 3.10.2 and 3.10.3).

4 Economic analysis

4.1 Introduction

Two economic methods were utilised to provide the necessary outputs required for the economic assessment. Firstly, cost benefit analysis (CBA) was used to determine the efficient allocation of resources. Secondly, extended input-output (I-O) analysis was employed for estimation of economic impacts.

The cost benefit analysis was conducted over 10-year and 30-year periods and two standard evaluation criteria were employed: net present value (NPV) and benefit-cost ratio (BCR).

The economic impacts were estimated using an extension of the conventional input-output method. Over the past decade EconSearch has developed an extended input-output model known as the RISE model (Regional Industry Structure & Employment). The RISE model provides a comprehensive economic framework that is extremely useful in the resource planning process, particularly for regional economic impact applications. The indicators used in impact analysis typically include employment and gross state product which are estimated in this report.

The following sections present key findings from the economic analysis. See Attachment 2 for the full economic analysis report.

4.2 Cost benefit analysis results

4.1.1 Analysis results

While the impact analysis illustrates the economic activity arising from the proposed investment, the CBA shows whether or not the proposed investment represents an efficient use of public money. The results of the CBA are presented in Table 4-1 for 10 and 30 year periods.

Table 4-1: Results of the cost benefit analysis

	10 Years		30 Years	
	Option 1 (Moderate)	Option 2 (High)	Option 1 (Moderate)	Option 2 (High)
Net present value (NPV) ($m)	30	261	91	566
Benefit-cost ratio (BCR)	1.7	1.4	1.9	1.4

The results indicate that according to the two evaluation criteria used both options are worthwhile investments over a 10-year and 30-year period. The decision rule is that the investment will be worthwhile if the NPV is greater than zero. In terms of ranking the options, Option 2 generates greater net benefits than Option 1 over both time periods, although the BCR is higher for Option 1.

Accordingly, the net benefit of investing in Options 1 and 2 outweigh the net benefits of proceeding with the business-as-usual investment (base case).

There are a number of non-market benefits associated with Options 1 and 2. Besides the avoided impacts associated with disposing of waste to landfill, which have been valued in dollar terms in this

analysis, there are additional non-market benefits associated with waste diversion. Reprocessing materials into new products avoids the use of virgin materials. Whilst reprocessing materials consumes resources, such as energy and water, and in turn produces emissions such as greenhouse gas emissions, taken across the full lifecycle of recycled materials it can be expected that across most materials there will be a net reduction in the use of virgin materials, energy and water (freeing up these resources for more productive uses to society) and reduction in the production of greenhouse gases (DECCW 2010).

4.1.2 Sensitivity analysis

The results of the cost-benefit analysis were re-estimated using values for key variables that reflect the uncertainty of those variables. The sensitivity analysis included the following:

- discount rates
- capital costs
- operating costs
- revenue
- landfill costs

The range of values used for each uncertain variable and detailed results of the sensitivity analysis are set out below with some interpretation of the results. Note that each sensitivity analysis for each variable was undertaken by holding all other variables constant at their 'expected' values. The assumptions and results of the sensitivity analysis are summarised and described in the following sections.

The following summarises key findings from the sensitivity analysis:

- For the 10 year analysis, the results are insensitive to changes in the discount rate. However, under the 30 year analysis, the results are quite sensitive to changes in the discount rate.
- As expected, the NPV and BCR improve with the lower (4 per cent) discount rate. This occurs because the benefits accrue over many years and are greater, in present value terms, when the discount rate is lower. Under the higher (8 per cent) discount rate the NPV and BCR indicate that both options are still preferable to the base case
- The results are quite sensitive to the capital costs. The NPV and BCR under both options improve if capital costs were 25 per cent lower than expected but even if capital costs were 25 per cent higher than expected both options would still be viable.
- The results are quite sensitive to the operating costs. Under Option 1, a 25 per cent increase in operating costs will result in a negative NPV under both time periods and the option would not be worthwhile. However, under Option 2, a 25 per cent increase in operating costs will result in a negative NPV for the 10 year analysis but would still be positive over the longer term (30 year analysis).
- The results are shown to be quite sensitive to revenue. This means that a 25 per cent increase or decrease in this value will have significant impact on the project viability. Under Option 1, a 25 per cent decrease in revenue will result in a negative NPV under both time

periods and the option would not be worthwhile. However, under Option 2, a 25 per cent decrease in revenue will still result in a positive NPV for the 10-year analysis but would be negative under the 30-year analysis.

- The results are shown to be moderately sensitive to landfill costs. This means that a 25 per cent increase or decrease in this value will have moderate impact on the project viability. However, even if landfill costs were 25 per cent lower both options under both time periods would still be worthwhile and generate greater net benefits than the base case. If landfill costs were 25 per cent higher both options under both time periods would be worthwhile and generate greater net benefits than the base case.

4.3 Economic impact analysis results

The total economic impact of the infrastructure investment options on the SA economy includes the capital impact and the operating impact.

This is summarised in Table 4-2 below.

Table 4-2: Total economic impacts of the infrastructure investment options

	At Year 10			At Year 30		
	Baseline	Moderate	High	Baseline	Moderate	High
Waste Stream Total						
GSP ($m)						
Direct	45.2	51.5	138.7	177.3	188.5	311.7
Flow-on	52.6	59.0	148.7	203.5	214.0	344.6
Total	**97.8**	**110.4**	**287.3**	**380.7**	**402.5**	**656.3**
Employment (fte)						
Direct	575	646	1,040	1,956	2,076	2,404
Flow-on	358	399	1,014	1,367	1,433	2,315
Total	**933**	**1,045**	**2,053**	**3,323**	**3,509**	**4,719**
fte/10,000 tonnes	**12**	**10**	**11**	**11**	**11**	**11**

The different impacts of the capital infrastructure investment and operating costs are detailed below.

The total economic impact of the infrastructure investment disaggregated by industry sector is detailed in Table 4-3.

The industry sector with the highest contribution to GSP economic impacts from infrastructure investment is the waste services sector. Other significant industry sectors include electricity, gas and water, other services, ownership of dwellings, manufacturing and construction. The industry sector with the highest contribution to employment economic impacts is the waste services sector. Other significant industry sectors include other services, manufacturing, electricity, gas and water, construction and retail trade.

A small number of jobs and GSP are expected to be lost in the public administration and safety sector. This is related to the assumption that a majority of jobs created will force people to move, either directly or indirectly, from unemployment (and social security support) into paid employment. This shift is estimated to decrease demand for support services in the public sector and result in a small decrease in employment and GSP in this sector.

Table 4-3: Total economic impact of the infrastructure investment by industry

	At Year 10			At Year 30		
	Baseline	Moderate	High	Baseline	Moderate	High
GSP ($m)						
Agric, Forestry & Fishing	1.1	1.2	3.3	4.2	4.5	7.4
Mining	0.8	0.9	2.5	2.6	2.7	4.5
Manufacturing	5.3	6.1	16.1	14.9	15.7	26.6
Electricity, gas, and water	10.7	12.1	25.1	44.0	46.3	68.9
Waste services	42.4	48.1	129.3	172.9	183.8	303.1
Construction	4.5	5.3	16.9	17.2	18.2	33.1
Wholesale Trade	1.5	1.7	4.5	5.7	6.0	9.8
Retail Trade	3.5	4.0	11.1	13.6	14.4	24.4
Accommodation and food services	1.3	1.5	3.9	5.1	5.4	8.8
Transport, postal and warehousing	2.1	2.4	6.5	7.6	8.0	13.4
Information media and telecommunications	1.3	1.5	3.8	4.9	5.2	8.5
Financial and insurance services	3.6	4.1	10.6	13.9	14.7	24.0
Ownership of Dwellings b	6.4	7.2	19.3	24.8	26.2	43.2
Rental, hiring and real estate services	0.9	1.0	2.6	3.3	3.5	5.7
Professional, scientific and technical services	1.6	1.9	4.9	6.1	6.4	10.6
Administrative and support services	1.0	1.2	3.2	3.8	4.0	6.7
Public administration and safety	-1.5	-1.7	-4.3	-5.6	-5.9	-9.5
Education and training	1.0	1.1	3.1	4.0	4.3	7.0
Health care and social assistance	0.3	0.4	1.1	1.4	1.6	2.7
Arts and recreation services	0.4	0.5	1.2	1.5	1.6	2.7
Other services	9.3	10.0	22.5	34.8	35.9	54.6
Total	**97.8**	**110.4**	**287.3**	**380.7**	**402.5**	**656.3**
Employment (fte)						
Agric, Forestry & Fishing	7	8	21	27	29	47
Mining	3	4	10	9	10	17
Manufacturing	49	56	149	136	143	241
Electricity, gas, and water	44	50	101	181	191	282
Waste services	551	617	958	1,926	2,044	2,344
Construction	43	51	161	161	169	309
Wholesale Trade	9	10	26	33	34	56
Retail Trade	40	46	129	156	165	279
Accommodation and food services	17	19	51	65	68	112
Transport, postal and warehousing	15	17	47	53	56	96
Information media and telecommunications	5	5	14	18	19	31
Financial and insurance services	8	9	24	30	32	52
Ownership of Dwellings b	0	0	0	0	0	0
Rental, hiring and real estate services	4	4	11	13	14	23
Professional, scientific and technical services	12	14	37	45	47	78
Administrative and support services	9	10	26	31	33	55
Public administration and safety	-12	-14	-35	-45	-47	-76
Education and training	10	11	31	40	42	70
Health care and social assistance	3	4	11	14	16	28
Arts and recreation services	2	2	6	8	8	14
Other services	113	121	272	421	434	660
Total	**933**	**1,045**	**2,053**	**3,323**	**3,509**	**4,719**

Source: EconSearch analysis

4.1.3 Capital impact

GSP is a measure of the net contribution of an activity or industry to the state economy. It represents payments to the primary inputs of production (labour, capital and land) and is a state level equivalent of gross domestic product. Employment is a key indicator of both economic activity and the welfare of households. Estimates for the total economic impact (on GSP and employment) at year 10 and year 30 for the capital phase are provided in Table 4-4.

The total estimated economic impact of the capital expenditure of the infrastructure investment options **at year 10** is:

- $6.5m in GSP and 48 FTE jobs under the baseline option
- $7.9m in GSP and 58 FTE jobs under the moderate investment option
- $21.9m in GSP and 164 FTE jobs under the high investment option

The total estimated economic impact of the capital expenditure of the infrastructure investment options **at year 30** is:

- $10.5m in GSP and 62 FTE jobs under the baseline option
- $11.2m in GSP and 66 FTE jobs under the moderate investment option
- $20.4m in GSP and 122 FTE jobs under the high investment option

4.1.4 Operating impact

Estimates for the total economic impact (on GSP and employment) at year 10 and year 30 for the operating phase are provided in Table 4-5.

The total estimated economic impact of the operating expenditure and revenue of the infrastructure investment options **at year 10** is:

- $91.3m in GSP and 885 FTE jobs under the baseline option
- $102.5m in GSP and 987 FTE jobs under the moderate investment option
- $265.4m in GSP and 1,869 FTE jobs under the high investment option

The total estimated economic impact of the operating expenditure and revenue of the infrastructure investment options **at year 30** is:

- $370.3m in GSP and 3,261 FTE jobs under the baseline option
- $391.3m in GSP and 3,443 FTE jobs under the moderate investment option
- $635.9m in GSP and 4,597 FTE jobs under the high investment option

Table 4-4: Estimated Economic impact of the infrastructure investment options by waste source sector, capital phase

	At Year 10			At Year 30		
	Baseline	Moderate	High	Baseline	Moderate	High
MSW						
GSP ($m)						
Direct	0.9	1.3	5.0	1.3	1.4	3.7
Flow-on	1.2	1.7	6.7	1.7	1.9	4.9
Total	**2.2**	**3.0**	**11.8**	**3.0**	**3.3**	**8.7**
Employment (fte)						
Direct	8	11	44	9	10	26
Flow-on	8	11	44	9	10	26
Total	**16**	**22**	**88**	**17**	**20**	**52**
C&I						
GSP ($m)						
Direct	1.6	1.7	3.6	2.5	2.6	4.0
Flow-on	2.0	2.2	4.6	3.2	3.3	5.2
Total	**3.6**	**3.9**	**8.1**	**5.7**	**5.9**	**9.2**
Employment (fte)						
Direct	13	14	30	17	17	28
Flow-on	13	14	30	17	17	27
Total	**26**	**29**	**60**	**33**	**35**	**55**
C&D						
GSP ($m)						
Direct	0.3	0.4	0.8	0.8	0.8	1.0
Flow-on	0.5	0.6	1.2	1.1	1.1	1.4
Total	**0.8**	**1.0**	**2.0**	**1.8**	**1.9**	**2.5**
Employment (fte)						
Direct	3	4	8	5	6	7
Flow-on	3	4	8	6	6	8
Total	**6**	**7**	**16**	**11**	**12**	**15**
Waste Streams Total						
GSP ($m)						
Direct	2.9	3.5	9.4	4.5	4.8	8.8
Flow-on	3.7	4.5	12.5	6.0	6.4	11.6
Total	**6.5**	**7.9**	**21.9**	**10.5**	**11.2**	**20.4**
Employment (fte)						
Direct	24	29	82	31	33	61
Flow-on	24	29	82	31	33	61
Total	**48**	**58**	**164**	**62**	**66**	**122**

Source: EconSearch analysis

Table 4-5: Estimated Economic impact of the infrastructure investment options by waste source sector, operating phase

	At Year 10			At Year 30		
	Baseline	Moderate	High	Baseline	Moderate	High
MSW						
GSP ($m)						
Direct	12.6	16.0	65.9	36.0	42.3	107.9
Flow-on	15.3	18.3	67.3	42.8	48.1	115.8
Total	**27.9**	**34.3**	**133.2**	**78.8**	**90.3**	**223.8**
Employment (fte)						
Direct	183	226	377	404	474	624
Flow-on	101	120	460	285	318	784
Total	**284**	**346**	**838**	**689**	**792**	**1,407**
C&I						
GSP ($m)						
Direct	20.7	21.8	46.4	90.4	93.2	136.3
Flow-on	23.2	24.3	48.5	99.7	102.1	146.4
Total	**43.9**	**46.1**	**94.9**	**190.0**	**195.4**	**282.7**
Employment (fte)						
Direct	268	280	315	1,047	1,077	1,125
Flow-on	160	167	334	675	691	993
Total	**428**	**446**	**649**	**1,722**	**1,768**	**2,119**
C&D						
GSP ($m)						
Direct	9.0	10.2	16.9	46.4	48.2	58.7
Flow-on	10.4	11.9	20.4	55.1	57.4	70.7
Total	**19.5**	**22.1**	**37.3**	**101.4**	**105.6**	**129.4**
Employment (fte)						
Direct	100	111	266	474	492	594
Flow-on	73	83	137	376	391	477
Total	**173**	**194**	**403**	**850**	**883**	**1,071**
Waste Stream Total						
GSP ($m)						
Direct	42.4	48.0	129.2	172.7	183.7	302.9
Flow-on	48.9	54.5	136.2	197.5	207.6	333.0
Total	**91.3**	**102.5**	**265.4**	**370.3**	**391.3**	**635.9**
Employment (fte)						
Direct	551	617	958	1,925	2,043	2,343
Flow-on	334	370	931	1,336	1,400	2,254
Total	**885**	**987**	**1,889**	**3,261**	**3,443**	**4,597**

Source: EconSearch analysis

5 Land-use planning considerations

5.1 South Australian Planning Strategy

The SA land use planning system is built around the Strategic directions set within the SA Strategic Plan and represented spatially through the South Australian Planning Strategy.

The volumes of the Planning Strategy guide the policy development for Development Plans across the different regions of South Australia, and therefore provide guidance for the future provision of developable land, including for such uses as industry and waste facilities. They are summarised below.

5.1.1 30 Year Plan for Greater Adelaide

The 30-Year Plan for Greater Adelaide is a key strategic planning document for the Greater Adelaide region. The main aim of the Plan is to outline how the South Australian Government proposes to balance population and economic growth with the need to preserve the environment and protect the heritage, history and character of Greater Adelaide. The Plan seeks to create inclusive, vibrant and liveable communities, while protecting the regional hinterlands and primary production lands and sustaining natural resources. It seeks to provide a set of practical and achievable policies and targets to manage the forecast changes that will confront Greater Adelaide during the next 30 years.

Of particular relevance to this project, the Plan identifies key industrial land, and the protection of existing waste facilities. In particular, it identifies:

- Retention of key industry and redevelopment for new industrial use within the Western region
- Provision of infrastructure, rezoning to encourage employment uses at Gillman
- New strategic employment lands adjacent the Edinburgh RAAF base (Greater Edinburgh Park)
- Protection of waste disposal activities south of Dublin, west of Port Wakefield Road
- New strategic employment lands at Roseworthy and protection of existing 24 hour activities at Kingsford Regional Estate
- New Strategic employment lands at Monarto South, including intermodal to accommodate growth from the Mount Barker and Murray Bridge townships
- New employment lands west of Goolwa (associated with township growth)

Where these locations are identified for this purpose, they are intended to be protected from encroachment by incompatible uses, such as housing through appropriate zoning. This is to protect existing established uses and infrastructure, as well as to provide greater certainty for any future investment and planned infrastructure. It also seeks to ensure that appropriate separation distances between conflicting land uses are maintained to ensure an appropriate level of amenity is afforded to residents within growth areas. It is noted however that of the areas identified above, Roseworthy and Goolwa will occur close to expansions within the housing areas. It may therefore be necessary to

consider interface issues and appropriateness of certain infrastructure at these interfaces. These are discussed further for each location within Section 5.4 below.

5.1.2 Regional Plans

The South Australian Planning Strategy includes plans for seven regional areas of the state. These plans provide high level strategic aspirations for the regions. There are consistencies amongst most of the region plans with regards to:

- identifying the need to accommodate appropriate land for future industry and waste facilities.
- identifying opportunities for co-location and clustering of facilities to allow for their efficient implementation and operation
- protection of existing waste facilities from encroachment by incompatible use.
- management of waste in accordance with the Zero Waste SA waste hierarchy.

Specific region-based positions are summarised as follows:

- **Eyre Peninsula Plan** - identifies the need for land for processing facilities and waste-disposal facilities in Port Lincoln, Whyalla, Ceduna, Coffin Bay, Cowell, Arno Bay, Haslam, Port Neill, Smoky Bay, Tumby Bay and Streaky Bay.
- **Kangaroo Island Plan** - identifies the need for well-sited and serviced industrial land in Kingscote, Penneshaw and Parndana. It is anticipated therefore that any waste infrastructure would be clustered within these identified locations as much as possible.
- **Limestone Coast** - identifies a need to provide for land-based processing and disposal facilities at key sites, in particular at Robe, Cape Jaffa and Beachport. Industrial growth is envisaged in Mount Gambier, Naracoorte, the Katnook industrial area near Penola, Snuggery, Bordertown, Keith, Kingston and Millicent, where potential facilities may also be established.
- **Mid North Plan** – seeks the expansion of industrial land in towns along the corridor between Port Pirie and Peterborough, and priority to build on the industrial focus of Port Pirie. The Lower North/Southern Flinders regional waste management strategy identifies the potential for a new central solid waste disposal site.
- **Murray and Mallee Region Plan -** identifies a need to promote industrial growth in Murray Bridge, Tailem Bend, Monarto, Berri and Renmark. Potential for waste and resource recovery activities to be integrated within these locations.
- **Yorke Peninsula Regional Land Use Framework** - identifies a need for land-based processing clusters at Wallaroo, Port Broughton, Port Giles, Ardrossan and Stansbury. Major industrial hubs identified at Kadina, Balaklava, Blyth and Ardrossan.
- **Andamooka Structure Plan** - close the existing waste site and plan for a new landfill facility and waste transfer station outside of the existing township boundary (identified White Dam Road as potential site)

5.2 EPA Separation Distances Guidelines

The EPA provides Guidelines for Separation Distances relating to industry activities. The separation distances are a means of reducing the effects of residual emissions. The recommended separation distances contained in this guideline are based on the best available information.

While a separation distance is recommended for an industry, the ensuing buffer zone can still be used for other compatible uses.

The guidelines apply to new industries/activities and redevelopment of existing industries/activities for which development authorisation is required. They are administered by both the EPA and relevant authorities assessing development proposals, and therefore are important to understand in determining appropriate locations for waste infrastructure likely to be accepted by authorities and referral agencies informing authorities.

Table 5-1 identifies separation distances provided by the EPA in relation to waste facilities (Sewage Treatment Works and Septic Tank Effluent Disposal systems have been excluded).

Table 5-1: Air separation distance for waste and recycling activities

Activity	Description of activity	Air separation distance (metres)
Incineration	destruction of chemical wastes	1,000
	destruction of medical wastes	500
	cremation	150
	solid municipal waste	500
Waste or Recycling Depots	Landfill	500
	Biosolids depot	400
	Other licensed facilities	300
See landfill guidelines & biosolids guidelines*	Not licensed	100

* The EPA Landfill Guidelines (2007) and Department Environment Natural Resources Biosolids Guidelines (1997) provide guidance on design and management considerations for such facilities. These may influence the desired or necessary buffers.

5.3 How waste management infrastructure is dealt with by the Land Use Planning System.

Waste management facilities will constitute development and therefore require development approval based on both land use and construction grounds, and as such will be subject to the planning system.

The manner in which the facilities are accommodated and processed within the system will be dependent on how they are defined within the Development Regulations, 2008, and how these defined uses are treated within relevant zones within the Council Development Plans.

The forms of infrastructure identified within this report will either fall within a form of 'General Industry' or 'Special Industry' definition within the Development Regulations, 2008, or alternatively be of a nature that is undefined by the legislation. In those instances, they will be defined by assessing authorities for what they are - storage, treatment and/or disposal of waste.

Development Plans for Council areas govern the range of land uses desired in certain locations. It is expected that the vast majority of the waste and resource recovery infrastructure identified within this report will be most suitable within a form of Industry Zone. This is due to the intensity and potential impacts of the activities that occur within the infrastructure facilities and how they influence amenity (they would be incompatible with residential or centre development as a result of this).

Notwithstanding this, their appropriateness will be governed by the ability to manage off site impacts, such as noise, odour, dust and vibration, to a level that is acceptable to their surrounding context. As the majority of the infrastructure will be licensed facilities, their compliance with appropriate separation distance requirements of the EPA will also need to be considered.

However, the following activities may potentially stand apart from the remainder as they have the potential to have broader impacts on amenity (subject to how they are designed and managed) and are such that they may be deemed to be a form of special industry:

- Composting Facilities (Open Windrow)
- Energy from Waste Facilities – Combustion
- Energy from Waste Facilities – Anaerobic Digestion
- Mechanical Biological Treatment Facilities
- Hazardous Waste Facilities
- Disposal Infrastructure

These activities have limited opportunities for locations as the majority of zones do not cater for them. They will instead need to take advantage of locations where existing or previous intensive industries occurred, or otherwise, will require specific rezoning to accommodate specific desired locations. Therefore, their preferred locations should be identified early, and appropriately planned for by land being set aside, and zoning put in place so that sensitive land uses do not encroach on their ability to establish into the future.

5.4 Relevant Location Considerations for Greater Adelaide

It is likely that the larger scale, more intensive waste and resource recovery infrastructure would be positioned within the Greater Adelaide Area (rather than in regional SA). This is due to the large volumes of material available in metropolitan areas, access to transport networks and proximity to many final markets for recycled products (or ports for export to overseas markets). A number of large scale key strategic industrial and employment land areas are identified within the 30 Year Plan for Greater Adelaide at Gillman / Wingfield, Torrens Island, Greater Edinburgh Parks, Lonsdale, Monarto South and Roseworthy. These locations are mapped in Figure 5-1.

Within these locations, there is a range of zones which provide differing levels of support for waste and resource recovery activities and associated infrastructure. The benefits and challenges of the identified key locations within Greater Adelaide are summarised in Table 5-2, with a view to highlighting the potential locations for the full range of infrastructure considered within this report.

Figure 5-1: Potential future waste infrastructure sites in Greater Adelaide

Table 5-2: Supportive characteristics, challenges and types of infrastructure suitable for identified key locations within Greater Adelaide

LocationS	Supportive Characteristics	Challenges of this location	Types of Infrastructure suitable
Gillman / Wingfield (Port Adelaide Enfield Council Development Plan)	• proposed Industry zoning changes will support majority of waste and resource recovery activities • recognises and fosters a cluster of resource recovery activities in this location around Wingfield facility • has excellent access to freight transport routes (road, rail and ports) • builds on existing cluster of waste management facilities in this location (supports the synergies provided by a cluster) • unlikely to be compromised by the encroachment of sensitive land uses (future housing over 500 metres away) and office and retail development limited by proposed policies • proximity to power station and associated infrastructure • availability of a full range of land sizes to cater for differing scales and needs for infrastructure	• forms of special industry remain an undesirable use, limiting some forms of infrastructure • some of this land has potential for inundation and will require mitigation works to occur • there is a presence of acid sulphate soils that needs to be managed • some sites may have proximity to the coast and sensitive coastal environments (including the Dolphin Sanctuary)	All forms of infrastructure are appropriate, except the following: – open windrow composting facilities – disposal infrastructure The following types of infrastructure may be appropriate if the amenity impacts are suitably designed managed: – mechanical biological treatment facilities – energy from waste facilities
Torrens Island (Land Not Within a Council Area Development Plan)	• Public Purpose(Power Station) Zone fully supportive of development that generates energy, including from waste • has excellent access to freight transport routes (road, rail and ports) • proximity to power station and associated infrastructure – very specific needs and opportunities • unlikely to be compromised by the encroachment of sensitive land uses	• does not support landfill from being established • some of this land has potential for inundation due to sea level rise and will require mitigation works to occur • there is a presence of acid sulphate soils that needs to be managed • proximity to the coast and sensitive coastal environments (including the Dolphin Sanctuary)	All forms of infrastructure (other than disposal infrastructure) are suitable here, however, best suited for waste to energy infrastructure, given limited land area and highly specific needs of these facilities with limited opportunities elsewhere.

LocationS	Supportive Characteristics	Challenges of this location	Types of Infrastructure suitable
	(surrounded by heavy industries with future housing over 500 metres away).		
Greater Edinburgh Parks (Playford and Salisbury Council Development Plans)	• Urban Employment Zone provides for most of the waste and resource recovery infrastructure facilities • has excellent access to freight transport routes • access to utility infrastructure required for developments of this nature • availability of a full range of land sizes to cater for differing scales and needs for infrastructure	• Urban Employment Zone also accommodates some more sensitive land uses (such as offices) which could encroach within the more intensive waste and resource recovery infrastructure buffers. • proximity to Edinburgh Air base may have limitation on large buildings, reflective surfaces and / or activities that attract birds	Most forms of infrastructure are appropriate, depending on the scale and range of external impacts in terms of noise, odour, dust and vibration. The following are not appropriate in this location: – open windrow composting facilities – disposal infrastructure The following types of infrastructure may be appropriate if the amenity impacts are suitably designed managed: – mechanical biological treatment facilities – energy from waste facilities
Lonsdale (Onkaparinga Council Development Plan)	• Industry Zone will facilitate most forms of waste and resource recovery infrastructure • the former Port Stanvac refinery site can accommodate more intensive forms of infrastructure than other areas in this location due to specific policy support • has excellent access to freight transport routes • unlikely to be threatened by encroachment of sensitive uses due to presence of existing industry (although subject to	• proximity of desalination plant and impacts on this facility (real or perceived) • vacant and larger scale sites may be difficult to find and would require consolidation of existing development	All forms of infrastructure are appropriate broadly within this location, except the following: – open windrow composting facilities – disposal infrastructure The following types of infrastructure may be appropriate if the amenity impacts are suitably designed managed:

LocationS	Supportive Characteristics	Challenges of this location	Types of Infrastructure suitable
	location within Lonsdale due to surrounding residential interface)		– mechanical biological treatment facilities – energy from waste facilities The above listed facilities would be suitable on the former Port Stanvac Refinery site.
Monarto South (Rural City of Murray Bridge Development Plan)	• Proposed Urban Employment zoning would support the establishment of some forms of waste and resources recovery infrastructure • good access to freight transport infrastructure • access to future intermodal facility in this location • availability of a full range of land sizes to cater for differing scales and needs for infrastructure	• more intensive infrastructure (i.e. special industry) not supported in this location • potential conflicts with nearby Monarto Zoo which is classified as a sensitive use • impacts on surrounding environment needs to be managed (potential conservation park and native flora and fauna) • potential future airport may create conflict with activities that attract birds	Most forms of infrastructure are appropriate, depending on the scale and range of external impacts in terms of noise, odour, dust and vibration. The following are not appropriate in this location: – open windrow composting facilities – disposal infrastructure The following types of infrastructure may be appropriate if the amenity impacts are suitably designed managed: – mechanical biological treatment facilities – energy from waste facilities
Roseworthy / Kingsford (Light Regional Council Development Plan)	• Industry Zone supports intensive 24 hour activities that require large sites or generate air emissions within the northern part of the Kingston Regional Estate. This aligns with a full range of waste and resource recovery infrastructure • unlikely to be subject to encroachment from	• Expansion to employment lands identified in the location (associated with growth of Roseworthy Township) into the future may take the shape of an Urban Employment Zone, which may introduce abilities for sensitive land uses to be established • broader infrastructure capacities need to	All forms of infrastructure are appropriate, except the following: – open windrow composting facilities – disposal infrastructure

LocationS	Supportive Characteristics	Challenges of this location	Types of Infrastructure suitable
	sensitive land uses (given intent of the zoning in this location) • good access to freight transport infrastructure • proximity to future urban growth area	be determined for adequacy	The following types of infrastructure may be appropriate if the amenity impacts are suitably designed managed: – mechanical biological treatment facilities – energy from waste facilities

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6 APPENDIX 1 – Waste Flow Projection Model

6.1.1 Introduction

A copy of the Waste Flow Projection Model (WFPM) is provided as Attachment 1. This Appendix provides an overview of key data and assumptions underpinning the model, as well as output tables.

6.1.2 Waste Flow Projection Model functionalities

The tool includes functionalities that enable users to identify waste and resource recovery gaps and consider associated infrastructure needs for:

- A particular Government region
- A particular future point in time (projection year), and
- A particular waste stream and sector.

6.1.3 Baseline waste volumes estimates

Waste volumes for baseline period (2013-14) were estimated based on the best available data.

Baseline resource recovery waste volumes (including breakdown by metro/regional, source sector, and materials) were sourced from the 2013-14 SA Recycling Activity Survey (Zero Waste SA, 2015), and hazardous waste volumes were based on a recent study undertaken by the Federal government (Australian Government Department of the Environment, 2015). These volumes were then broken down by Government Regions on a population basis using population data (Australian Bureau of Statistics, 2015). Adjustments to C&I waste volumes were made for select regions where it was known that volumes of particular material were generated in the region (e.g. fly ash from mid-north, timber from the South East, foundry sands from Yorke Mid North, organics from Murray Mallee and Barossa, Light and Lower North, etc.).

Baseline landfill waste volumes were sourced from a combination of the 2013-14 SA Recycling Activity data for totals by metro/regional and source sector (Zero Waste SA, 2015), the 2007 SA landfill audit to estimate material composition of C&I, C&D landfill streams (Zero Waste SA, 2008), and council kerbside audit data for materials composition of MSW landfill stream (various audits, unpublished). These volumes were then broken down Government Regions on a population basis using population data (Australian Bureau of Statistics, 2015).

6.1.4 Waste generation projection

Waste volumes were projected for future periods using demographic and economic data.

Volumes of MSW and medical waste were projected using the most recent (unpublished) data on SA population projections from the SA Department of Planning, Transport and Infrastructure. A breakdown of these population projections by Government Region was not available at the time this tool waste developed, and so state-wide projections are used to project waste volumes in each region. Material compositions of future MSW stream are based on baseline compositions.

Volumes of C&I and C&D waste were projected using Gross State Product growth forecasts published in the 2015-16 Budget Paper (Government of South Australia).

Table 6-1: Annual growth rates for waste generation adopted in the WFMP

Source sector	Annual growth rate
MSW	0.76%
C&I	2.25%
C&D	2.25%

Volumes of hazardous waste were adopted from previous projections undertaken in a study for the Federal government (Australian Government Department of the Environment, 2015).

Material compositions of MSW, C&I and C&D streams were based on baseline compositions with an adjustment made for periods 2018 onwards whereby the planned closure of the Port Augusta Power Station will remove volumes of fly ash.

Future volumes of waste that is sent for resource recovery vs. landfill for MSW, C&I and C&D streams were estimated based on different resource recovery scenarios (see Section 6.1.5)

Future recovery of e-waste volumes were based on targets set under the Australian National Television and Computer Recycling (Federal Government Department of the Environment, 2015).

6.1.5 Landfill diversion scenarios

Landfill diversion scenarios considered in the WFPM include:

1. Business-as-usual (BAU)– assumes a status quo approach with no significant changes in people's behaviour, technology, economics and policies so that normal circumstances expected to continue and the recovery rate remains at the level reflecting most recent trends
2. Moderate Additional Diversion – by 2045, the recovered tonnes exceed BAU recovery rate or by some quantity that can be set by the user.
3. High Additional Diversion– by 2045, the recovered tonnes exceed BAU recovery rate or by some quantity that can be set by the user.

A workshop was held with Zero Waste SA to set diversion rates for each of the above scenarios. These scenarios are identified in Table 6-2 below.

Table 6-2: Diversion rates for landfill diversion scenario adopted in the WFMP

MSW diversion rate	SA	metro	regional
Business-as-usual (baseline)	55%	60%	39%
Moderate additional	70%	70%	70%
High additional	98%	100%	90%
C&I diversion rate	**SA**	**metro**	**regional**
Business-as-usual (baseline)	83%	77%	93%
Moderate additional	85%	80%	94%
High additional	98%	100%	95%
C&D diversion rate	**SA**	**metro**	**regional**
Business-as-usual (baseline)	87%	88%	60%
Moderate additional	89%	90%	70%
High additional	100%	100%	95%

6.1.6 Model outputs

This Section provides a summary of model outputs (data tables) from the Waste Flow projection Model (WFPM) for each Government Region for projection periods 2024-25 (10 years) and 2044-45 (30 years), and landfill diversion scenarios. These tables show total waste generation, resource recovery and landfill volumes broken down by sector (MSW, C&I and C&D). This data is presented in the unit of tonnes per annum. Data has not been rounded to reflect levels of accuracy.

A complete set of outputs tables from the WFPM providing a further breakdown volumes by waste stream is provided in Excel format as Attachment 4.

6.1.6.1 Eastern Adelaide

Table 6-3: Eastern Adelaide – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**824,161**	**664,710**	**159,451**
Sector			
MSW	131,486	78,271	53,215
C&I	221,270	169,678	51,592
C&D	471,405	416,760	54,645

Table 6-4: Eastern Adelaide – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**824,161**	**693,321**	**130,840**
Sector			
MSW	131,486	92,040	39,446
C&I	221,270	177,016	44,254
C&D	471,405	424,265	47,141

Table 6-5: Eastern Adelaide – Projections 2024/25 (High additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**824,161**	**824,161**	**-**
Sector			
MSW	131,486	131,486	-
C&I	221,270	221,270	-
C&D	471,405	471,405	-

Table 6-6: Eastern Adelaide – Projections 2044/25 (Business-as-usual diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**1,233,909**	**1,006,211**	**227,698**
Sector			
MSW	152,983	91,068	61,915
C&I	345,294	264,785	80,510
C&D	735,632	650,358	85,274

Table 6-7: Eastern Adelaide – Projections 2044/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,233,909**	**1,045,392**	**188,517**
Sector			
MSW	152,983	107,088	45,895
C&I	345,294	276,235	69,059
C&D	735,632	662,069	73,563

Table 6-8: Eastern Adelaide – Projections 2044/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,233,909**	**1,233,909**	**-**
Sector			
MSW	152,983	152,983	-
C&I	345,294	345,294	-
C&D	735,632	735,632	-

6.1.6.2 Northern Adelaide

Table 6-9: Northern Adelaide – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,410,861**	**1,137,900**	**272,961**
Sector			
MSW	225,087	133,991	91,097
C&I	378,787	290,468	88,319
C&D	806,987	713,442	93,545

Table 6-10: Northern Adelaide – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,410,861**	**1,186,879**	**223,982**
Sector			
MSW	225,087	157,561	67,526
C&I	378,787	303,030	75,757
C&D	806,987	726,288	80,699

Table 6-11: Northern Adelaide – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,410,861**	**1,410,861**	**-**
Sector			
MSW	225,087	225,087	-
C&I	378,787	378,787	-
C&D	806,987	806,987	-

Table 6-12: Northern Adelaide – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**2,112,298**	**1,722,507**	**389,791**
Sector			
MSW	261,887	155,897	105,990
C&I	591,101	453,278	137,822
C&D	1,259,310	1,113,332	145,978

Table 6-13: Northern Adelaide – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**2,112,298**	**1,789,581**	**322,717**
Sector			
MSW	261,887	183,321	78,566
C&I	591,101	472,880	118,220
C&D	1,259,310	1,133,379	125,931

Table 6-14: Northern Adelaide – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**2,112,298**	**2,112,298**	**-**
Sector			
MSW	261,887	261,887	-
C&I	591,101	591,101	-
C&D	1,259,310	1,259,310	-

6.1.6.3 Southern Adelaide

Table 6-15: Southern Adelaide – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,324,996**	**1,068,648**	**256,348**
Sector			
MSW	211,388	125,836	85,553
C&I	355,734	272,790	82,944
C&D	757,874	670,021	87,852

Table 6-16: Southern Adelaide – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,324,996**	**1,114,645**	**210,351**
Sector			
MSW	211,388	147,972	63,417
C&I	355,734	284,587	71,147
C&D	757,874	682,086	75,787

Table 6-17: Southern Adelaide – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,324,996**	**1,324,996**	**-**
Sector			
MSW	211,388	211,388	-
C&I	355,734	355,734	-
C&D	757,874	757,874	-

Table 6-18: Southern Adelaide – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,983,743**	**1,617,675**	**366,068**
Sector			
MSW	245,949	146,409	99,540
C&I	555,126	425,692	129,434
C&D	1,182,669	1,045,575	137,094

Table 6-19: Southern Adelaide – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,983,743**	**1,680,667**	**303,077**
Sector			
MSW	245,949	172,164	73,785
C&I	555,126	444,101	111,025
C&D	1,182,669	1,064,402	118,267

Table 6-20: Southern Adelaide – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,983,743**	**1,983,743**	**-**
Sector			
MSW	245,949	245,949	-
C&I	555,126	555,126	-
C&D	1,182,669	1,182,669	-

6.1.6.4 Western Adelaide

Table 6-21: Western Adelaide – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**853,491**	**688,365**	**165,126**
Sector			
MSW	136,165	81,057	55,108
C&I	229,145	175,717	53,428
C&D	488,181	431,592	56,590

Table 6-22: Western Adelaide – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**853,491**	**717,994**	**135,497**
Sector			
MSW	136,165	95,315	40,849
C&I	229,145	183,316	45,829
C&D	488,181	439,363	48,818

Table 6-23: Western Adelaide – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**853,491**	**853,491**	**-**
Sector			
MSW	136,165	136,165	-
C&I	229,145	229,145	-
C&D	488,181	488,181	-

Table 6-24: Western Adelaide – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,277,820**	**1,042,019**	**235,801**
Sector			
MSW	158,427	94,309	64,118
C&I	357,582	274,208	83,375
C&D	761,811	673,503	88,309

Table 6-25: Western Adelaide – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,277,820**	**1,082,595**	**195,226**
Sector			
MSW	158,427	110,899	47,528
C&I	357,582	286,066	71,516
C&D	761,811	685,630	76,181

Table 6-26: Western Adelaide – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**1,277,820**	**1,277,820**	**-**
Sector			
MSW	158,427	158,427	-
C&I	357,582	357,582	-
C&D	761,811	761,811	-

6.1.6.5 Adelaide Hills

Table 6-27: Adelaide Hills – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**77,084**	**48,342**	**28,742**
Sector			
MSW	32,163	12,662	19,501
C&I	26,582	24,721	1,861
C&D	18,339	10,959	7,380

Table 6-28: Adelaide Hills – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**77,084**	**60,339**	**16,746**
Sector			
MSW	32,163	22,514	9,649
C&I	26,582	24,987	1,595
C&D	18,339	12,837	5,502

Table 6-29: Adelaide Hills – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**77,084**	**71,622**	**5,462**
Sector			
MSW	32,163	28,947	3,216
C&I	26,582	25,253	1,329
C&D	18,339	17,422	917

Table 6-30: Adelaide Hills – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**107,521**	**70,411**	**37,111**
Sector			
MSW	37,421	14,732	22,690
C&I	41,482	38,578	2,904
C&D	28,618	17,101	11,517

Table 6-31: Adelaide Hills – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**107,521**	**85,221**	**22,301**
Sector			
MSW	37,421	26,195	11,226
C&I	41,482	38,993	2,489
C&D	28,618	20,033	8,586

Table 6-32: Adelaide Hills – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**107,521**	**100,274**	**7,247**
Sector			
MSW	37,421	33,679	3,742
C&I	41,482	39,408	2,074
C&D	28,618	27,187	1,431

6.1.6.6 Barossa, Light and Lower North

Table 6-33: Barossa, Light & Lower North – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**244,247**	**205,014**	**39,233**
Sector			
MSW	30,495	12,005	18,490
C&I	196,363	182,618	13,745
C&D	17,388	10,391	6,998

Table 6-34: Barossa, Light & Lower North – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**244,247**	**218,100**	**26,147**
Sector			
MSW	30,495	21,347	9,149
C&I	196,363	184,582	11,782
C&D	17,388	12,172	5,216

Table 6-35: Barossa, Light & Lower North – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**244,247**	**230,510**	**13,737**
Sector			
MSW	30,495	27,446	3,050
C&I	196,363	186,545	9,818
C&D	17,388	16,519	869

Table 6-36: Barossa, Light & Lower North – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**369,042**	**315,159**	**53,883**
Sector			
MSW	35,481	13,968	21,513
C&I	306,427	284,977	21,450
C&D	27,134	16,215	10,920

Table 6-37: Barossa, Light & Lower North – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**369,042**	**331,872**	**37,170**
Sector			
MSW	35,481	24,837	10,644
C&I	306,427	288,041	18,386
C&D	27,134	18,994	8,140

Table 6-38: Barossa, Light & Lower North – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**369,042**	**348,816**	**20,226**
Sector			
MSW	35,481	31,933	3,548
C&I	306,427	291,106	15,321
C&D	27,134	25,778	1,357

6.1.6.7 Fleurieu Peninsula and Kangaroo Island

Table 6-39: Fleurieu Peninsula & Kangaroo Island – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**52,651**	**33,019**	**19,632**
Sector			
MSW	21,968	8,648	13,320
C&I	18,157	16,886	1,271
C&D	12,526	7,485	5,041

Table 6-40: Fleurieu Peninsula & Kangaroo Island - Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**52,651**	**41,213**	**11,438**
Sector			
MSW	21,968	15,378	6,591
C&I	18,157	17,067	1,089
C&D	12,526	8,768	3,758

Table 6-41: Fleurieu Peninsula & Kangaroo Island – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**52,651**	**48,920**	**3,731**
Sector			
MSW	21,968	19,772	2,197
C&I	18,157	17,249	908
C&D	12,526	11,900	626

Table 6-42: Fleurieu Peninsula & Kangaroo Island – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**73,441**	**48,093**	**25,348**
Sector			
MSW	25,560	10,062	15,498
C&I	28,333	26,350	1,983
C&D	19,547	11,681	7,867

Table 6-43: Fleurieu Peninsula & Kangaroo Island – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**73,441**	**58,209**	**15,232**
Sector			
MSW	25,560	17,892	7,668
C&I	28,333	26,633	1,700
C&D	19,547	13,683	5,864

Table 6-44: Fleurieu Peninsula & Kangaroo Island – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**73,441**	**68,491**	**4,950**
Sector			
MSW	25,560	23,004	2,556
C&I	28,333	26,917	1,417
C&D	19,547	18,570	977

6.1.6.8 Eyre Western

Table 6-45: Eyre Western – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**62,305**	**39,073**	**23,232**
Sector			
MSW	25,997	10,234	15,762
C&I	21,486	19,982	1,504
C&D	14,823	8,858	5,965

Table 6-46: Eyre Western – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**62,305**	**48,770**	**13,535**
Sector			
MSW	25,997	18,198	7,799
C&I	21,486	20,197	1,289
C&D	14,823	10,376	4,447

Table 6-47: Eyre Western – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**62,305**	**57,890**	**4,415**
Sector			
MSW	25,997	23,397	2,600
C&I	21,486	20,411	1,074
C&D	14,823	14,082	741

Table 6-48: Eyre Western – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**86,907**	**56,911**	**29,995**
Sector			
MSW	30,247	11,907	18,339
C&I	33,529	31,182	2,347
C&D	23,131	13,823	9,309

Table 6-49: Eyre Western – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**86,907**	**68,882**	**18,025**
Sector			
MSW	30,247	21,173	9,074
C&I	33,529	31,517	2,012
C&D	23,131	16,192	6,939

Table 6-50: Eyre Western – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**86,907**	**81,049**	**5,858**
Sector			
MSW	30,247	27,222	3,025
C&I	33,529	31,852	1,676
C&D	23,131	21,975	1,157

6.1.6.9 Far North

Table 6-51: Far North – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**27,988**	**17,552**	**10,436**
Sector			
MSW	11,678	4,597	7,081
C&I	9,652	8,976	676
C&D	6,659	3,979	2,680

Table 6-52: Far North – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**27,988**	**21,908**	**6,080**
Sector			
MSW	11,678	8,175	3,503
C&I	9,652	9,073	579
C&D	6,659	4,661	1,998

Table 6-53: Far North – Projections 2024/25 (High additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**27,988**	**26,005**	**1,983**
Sector			
MSW	11,678	10,510	1,168
C&I	9,652	9,169	483
C&D	6,659	6,326	333

Table 6-54: Far North – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**39,040**	**25,565**	**13,474**
Sector			
MSW	13,587	5,349	8,238
C&I	15,061	14,007	1,054
C&D	10,391	6,209	4,182

Table 6-55: Far North – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**39,040**	**30,942**	**8,097**
Sector			
MSW	13,587	9,511	4,076
C&I	15,061	14,158	904
C&D	10,391	7,274	3,117

Table 6-56: Far North – Projections 2044/45 (High additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**39,040**	**36,408**	**2,631**
Sector			
MSW	13,587	12,228	1,359
C&I	15,061	14,308	753
C&D	10,391	9,871	520

6.1.6.10 Limestone Coast

Table 6-57: Limestone Coast – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**210,206**	**174,268**	**35,938**
Sector			
MSW	29,239	11,510	17,728
C&I	164,295	152,795	11,501
C&D	16,672	9,962	6,709

Table 6-58: Limestone Coast – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**210,206**	**186,575**	**23,631**
Sector			
MSW	29,239	20,467	8,772
C&I	164,295	154,438	9,858
C&D	16,672	11,670	5,002

Table 6-59: Limestone Coast – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**210,206**	**198,234**	**11,972**
Sector			
MSW	29,239	26,315	2,924
C&I	164,295	156,081	8,215
C&D	16,672	15,838	834

Table 6-60: Limestone Coast – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**316,420**	**267,376**	**49,044**
Sector			
MSW	34,019	13,392	20,627
C&I	256,384	238,438	17,947
C&D	26,016	15,547	10,470

Table 6-61: Limestone Coast – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**316,420**	**283,026**	**33,394**
Sector			
MSW	34,019	23,813	10,206
C&I	256,384	241,001	15,383
C&D	26,016	18,212	7,805

Table 6-62: Limestone Coast – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**316,420**	**298,898**	**17,522**
Sector			
MSW	34,019	30,617	3,402
C&I	256,384	243,565	12,819
C&D	26,016	24,716	1,301

6.1.6.11 Murray Mallee

Table 6-63: Murray Mallee – Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**237,629**	**198,387**	**39,242**
Sector			
MSW	31,145	12,261	18,884
C&I	188,726	175,515	13,211
C&D	17,759	10,612	7,147

Table 6-64: Murray Mallee – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**237,629**	**211,634**	**25,995**
Sector			
MSW	31,145	21,801	9,343
C&I	188,726	177,402	11,324
C&D	17,759	12,431	5,328

Table 6-65: Murray Mallee – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**237,629**	**224,190**	**13,439**
Sector			
MSW	31,145	28,030	3,114
C&I	188,726	179,289	9,436
C&D	17,759	16,871	888

Table 6-66: Murray Mallee – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**358,457**	**304,718**	**53,740**
Sector			
MSW	36,237	14,265	21,971
C&I	294,508	273,892	20,616
C&D	27,712	16,560	11,152

Table 6-67: Murray Mallee – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**358,457**	**321,602**	**36,855**
Sector			
MSW	36,237	25,366	10,871
C&I	294,508	276,837	17,670
C&D	27,712	19,399	8,314

Table 6-68: Murray Mallee – Projections 2044/45 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**358,457**	**338,723**	**19,735**
Sector			
MSW	36,237	32,613	3,624
C&I	294,508	279,783	14,725
C&D	27,712	26,327	1,386

6.1.6.12 Yorke and Mid North

Table 6-69: Yorke & Mid North Projections 2024/25 (Business-as-usual diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**121,075**	**88,029**	**33,046**
Sector			
MSW	33,850	13,326	20,524
C&I	67,924	63,169	4,755
C&D	19,301	11,533	7,767

Table 6-70: Yorke & Mid North – Projections 2024/25 (Moderate additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**121,075**	**101,054**	**20,021**
Sector			
MSW	33,850	23,695	10,155
C&I	67,924	63,849	4,075
C&D	19,301	13,511	5,790

Table 6-71: Yorke & Mid North – Projections 2024/25 (High additional diversion)

Tonnes per annum	Waste generation	Resource recovery	Landfill
Total	**121,075**	**113,329**	**7,746**
Sector			
MSW	33,850	30,465	3,385
C&I	67,924	64,528	3,396
C&D	19,301	18,336	965

Table 6-72: Yorke & Mid North – Projections 2044/45 (Business-as-usual diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**175,499**	**132,079**	**43,420**
Sector			
MSW	39,384	15,504	23,880
C&I	105,996	98,577	7,420
C&D	30,119	17,998	12,121

Table 6-73: Yorke & Mid North – Projections 2044/45 (Moderate additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**175,499**	**148,289**	**27,211**
Sector			
MSW	39,384	27,569	11,815
C&I	105,996	99,636	6,360
C&D	30,119	21,083	9,036

Table 6-74: Yorke & Mid North – Projections 2044/45 (High additional diversion)

Tonnes per annum	**Waste generation**	**Resource recovery**	**Landfill**
Total	**175,499**	**164,755**	**10,744**
Sector			
MSW	39,384	35,446	3,938
C&I	105,996	100,696	5,300
C&D	30,119	28,613	1,506

7 APPENDIX 2 – Infrastructure Assessment

7.1.1 Introduction

This Appendix provides an overview of key data and assumptions underpinning the assessment of infrastructure needs.

7.1.2 Application of technology/infrastructure to manage additional waste volumes

Outputs from the Waste Flow Projection Model were used to estimate additional volumes of waste that would need to be managed via new/upgraded infrastructure under each diversion scenario for the 10 and 30 year timeframes. The following sections describe the set of assumptions used to allocate additional waste volumes to types of infrastructure so that an assessment could be made regarding infrastructure needs. Excess capacity in existing infrastructure (where known) was taken into account. Data on existing capacities was sourced from a previous review of SA's waste and resource recovery infrastructure (Zero Waste SA, 2014) and other industry intelligence. Only the net volume of additional waste (once removing for this excess capacity) was applied to estimate infrastructure needs.

7.1.2.1 Business-as-usual, 10 year

The following assumptions were made for estimating the volume of additional waste going via each infrastructure type under the business-as-usual 10 year timespan.

Metropolitan - MSW

- 70% of additional waste volumes would go via kerbside source-separation system infrastructure (balance is hard-waste, dropped off by residents or collected via street sweeper)
- 80% of additional waste generated would go via collection vehicle infrastructure (rest is dropped off by residents)
- Nominal allowance of 5,000 tonnes to go via vacuum system infrastructure
- 80% of additional waste generated would go via transfer station infrastructure
- 80% of additional waste generated would go via transfer vehicle infrastructure
- 100% of additional recovered dry recyclable volumes (cardboard/paper, plastics, glass and metals) would go via MRF infrastructure.
- 50% of the additional recovered CDL volumes would go via a CDL facility.
- 100% of the additional materials recovered via product stewardship scheme would go to a drop-off facility
- 10% of additional recovered organics materials would go via Anaerobic digestion infrastructure (note that after AD would go via composting infrastructure for secondary processing)
- 60% of additional recovered organics materials would go via open windrow composting infrastructure, with balance (40%) going via covered tunnel composting infrastructure

- 75% of additional recovered dry recyclables would be processed in SA (balance exported interstate or overseas) and go via reprocessing infrastructure (medium tech)

Regional - MSW

Same as for metropolitan MSW apart from the following differences:

- No allowance for waste going via vacuum system
- 70% of additional waste generated would go via through transfer station infrastructure
- 70% of additional waste generated would go via through transfer vehicle infrastructure
- None of the additional recovered organic material would go via Anaerobic digestion infrastructure
- 100% of recovered organics would go via open windrow composting infrastructure

Metropolitan – C&I

- 100% of additional waste volumes would go via skip bin infrastructure
- 100% of additional waste generated would go via collection vehicle infrastructure
- 70% of additional waste generated would go via transfer station infrastructure
- 50% of additional waste generated would go via transfer vehicle infrastructure
- 30% of additional recovered dry recyclable volumes (cardboard/paper, plastics, glass and metals) would go via MRF infrastructure.
- 50% of the additional recovered CDL volumes would go via a CDL facility.
- 20% of additional recovered organics materials would go via anaerobic digestion infrastructure (note that after AD would go via composting infrastructure for secondary processing)
- 60% of additional recovered organics materials would go via open windrow composting infrastructure, with balance (40%) going via covered tunnel composting infrastructure
- 75% of additional recovered dry recyclables would be processed in SA (balance exported interstate or overseas) and 100% of additional meat rendering volumes and 100% of additional refuse-derived-fuel (RDF) go via reprocessing infrastructure (medium tech)

Regional – C&I

Same as for metropolitan C&I apart from the following differences:

- 20% of additional waste generated would go via through transfer station infrastructure (as many of the large C&I volumes from regional areas – e.g. meat rendering – would go directly to reprocessor)
- 20% of additional waste generated would go via through transfer vehicle infrastructure
- Nominal allowance of 10,000 tonnes of recovered organics from Limestone Coast to anaerobic digestion infrastructure
- 100% of additional recovered organics would go via open windrow composting infrastructure (none goes to covered tunnel)

- Extra waste streams would go via medium tech reprocessing infrastructure, including 100% of additional volumes of waste from Tarac plus additional volumes of meat rendering

Metropolitan – C&D

- 25% of additional waste generated would go via skip bin infrastructure (rest would be collected straight into trucks).
- 100% of additional waste generated would go via collection vehicle infrastructure
- 25% of additional waste generated would go via transfer vehicle infrastructure
- 20% of additional recovered waste would be mixed building bins and go via MRF infrastructure
- 100% of additional recovered waste would go via C&D processing facility
- 50% of additional recovered soil would go to a waste soil storage and remediation facility

Regional – C&D

Same as for metropolitan C&D apart from the following differences:

- None of the additional recovered material would go via MRF infrastructure

Other waste streams

- 100% of additional waste to landfill (across MSW, C&I and C&D) would go to landfill infrastructure
- 100% of additional hazardous waste would go via a hazardous waste facility infrastructure
- 100% of additional recovered e-waste would go via emerging waste stream facility infrastructure
- 100% of additional medical waste would go to medical waste disposal infrastructure

7.1.2.2 Moderate additional diversion, 10 year

Same assumptions as for 'business-as-usual 10 year' scenario regarding application of technologies to process additional waste and resource recovery volumes. For example, assume 100% of additional recovered dry recyclables would go via MRF infrastructure, noting that the volume of recovered dry recyclables is larger in this scenario (due to higher diversion rates) and hence the volumes through this recovery infrastructure are higher.

7.1.2.3 High additional diversion, 10 year

Metropolitan & Regional –MSW

Adoption of MBT technologies to achieve high additional diversion scenario. Assume same tonnes of waste as under the 'business-as-usual' scenario would go via the MRF, composting and AD technologies, with rest of volumes (i.e. material disposed into general waste bins) going via MBT to achieve high additional diversion (100% diversion for metro, and 90% diversion for regional SA). Additional waste volumes would need to be transported from regional areas in bulk to MBT facilities. Increase to 90% of regional MSW waste goes via transfer vehicle.

Metropolitan –C&I

As above, adoption of MBT technology to achieve high additional diversion scenario of 100% diversion for metropolitan Adelaide.

All other streams

Same assumptions regarding application of technology as in 'business-as-usual 10 year' scenario.

7.1.2.4 Business-as-usual, 30 year

Same assumptions as for 'business-as-usual scenario 10 year' regarding application of technologies to process additional waste and resource recovery volumes, with the following exceptions:

- Nominal allowance of 50,000 tonnes of metropolitan MSW waste to go via vacuum system technology
- 100% of additional recovered organics from metropolitan MSW and C&I sources via covered tunnel composting (no additional tonnes via open windrow composting)
- 20% of additional recovered organics from metropolitan MSW sources go via anaerobic digestion infrastructure (note that after AD would go via composting infrastructure for secondary processing)
- Nominal allowance of 50,000 tonnes of recovered organic waste from Limestone Coast to anaerobic digestion infrastructure

7.1.2.5 Moderate additional diversion, 30 year

Same assumptions as for 'business-as-usual, 30 year' scenario regarding application of technologies to process additional waste and resource recovery volumes. For example, assume 100% of additional recovered dry recyclables would go via MRF infrastructure, noting that the volume of recovered dry recyclables is larger in this scenario (due to higher diversion rates) and hence the volumes through this recovery infrastructure is higher.

7.1.2.6 High additional diversion, 30 year

Metropolitan & Regional –MSW

Adoption of MBT and Energy from Waste Combustion technologies to achieve high additional diversion scenario. Assume same tonnes of waste as under the 'business-as-usual 30 year' scenario would go via the MRF, composting and AD technologies, with rest of volumes (material from the general waste bins) going via MBT to achieve high additional diversion (100% diversion for metro, and 90% diversion for regional SA). Assume that 25% of material from MBT would then go via Energy from Waste Combustion infrastructure. Additional waste volumes would need to be transported from regional areas in bulk to MBT facilities. Increase to 90% of regional MSW waste goes via transfer vehicle.

Metropolitan –C&I

As above, adoption of MBT technology to achieve high additional diversion scenario of 100% diversion for metropolitan Adelaide. Assume that 25% of material from MBT would go via Energy from Waste Combustion infrastructure.

All other streams

Same assumptions regarding application of technology as in 'business-as-usual 30 year' scenario.

7.1.3 Assumptions on capital expenditure, operating expenditure and revenue per tonne processed

The following sections provide tables that summarise infrastructure data assumptions on:

- Average processing capacity
- Capital expenditure per tonne
- Operating expenditure per tonne
- Revenue per tonne

These assumptions were applied on a pro-rata basis to estimate the number of new/upgraded infrastructure units needed to manage additional waste volumes, and the associated total capital expenditures, annual operating expenditures and revenues.

Assumptions on average processing capacity and capital expenditure, where available, were adopted from a report by the Federal government on waste and resource recovery infrastructure needs for Australia (Australian Government Department of the Environment, 2014). In absence of published data, estimates were based on industry intelligence.

7.1.3.1 Collection infrastructure

Table 7-1 summarises assumptions regarding processing capacity (tonnes per annum), capital expenditure (per tonne), operating expenditure (per tonne) and revenue (per tonne) for collection infrastructure in SA.

Table 7-1: Collection infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Kerbside SS Bin Systems	Skip Bin	Collection Vehicles	Vaccum System
Nominated Average processing capacity (tonnes pa)				
MSW	1		10,400	10,000
C&I		37	10,400	10,000
C&D		499	32,500	
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)				
MSW	$ 150		$ 350,000	$ 10,000,000
C&I		$ 1,000	$ 350,000	$ 10,000,000
C&D		$ 2,000	$ 300,000	
Estimated Infrastructure Capex per Tonne				
MSW	$ 150.00		$ 30.00	$ 1,000.00
C&I		$ 26.71	$ 30.00	$ 1,000.00
C&D		$ 4.01	$ 10.00	
Estimated Operating Expenditure Per Tonne				
MSW	$ 6.00		$ 19.00	$ 300
C&I		$ 1.34	$ 19.00	$ 300
C&D		$ 0.20	$ 6.08	
Estimated Revenue Per Tonne				
MSW	$ 7.80		$ 24.70	$ 390.00
C&I		$ 1.74	$ 24.70	$ 390.00
C&D		$ 0.26	$ 7.90	

7.1.3.2 Recovery infrastructure

Table 7-2 and Table 7-3 summarise assumptions regarding processing capacity (tonnes per annum), capital expenditure (per tonne), operating expenditure (per tonne) and revenue (per tonne) for resource recovery infrastructure in Metropolitan Adelaide and Regional SA respectively.

Table 7-2: Metro Adelaide resource recovery infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Transfer Stations	Transfer Vehicles	Material Recovery Facility	CDL Facilities	Drop Off Facilities
Nominated Average processing capacity (tonnes pa)					
MSW	100,000	19,500	50,000	250	250
C&I	100,000	19,500	50,000	250	250
C&D	100,000	19,500			
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)					
MSW	$ 6,000,000	$ 400,000	$ 10,000,000	$ 100,000	$ 100,000
C&I	$ 6,000,000	$ 400,000	$ 10,000,000	$ 100,000	$ 100,000
C&D	$ 6,000,000	$ 400,000			
Estimated Infrastructure Capex per Tonne					
MSW	$ 60.00	$ 20.00	$ 200.00	$ 400.00	$ 400.00
C&I	$ 60.00	$ 20.00	$ 200.00	$ 400.00	$ 400.00
C&D	$ 60.00	$ 20.00			
Estimated Operating Expenditure Per Tonne					
MSW	$ 20.00	$ 12.16	$ 30.00	$ 1,000.00	$ 1,000.00
C&I	$ 20.00	$ 12.16	$ 30.00	$ 1,000.00	$ 1,000.00
C&D	$ 20.00	$ 12.16			
Estimated Revenue Per Tonne					
MSW	$ 26.00	$ 15.81	$ 39.00	$ 1,300.00	$ 1,300.00
C&I	$ 26.00	$ 15.81	$ 39.00	$ 1,300.00	$ 1,300.00
C&D	$ 26.00	$ 15.81			

Table 7-3: Regional SA resource recovery infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Transfer Stations	Transfer Vehicles	Material Recovery Facility	CDL Facilities	Drop Off Facilities
Nominated Average processing capacity (tonnes pa)					
MSW	10,000	19,500	5,000	250	250
C&I	10,000	19,500	5,000	250	250
C&D	10,000	19,500			
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)					
MSW	$ 3,000,000	$ 400,000	$ 2,000,000	$ 100,000	$ 100,000
C&I	$ 3,000,000	$ 400,000	$ 2,000,000	$ 100,000	$ 100,000
C&D	$ 3,000,000	$ 400,000			
Estimated Infrastructure Capex per Tonne					
MSW	$ 300.00	$ 20.00	$ 400.00	$ 400.00	$ 400.00
C&I	$ 300.00	$ 20.00	$ 400.00	$ 400.00	$ 400.00
C&D	$ 300.00	$ 20.00			
Estimated Operating Expenditure Per Tonne					
MSW	$ 250.00	$ 12.16	$ 60.00	$ 1,000.00	$ 1,000.00
C&I	$ 250.00	$ 12.16	$ 60.00	$ 1,000.00	$ 1,000.00
C&D	$ 250.00	$ 12.16			
Estimated Revenue Per Tonne					
MSW	$ 325.00	$ 15.81	$ 78.00	$ 1,300.00	$ 1,300.00
C&I	$ 325.00	$ 15.81	$ 78.00	$ 1,300.00	$ 1,300.00
C&D	$ 325.00	$ 15.81			

7.1.3.3 Reprocessing infrastructure

Table 7-4 and Table 7-5 summarise assumptions regarding processing capacity (tonnes per annum), capital expenditure (per tonne), operating expenditure (per tonne) and revenue (per tonne) for reprocessing infrastructure in Metropolitan Adelaide and Regional SA respectively.

Table 7-4: Metro Adelaide reprocessing infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Composting Facilities (Open WR)	Composting Facilities (Covered Tunnel)	Energy from Waste Facilities - Combustin	Energy from Waste - Anerobic Digestion	Mechanical Biological Treatment	C&D Processing Facilities	Other Reprocessing Facilities (Medium Tech)	Other Reprocessing Facilities (High Tech)
Nominated Average processing capacity (tonnes pa)								
MSW	50,000	50,000	100,000	20,000	100,000		20,000	5,000
C&I	50,000	50,000	100,000	20,000	100,000		20,000	5,000
C&D			100,000			200,000		
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)								
MSW	$ 3,000,000	$ 10,000,000	$ 100,000,000	$ 10,000,000	$ 30,000,000		$ 1,200,000	$ 5,000,000
C&I	$ 3,000,000	$ 10,000,000	$ 100,000,000	$ 10,000,000	$ 30,000,000		$ 1,200,000	$ 5,000,000
C&D			$ 100,000,000			$ 8,000,000		
Estimated Infrastructure Capex per Tonne								
MSW	$ 60.00	$ 200.00	$ 1,000.00	$ 500.00	$ 300.00		$ 60.00	$ 1,000.00
C&I	$ 60.00	$ 200.00	$ 1,000.00	$ 500.00	$ 300.00		$ 60.00	$ 1,000.00
C&D			$ 1,000.00			$ 40.00		
Estimated Operating Expenditure Per Tonne								
MSW	$ 25.00	$ 60.00	$ 200.00	$ 100.00	$ 200.00		$ 50.00	$ 500.00
C&I	$ 25.00	$ 60.00	$ 200.00	$ 100.00	$ 200.00		$ 50.00	$ 500.00
C&D			$ 200.00			$ 25.00		
Estimated Revenue Per Tonne								
MSW	$ 32.50	$ 78.00	$ 260.00	$ 130.00	$ 260.00		$ 65.00	$ 650.00
C&I	$ 32.50	$ 78.00	$ 260.00	$ 130.00	$ 260.00		$ 65.00	$ 650.00
C&D			$ 260.00			$ 32.50		

Table 7-5: Regional SA reprocessing infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Composting Facilities (Open WR)	Composting Facilities (Covered Tunnel)	Energy from Waste Facilities - Combustin	Energy from Waste - Anerobic Digestion	Mechanical Biological Treatment	C&D Processing Facilities	Other Reprocessing Facilities (Medium Tech)	Other Reprocessing Facilities (High Tech)
Nominated Average processing capacity (tonnes pa)								
MSW	10,000	10,000	100,000	20,000	100,000		20,000	5,000
C&I	10,000	10,000	100,000	20,000	100,000		20,000	5,000
C&D			100,000			50,000		
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)								
MSW	$ 1,000,000	$ 5,000,000	$ 100,000,000	$ 10,000,000	$ 30,000,000		$ 1,200,000	$ 5,000,000
C&I	$ 1,000,000	$ 5,000,000	$ 100,000,000	$ 10,000,000	$ 30,000,000		$ 1,200,000	$ 5,000,000
C&D			$ 100,000,000			$ 2,000,000		
Estimated Infrastructure Capex per Tonne								
MSW	$ 100.00	$ 500.00	$ 1,000.00	$ 500.00	$ 300.00		$ 60.00	$ 1,000.00
C&I	$ 100.00	$ 500.00	$ 1,000.00	$ 500.00	$ 300.00		$ 60.00	$ 1,000.00
C&D			$ 1,000.00			$ 40.00		
Estimated Operating Expenditure Per Tonne								
MSW	$ 40	$ 70	$ 200	$ 100	$ 200		$ 50	$ 500
C&I	$ 40	$ 70	$ 200	$ 100	$ 200		$ 50	$ 500
C&D			$ 200			$ 25		
Estimated Revenue Per Tonne								
MSW	$ 52.00	$ 91.00	$ 260.00	$ 130.00	$ 260.00		$ 65.00	$ 650.00
C&I	$ 52.00	$ 91.00	$ 260.00	$ 130.00	$ 260.00		$ 65.00	$ 650.00
C&D			$ 260.00			$ 32.50		

7.1.3.4 Hazardous waste and disposal infrastructure

Table 7-6 summarises assumptions regarding processing capacity (tonnes per annum), capital expenditure (per tonne), operating expenditure (per tonne) and revenue (per tonne) for hazardous waste and disposal infrastructure in SA.

Table 7-6: Hazardous waste and disposal infrastructure assumptions for processing capacity, capital expenditure per tonne, operating expenditure per tonne and revenue per tonne

	Hazardous Waste Facilties	Waste Soil Storage and Remediation Facilities	Emerging Waste Streams Facilities	Landfills	Medical Waste Disposal
Nominated Average processing capacity (tonnes pa)					
MSW	5,000		5,000	200,000	
C&I	5,000		5,000	200,000	4,000
C&D		100,000	5,000	200,000	
Estimated Infrastructure Capex For Nominated Infrastructure Size ($)					
MSW	$ 5,000,000		$ 5,000,000	$ 4,000,000	
C&I	$ 5,000,000		$ 5,000,000	$ 4,000,000	$ 10,000,000
C&D		$ 4,000,000	$ 5,000,000	$ 4,000,000	
Estimated Infrastructure Capex per Tonne					
MSW	$ 1,000.00		$ 1,000.00	$ 20.00	
C&I	$ 1,000.00		$ 1,000.00	$ 20.00	$ 2,500.00
C&D		$ 40.00	$ 1,000.00	$ 20.00	
Estimated Operating Expenditure Per Tonne					
MSW	$ 500.00		$ 500.00	$ 20.00	
C&I	$ 500.00		$ 500.00	$ 20.00	$ 650.00
C&D		$ 50.00	500	$ 20.00	
Estimated Revenue Per Tonne					
MSW	$ 650.00		$ 650.00	$ 26.00	
C&I	$ 650.00		$ 650.00	$ 26.00	$ 845.00
C&D		$ 65.00	$ 650.00	$ 26.00	